ESIC2024 Posted: 22/11/2024

Measuring the Performance of Medical Laboratories Globally

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Abstracts

For medical and laboratory processes to be continuously improved, laboratory performance as a relative term requires frequent benchmarking. As such, benchmarking creates reference levels that serve as the foundation for healthcare organizations' attempts to improve throughout the diagnosis cycle, with the patient at its core. However, despite the fact that this idea appears to be widely accepted in laboratory medicine, its lack of application impedes global advancement. The study's objectives were to create a global benchmarking dataset of laboratory performance for use by healthcare institution decision makers and investigate the usefulness of a particular set of indicators and survey-based data gathering methodology. Methods: In addition to forty-four items related to laboratory operations in general, the survey contained three subscales that were previously used in studies. Selected laboratories throughout the world were approached by trained individuals. The results were analyzed using exploratory factor analysis and standard descriptive statistics. Confirmatory factor analysis was used to dimensionally reduce specific items in order to obtain individual laboratory scores for the three subscales of "Operational performance," "Integrated clinical care performance," and "Financial sustainability" for the high-level concept of laboratory performance, Conclusions: All things considered, this benchmark clarifies existing practice and has the power to direct efforts toward quality and safety improvement, standardization for both patients and staff, and the sustainability of healthcare systems worldwide.

Keywords: Diagnostic Laboratory, Clinical Laboratory, Patient Safety, Questionnaire, Digitalization, Diagnostic Quality.

1. Introduction

Repetitive benchmarking is necessary to continuously improve medical processes that involve both laboratory procedures and other aspects of health care since laboratory performance is a relative concept. Establishing a reference level around which improvement initiatives can be built is the fundamental notion behind benchmarking. However, even though this idea seems to be widely accepted, there doesn't seem to be any actual application of it on a global scale.

Over the years, a number of quality improvement projects have been started; some focus on specific elements of laboratory performance, while others address general laboratory performance. These include the American College of Pathologists' Q-Probes program and the Working Group on Laboratory Errors and Patient Safety (WG-LEPS) of the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC). Many external quality assessment (EQA) programs are among the latter. Nevertheless, none of these systems have been successful worldwide for reasons that are still not entirely understood (Sciacovelli , 2009).

The phrase "quality indicator paradox" was created by Plebani et al. to characterize the disparity between laboratories' overall desire to increase productivity, quality, and patient safety and their actual efforts in this area. A number of basic issues that originate from the complexity of the healthcare system appear to be impeding the application of high-level principles of laboratory performance in clinical practice. A few essential components are required but usually undefined in order to install apps that work (Howanitz , 2002).

There aren't many key performance indicators (also known as "quality indicators," or QIs) that are frequently utilized in laboratory medicine. Exceptions include time measures that are pertinent to clinical practice (e.g., different definitions of turn-around times, TATs), financial viability resource measures (e.g., number of full-time equivalents, laboratory space), and total numbers or proportions (e.g., number of patients, number of orders, number of samples, and proportion of samples where the analysis was not possible due to errors in pre- examination processes). In general, there is still a dearth of research on benchmarking medical laboratory performance (Buchta , 2022; Lange, 2023).

the data collection approach was tested on a pilot sample, the results of which were published together with the questionnaire . In the second stage of implementation, the questionnaire itself was validated on a larger sample . This publication describes the third stage of implementation, where insights gained during stages one and two of implementation have led to the first global survey of this initiative (Plebani , 2016).

We created the questionnaire to be as appropriate as feasible for all laboratories because the state of performance measure development on a worldwide level is now very uneven. Thankfully, there is a common basis for interpretation because the medical process itself is the same everywhere.

The Laboratory Community:

Although longitudinal and transversal comparison are frequently used to help interpret the results of individual patients, they are not frequently employed for individual laboratory evaluation. It seems that the lack of execution, rather than a lack of theoretical knowledge, is the main issue facing the laboratory community. This leads to a general lack of benchmarking data that one can use to compare different aspects of one's own laboratory operations (Lundberg, 1981). This was the first catalyst for our methodical approach, which culminated in this paper. The authors have firsthand experience with both the enabling and impeding elements related to global laboratory benchmarking during the four years of this study. The medical laboratory community's professional ethics are undoubtedly one of the former. The latter include, above all, the field's significant variability, which makes it exceedingly challenging to find a widely recognized set

of benchmarking parameters in conjunction with an environmentally friendly data collection procedure (White TE, 2021).

Quality Of Medical Laboratories:

Medical labs will probably continue to prioritize quality, but referring clinicians have historically required speed. Although the recent epidemic may have somewhat decreased this disparity, there is still room for improvement. It seems that integrating the laboratory into the entire diagnosis cycle is essential to enhancing performance, patient and professional quality and safety, and sustainability across the healthcare system (Price , 2005; Brokopp, 2006).

Ordering, sample collection, identification, transportation, preparation, analysis, reporting, interpretation, and action are the stages that make up the brain-to-brain loop, as defined by Lundberg in the 1980s. The primary distinction from a contemporary perspective is that the opportunities brought about by automation and digitization can be leveraged to successfully improve patient safety and quality while lowering healthcare system costs.

There are several practical steps that can be taken:

The global certification trend (such as ISO 9001) ought to be reinforced. The level is still quite low at the moment, with over half of laboratories in some nations lacking any kind of international certification or accreditation. In order to balance this with high-quality output, laboratory performance efficiency should include both costs and time spent. High levels of automation and digitization make it easier to achieve both goals, yet there is still opportunity for improvement. In fact, across all testing disciplines, the median for both technical and clinical auto-verification is zero, meaning that over half of all results are neither auto-validated nor even auto-verified. This is an intriguing 21st-century discovery, as machines excel at repeated jobs while humans struggle with them (Sciacovelli , 2022).

From an economic perspective, the laboratories' future sphere of operation seems to be, at the very least, largely outside of the actual laboratory. Usually, the laboratory's direct charges only make up around 2% of total medical expenses. However, given that laboratory results have a significant impact on clinical decisions and that physicians and clinicians have significant influence over certain costs, the quality of upstream and downstream decisions appears to be an area that hasn't gotten enough attention up to this point (Huf ,2022).

Remarkably, only over two-thirds of laboratories offer doctors services other than consistently communicating test results and providing some interpretation. More guidance on diagnostic routes, optimization of adherence to diagnostic criteria, therapeutic suggestions, and real- time decision support using clinical algorithms are just a few concrete actions that might directly add value in this approach.

2. Recommendations:

- The data gathering process and the item formulations' subpar discriminatory power are the study's primary weaknesses. Both, however, constitute a compromise because they are at least partially practical. Nonetheless, results should be evaluated cautiously, especially when it

comes to values that are hard to ascertain (e.g., regarding personnel distribution over testing disciplines).

- Low reliability, poor construct fit, and various types of bias (such as social desirability bias, where respondents answer how they believe they should) are common problems with questionnaire studies. The quality of measurements is negatively impacted by each of these issues. Through interviewer training and questionnaire adaptation to the actual demands of the field, our goal in this study was to decrease variability and boost relevance for respondents. By integrating pertinent subitems into items, the latter sought to improve comprehensibility and was related to the corona virus pandemic. However, this method may lower the quality of the data gathered because it raises the connection between nearby subitems.

- When comparing the outcomes of medical laboratory subsets, extreme caution is necessary. Cultural differences are crucial for proper calibration and interpretation of questionnaire data, in addition to variations in legal requirements. One can wonder if the questionnaire needs to be validated for different cultural groupings, using the social desirability bias discussed above as an example. On the one hand, this would likely produce more accurate results, but on the other, it would increase costs to the point where such academic research are no longer financially viable. Practically speaking, we anticipate that global bias will be rather low (compared to the resources available for the entire modeling process) because the questionnaire design process used various focus groups. However, the merged dataset will have larger variation than in a theoretically ideal scenario.

3. Conclusion:

In Conclusion, Overall, we made every effort to balance the many variables in the questionnaire design and data collection, and we hope that this study can contribute to the establishment of future laboratory medicine benchmarking studies. The primary takeaway from this study is that it is very difficult to set up and sustain laboratory benchmarking globally. In essence, the choices are to use some kind of human-to- human interaction to improve data quality (and expense) or to extend coverage by decreasing data quality (for example, by utilizing an online- only format). Prioritizing data quality, we mostly chose the latter; nevertheless, because of its significant human resource requirements, we do not now see an immediate future for this strategy. Future efforts' ability to strike an even better balance between cost, coverage, and data quality is yet up in the air.

All things considered, it is evident that laboratory benchmarking is necessary to progress laboratory medicine overall. Even though laboratory operations have always prioritized quality, the comparatively low adoption of international certification/accreditation programs (such ISO 9001 and ISO 15189) and EQA schemes attests to this necessity. Together with good data collection procedures, standardized standards and indicators for structure, process, and result quality could hasten the advancement of laboratory medicine and so successfully support the sustainability of healthcare systems worldwide.

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