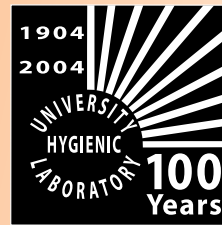


# CLIA Corner

The University of Iowa Hygienic Laboratory

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## In This Issue...

### Verifying Performance Specifications

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Is your laboratory planning to replace an analyzer with a new one or add a new kit test method to your current test menu? If the answer is yes, then the laboratory needs to determine how it will meet the CLIA regulations for verifying the manufacturer's performance specifications. The regulations apply to each nonwaived test or test system introduced into the laboratory for the first time. For example, if the laboratory installs a new chemistry analyzer or adds a new chemistry analyte to an existing instrument, the laboratory must ensure that the new instrument or analyte performs within the specifications established by the manufacturer. The validation of the new test system must be completed prior to reporting patient test results.



This article will focus on the requirements and guidelines for tests and test systems that are FDA approved or cleared because these are the ones most laboratories use. The verification process is required whether the test system produces quantitative or qualitative results. If the laboratory is introducing a test system or method that is nonFDA approved or cleared, modified or developed in-house, the laboratory must establish and verify its own performance specifications for which there are additional CLIA regulations.

The CLIA regulations for verifying the performance specifications do not apply to test systems categorized as "waived," but may be required by one of the accrediting agencies (e.g. CAP, COLA, and JCAHO).

### Meeting the Standards

The laboratory must verify accuracy, precision, reportable range and reference intervals (normal values). In addition, there are several general requirements the laboratory must meet to be in compliance.

**ACCURACY** is defined as the closeness of agreement between the average value obtained from a large series of test results and an accepted reference value. Depending on the test system, the laboratory may choose either a comparison or reference method to verify the test produces correct results.

With the comparison method, the laboratory assesses the accuracy using split samples. For example, the laboratory obtains 20 patient samples with test results covering the reportable range of the test system. The samples are split and tested on the new test system and by a comparative method either in-house or by sending them to another facility with the same or a similar test system. The laboratory compares the results from the two methods or instruments to determine if significant differences exist. Accuracy is considered met if the laboratory's percent bias is not greater than the manufacturer's claim. (Refer to CLSI document EP15-A2 for percent bias calculation.)

With the reference method, the laboratory assesses accuracy using reference materials with known values, which cover the entire reportable range of the test system. Reference materials may include, but are not limited to: previously tested proficiency testing material; standards or calibrators provided by the manufacturer of the test system; assayed control materials; and previously tested patient specimens with established values. If you use manufacturer's calibrators as reference material, they cannot be the same lot number used to perform calibration procedures on the test system. Using the assayed reference material the laboratory compares the results obtained from the new test method to the expected reference value. Accuracy is considered met if the results are within the assayed methods.

***PRECISION*** is defined as the closeness of agreement between independent test results obtained under stipulated conditions; or in other words, can the laboratory obtain the same test results time after time.

The laboratory is responsible for verifying that it can repeatedly test the same samples on the same day, and on different days and get the same or comparable results regardless of which laboratory testing personnel performs the test. This may be accomplished by:

- repeat testing of known patient samples over time;
- testing quality control material in duplicate and over time; or
- repeat testing of calibration material over time.

***REPORTABLE RANGE*** is defined as the span of test result values over which the laboratory can establish or verify the accuracy of the instrument or test system measurement response.

To determine how high and how low test values can be and still be accurate, the laboratory needs to choose samples with known values at the highest and lowest levels the manufacturer claims accurate results can be produced by the test system. The laboratory may only report patient test results that fall within the verified levels. The reportable range can be expanded if the results are verified. The laboratory must decide how to report results that are greater than the highest verified level or less than the lowest level.

***REFERENCE RANGE*** is defined as the range of test values expected for a designated population of individuals (e.g. 95 percent of individuals that are presumed to be healthy or normal). The laboratory may use the manufacturer's suggested range(s) or may use other published ranges from a textbook or a journal publication. Reference ranges can vary based on the type of patient (e.g. pediatric, male, female, etc.). The laboratory may need to adjust the reference range to better fit the patient population it routinely tests.

## ***GENERAL REQUIREMENTS AND GUIDELINES***

- The number of specimens needed for each part of the verification study may vary depending on the test system and the laboratory's testing volume. The sample size must be adequate to ensure the accuracy and precision of the test method. When planning the verification process, the laboratory may use the same samples to verify accuracy, precision and reportable range.
- The activities of the verification process may also be used to meet the personnel requirements for training and competency. All operators whether they participated in the process or not, must have training and competency documented.
- If multiple instruments (including same make and model) are being introduced, the performance specifications must be verified for each instrument.
- If a laboratory information system (LIS) is interfaced with the test system and is used to calculate and/or report test results, the laboratory needs to verify the information produced by the LIS as part of its process.
- Once the verification studies have been completed, the laboratory director must review and approve the

results prior to reporting patient test results. If the results indicate the test system is not accurate or results cannot be consistently reproduced, the test system manufacturer should be consulted regarding steps to resolve the problem.

- The laboratory must establish the frequency of calibration and control procedures based on the verification study. The frequency must meet or exceed the manufacturer's instructions or CLIA regulations, whichever is most stringent.
- The laboratory director must approve, sign and date a written procedure for the test system prior to reporting patient results.
- All activities must be documented.

**In summary**, planning and executing a comprehensive verification process, ensures that the laboratory is meeting all regulatory requirements, as well as, reporting accurate and reliable test results.

For more information regarding the CLIA requirements pertaining to the verification of performance specifications, refer to the State Operation Manual, Appendix C-Interpretative Guidelines, §493.1253, available on the CMS website at: [www.cms.hhs.gov/clia](http://www.cms.hhs.gov/clia).

### **References**

Clinical Laboratory Institute Standards (CLSI) document EP5-A2—Evaluation of Precision Performance of Quantitative Measurement Methods; Approved Guideline-Second Edition (ISBN 1-56238-542-9).

CLSI document EP12-A—User Protocol for Evaluation of Qualitative Test Performance; Approved Guideline (ISBN 1-56238-468-6).

CLSI document EP15-A2—User Verification of Performance for Precision and Trueness; Approved Guideline-Second Edition (ISBN 1-56238-574-7).

State Operations Manual, Appendix C- Survey Procedures and Interpretative Guidelines for Laboratories and Laboratory Services; Centers for Medicare and Medicaid Services (CMS); published January 12, 2004.

CMS Brochure #2: Verification of Performance Specifications; published February 2004.



### **Contact Information:**

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