

# Harmonization efforts add value to clinical laboratory and improve patient safety

*Esforços de harmonização agregam valor ao laboratório clínico e aumentam a segurança para os pacientes*<sup>(2)</sup>

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Laboratory tests provide a basis for medical decisions; for this reason they are of great relevance to healthcare, both in clarifying diagnoses, in prescribing or monitoring treatment, and in making decisions about hospitalization or hospital discharges. Reliability of test results depends on technical quality, the technology that must be employed within strict specifications, the use of materials and supplies of good origin, efficiency and implementation of mechanisms for potential failure prevention.

The movement within Clinical Pathology for harmonization of methods and equipment in the latest years is part of a context guided by: the search for patient safety; electronic health records (EHR); consolidation of laboratory services into large regional or national chains; use of multiple equipment platforms in diagnostic routines, to increase productivity and efficiency of analytical systems<sup>(1)</sup>; patient care in diverse types of health services, within a same system; the urgent need for laboratory error reduction to minimize risks to patients<sup>(2)</sup>.

Harmonization of laboratory tests is defined as the process of recognizing, understanding and explaining differences to reach result uniformity, or, at least, as a means of result conversion so that different groups can use the data obtained from assays interchangeably<sup>(3)</sup>. It encompasses capacity to reach equivalent results, within clinically acceptable limits, with the same interpretation for the measurement procedures used<sup>(4)</sup>. As a consequence, in harmonized results, information is comparable regardless of where and when the measurement procedure is applied.

The reasons that justify harmonization in laboratory medicine are due to the fact that different results have the potential for wrong interpretation, with the provision of wrong treatments and adverse events for patients. Laboratory professionals are responsible for the identification of gaps and for creating compatibility – when it is possible – to minimize errors<sup>(5)</sup>. Harmonization contributes to add value to laboratory medicine by means of reliable and comparable laboratory test results, allowing improved interpretation.

Given the relevance of this subject, several scientific societies linked to laboratory medicine have been working together to standardize, organize the implementation, and disseminate knowledge on harmonization activities<sup>(6)</sup>. Those efforts count on the support of *in vitro* diagnostics manufacturers to present information, indicating that their routine tests are traceable through reference materials and/or reference methods, because one of the barriers to result harmonization is the lack of reference measurement procedures or certified reference materials for all laboratory tests. They also involve proficiency testing providers to use commutable samples with reference method target values, to allow classification based on the accuracy of manufacturers' tests<sup>(7)</sup>.

This process involves all the phases of laboratory testing<sup>(8)</sup>. In the pre-analytical phase, one intends to harmonize test orders, patient preparation, handling and transportation of samples and quality indicators. In the post-analytical phase, groups are working in the standardization of reports, in calculated parameters, in management of critical results, in interpretative comments on test reports and specific performance indicators. In the analytical phase, there are groups studying the development of traceable measurements, harmonization of mass spectrometry, development of secondary reference materials, all focused to create the best roadmap for such works<sup>(9)</sup>.

Equivalence studies performed on different analytical systems are necessary in laboratories working with several platforms, so that their results in the clinically relevant ranges are comparable within variation ranges considered acceptable. By the level of detail that standardization studies like these require, they must be documented and spread among those involved, in order to be adequately applied<sup>(10)</sup>. This parameterization is exemplified by Scapin *et al.* (2018)<sup>(11)</sup> in an article in the current issue of *Jornal Brasileiro de Patologia e Medicina Laboratorial* (JBPML), for

biochemical analyzers and some biochemical analytes [glucose, total cholesterol, triglycerides, uric acid, aspartate transaminase (AST), alanine transaminase (ALT), and lactate dehydrogenase (LDH)], demonstrating suitability for laboratory routine. These studies are also part of the validating processes of new equipment installed in diagnostic routine to ensure quality and exactness of the released results, as described by Ebner *et al.* (2015)<sup>(12)</sup> in a study conducted with multiple analyzers of blood gases, from a single manufacturer, assessing performance for pH, pO<sub>2</sub>, pCO<sub>2</sub>, ionized calcium, potassium, glucose, lactate and chlorine. The protocol must describe details on the used samples, resource provision (inputs, calibrators, control material, and personnel), records, statistical evaluation of the acquired data, acceptance criteria, interpretation and critical analysis<sup>(13)</sup>. The adequate results of these evaluations demonstrate an acceptable statistical alignment of the studied systems, ensuring that eventual differences in results are typical of the adopted treatments and of the patient clinical situation, and do not depend on variations of the analytical systems.

Risk management in clinical laboratory needs to consider lack of harmonization as a risk to patient safety and must secure implementation of good practices as a preventive action<sup>(14)</sup>. The challenge is not only to share definitions, information, and procedures, but to involve determination and judicious application in its execution in the laboratory.

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