Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE

DOI: 10.53555/jptcp.v30i17.2752

REASONABLE LABORATORY APPLICATIONS ANALYSIS EXAMPLE

Elife Özkan [1*]

[1*] Medical bıochemistry/Tire State Hospital,ORCİD NO: 0000-0001-7369-1541
Mail: drelifeozkan@gmail.com

***Corresponding Author:** Elife Özkan

***** Medical bıochemistry/Tire State Hospital, ORCİD NO: 0000-0001-7369-1541
Mail: drelifeozkan@gmail.com

Abstract

The Ministry of Health has initiated studies to reduce the number of unnecessary tests requested from medical laboratories in order to increase the efficiency and standardization of the test results, with the minimum number of tests to be diagnosed in a shorter time with the minimum number of tests. In this context, accurate, low-cost and less time-consuming practices have been planned under the title of "Reasonable Laboratory". This application is followed by SAS (Health Accreditation Standards) and quality and accreditation applications in health systems, and platforms such as SINA, where statistics are made by combining the data of all health institutions. Our hospital has SAS and HIMSS (Healthcare Information and Management System Society) level 7 certificate. In this context, laboratory SAS indicators and HIMSS laboratory decision supports, which provide efficiency and accuracy traceability in hospital laboratories, are implemented and followed with HIMS integration. "Rational laboratory" practices, which were initiated by the Ministry of Health in all health institution laboratories in 2020, are also included in these practices. Our aim is to evaluate all these applications created in the laboratory in terms of cost per patient. For this purpose, the total number of outpatient clinics and per-patient examination rates were calculated before and after laboratory applications. The total number of patients who applied for the years 2019 and 2022 and the number of biochemistry tests requested were taken and the number of examinations per patient was calculated. Biochemistry parameters were preferred because of the easy standardization of sampling conditions, especially at the preanalytical stage, and because of the increasing kit prices. There was a 65% decrease in the number of examinations per patient in every 2 years. Similar applications are made in other laboratories. In addition, such applications can be applied in pharmaceutical materials and other health service offerings and added value can be provided.

Keywords: Smart laboratory, SAS, SKS, HIMSS

INTRODUCTION

Ineffective use of laboratory services stems from multiple factors, including the use of specialty profiles of physicians or diagnostic test panels in emergency services, organ or disease-specific test panels, a lack of data sharing for test orders under social indication (patient requests) between departments or health facilities (e.g. testing performed in family physicians or private laboratories), and repeat testing (1)

Since the laboratory resources, patient potential served, the existence of regional diseases, and local medical tradition all affect test orders, each healthcare facility should develop the standard test panels that are best suited to its needs. The analysis of standing test orders in outpatients suggests that these

tests are often used to predict the potential pathology in stable patients. Cutting laboratory costs can be achieved by reducing the quantity of repeat testing (2)
Our hospital has been fully digitised since 2016 (HIMSS STAGE 7) Computerised Provider Order Entry (CPOE) is performed electronically by physicians, nurses and all healthcare providers. The fact that all data entries (laboratory test entry, drug orders, care orders, etc.) are electronic in our hospital has allowed healthy measurable statistical data to be obtained in follow-up, as well as decision support systems applications at all stages of it (3).
The Ministry of Health has launched more accurate, cost-effective and less time-saving applications under the title of "Reasonable Laboratory". Patient follow-ups could be performed in SAS and quality and accreditation applications in health systems using applications such as SİNA, e-nabız (e-pulse), where the data from all healthcare facilities are pooled, statistics are performed, and all hospital data can be monitored and compared (4,5,6).
Ministry of Health "Reasonable laboratory" applications have been started in our hospital with the support of a software company as of 2020.

The Procedures and Applications established by the Ministry of Health, Directorate General of Health Services, Department of Testing and Diagnosis Services as part of the Reasonable Use of Laboratory Project:

1. Procedure for standardisation of Decision Limit (Threshold Value), Critical Value (Panic Value) and Measuring Units
2. Standardization of Report for Medical Laboratory Testing Result
3. Reasonable Test Order Procedure
4. Applications of Reflex Test and Reflective Test
5. Procedure for Reasonable Laboratory Use for Consultation Request
6. Procedure for Use of Approval Support Systems (ASS)

Procedure for standardization of Decision Limit (Threshold Value), Critical Value (Panic Value) and Measuring Units

The Ministry of Health intends to speed up the clinical decision-making process by guaranteeing that the decision limit (threshold value) and critical (panic) values in the parameters are equated in all laboratories in order to ensure standardisation in all healthcare facility laboratories and to accelerate the clinical decision process and to protect patient safety and to improve quality and efficiency because different departments can be used when the same patient is analysed in different medical laboratories and it makes clinical diagnoses difficult. Hence, universal standardisation and traceability studies are being carried out as in the rest of the world.

Reasonable Test Requesting Procedure

Applications that reduce the number of unnecessary tests ordered from medical laboratories are targeted in order to ensure that the patient is diagnosed accurately and to enhance the clinical benefit of the testing results in health service providers.

Applications of Reflex Test and Reflective Test

Certain diseases require further tests to establish a final diagnosis once the physician-requested test result is obtained, but this necessitates re-sampling and time waste. Therefore, it is aimed to avoid performing further tests by developing algorithms in HIMSS during the initial sampling or to avoid repeat testing in case the first test result is negative. This application is the reflex test application.
Algorithms must be defined on HIMSS for the tests under reflex test. Additional test(s) are automatically included in the specimen taken and conducted in laboratories based on the results of the test and/or tests under the criteria set in the algorithms,. This eliminated the need for repeat and other time sampling.

Procedure for Reasonable Laboratory Use for Consultation Request

All clinicians and medical laboratory specialists who provide services in the health facilities are addressed by the consultation request procedure. Any medical laboratory specialist can request consultation concerning a test relating to his/her branch or respond to a consultation request from a clinician. This corresponds to the consultation cycle between clinicians in HIMSS.

The quality department of our hospital has developed a reasonable laboratory procedure in accordance with the reasonable laboratory criteria conveyed to us. Except for Article 6, all articles of the Ministry of Health are applied to the hospital structure (taking into account the patient potential and physician branch diversity). The main purpose of this study is to provide evidence for future studies on testing-based cost and assessment by monitoring the laboratory parameters established under the "Reasonable laboratory standards" determined by the Ministry of Health.

Studies on reducing laboratory test recurrence and cost should be effective at the test order phase, i.e. at the pre-analytical phase.

The pre-analytical phase begins the entry of test data into the HIMSS, and includes the process of collecting the specimen in the appropriate manner after ensuring the test suitability of the person to be collected specimen (age, gender, time of specimen collection), identifying the specimen and delivering it to the laboratory under appropriate conditions and making it ready for analysis (7,8).

Our study conducted in our hospital laboratory aimed to control the test ordering phase with the precautions and alerts issued during the pre-analytical process, namely the physician's test entry phase.

To this end, HIMS rules have been established at the pre-analytical process test order phase from the Medical Biochemistry laboratory under the Reasonable Test Order Procedure in our hospital.

1. Restriction of days of testing
2. Matching the testing with the speciality
3. Avoiding ordering the same test again on the same day in another unit
4. Accessing the e-nabız (e-pulse) data of the patient's testing performed in different facilities

Digital restrictions created in the HIMSS system alerted the physician at the test entry phase.

The repeated test order was prevented by incorporating restriction rules into the process, such as the rule of preventing the entry of tests earlier than its day by alerting the test day restriction, the rule of matching speciality with testing, and restriction of being ordered the same test in another clinic. Following the inclusion of the test order time constraint and other applications in the HIS system; statistical follow-ups were performed in both SAS and SKS laboratory indicators.

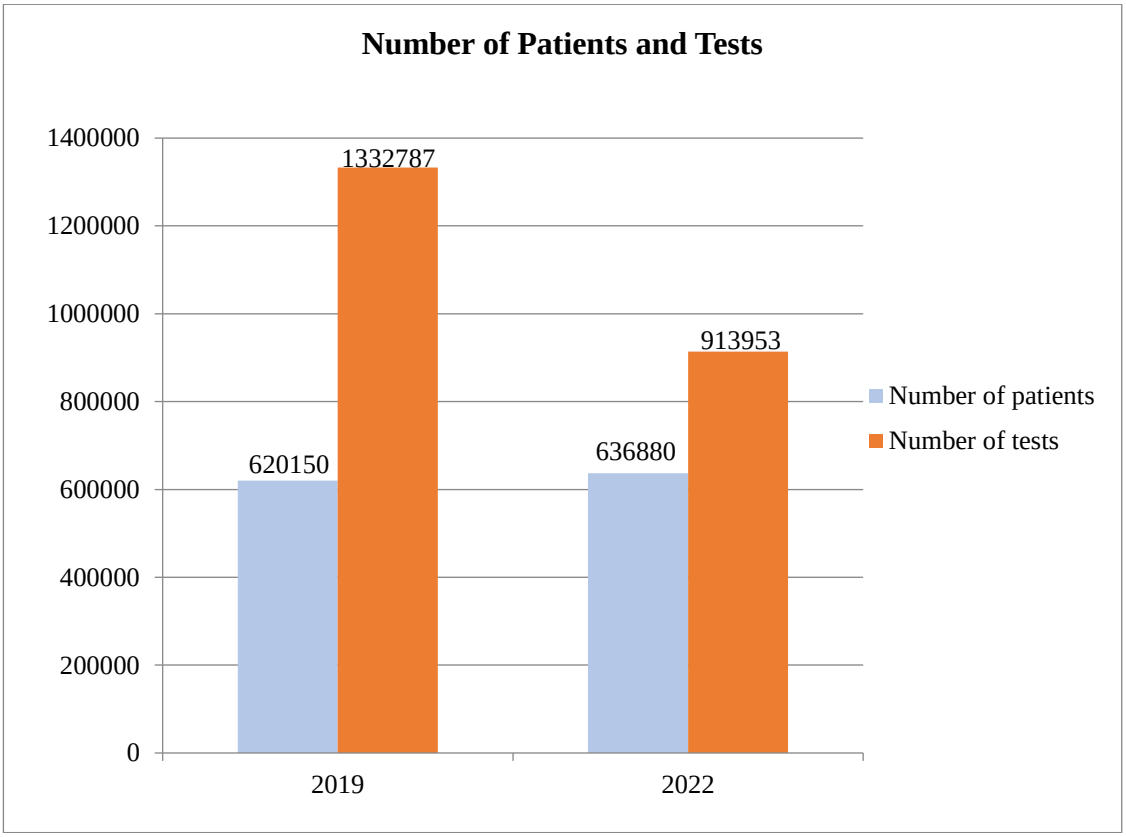
MATERIALS AND METHODS

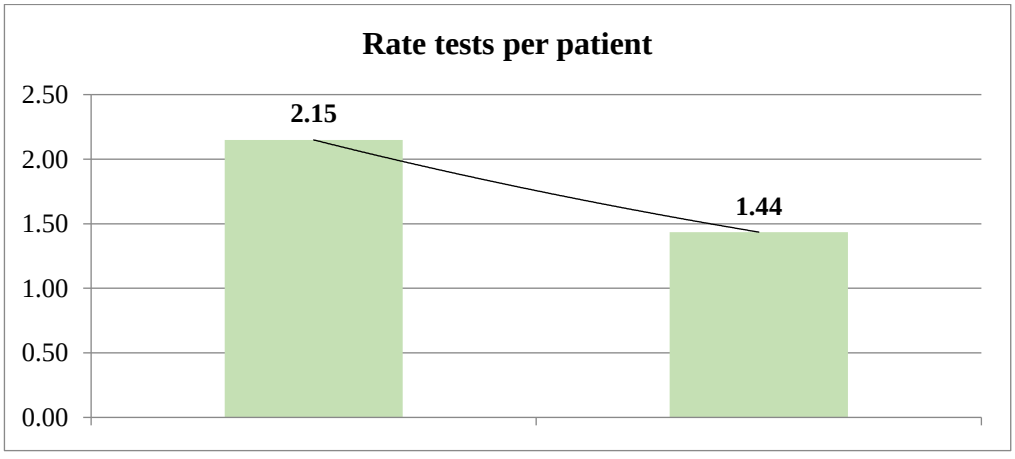
Our study was conducted in our hospital under the "reasonable laboratory" introduced by the Ministry of Health, which aimed to establish standardisation in all hospital laboratories. This study contains the test day restriction to the test order phase of the physician in the pre-analytical process of laboratory, test branch overlapping alert and re-run alert based on the rule engines created in HIMSS. Biochemistry tests were taken as laboratory data. Biochemistry parameters were preferred due to the ease of standardization of sampling conditions, particularly at the pre-analytical phase, and rising kit prices. Retrospective comparison was made between the 2019 data before the application and 2022 data after the application.

The study looked at the number of biochemistry laboratory tests performed in 2019 and 2022 after the applications were implemented. All testing performed in the biochemistry laboratory in 2019 were divided by the total number of patients, and per patient test rates and patient-based costs were compared with the tests performed in 2022 and their rates. The number of patients comprised the number of people admitted to the emergency department. This study is descriptive research. In this respect, basic statistics such as figures, percentages and ratios were employed for assessing indicators about biochemistry laboratory services in inpatient health facilities in Turkey.

RESULTS

Title	2019	2020
Number of patients	620150	636880
Number of tests performed	1332787	913953
Number of tests ordered per patient	2,15	1,44





Total number of patients admitted to the hospital in 2019: 620150
Total number of biochemistry tests ordered in 2019: 1332787
Rate of tests per patient: 2,15

Total number of patients in 2022: 636880
Total number of biochemistry tests performed in 2022: 913953
Rate of tests ordered per patient: 1,44

Percentage Decrease: 65%

DISCUSSION

There are many studies undertaken to use laboratories effectively. All departments of HIMSS operate in an integrated manner in an environment where all data are electronic, taking advantage of full digital structure in our hospital. HIMSS make it simple to report for laboratory-based decision support systems as well as SAS SKS indicator follow-ups.
All data from laboratory indicator cards were reported and assessed electronically in a study we conducted on "assessment of pre-analytical, analytical, and post-analytical processes in laboratory indicators" (7).

Andrew Georgiou, Sydney Health Sciences, noted electronic order entries in his thesis work, emphasizing that Computerized Provider Order Entry (CPOE) systems allow clinicians to electronically record hospital orders for laboratory testing and other services. CPOE can be integrated with hospital information systems and give users with point-of-care decision support, thus potentially contributing significantly to efficiency (9).

The laboratory at 9 Eylül University, which has TS EN ISO/IEC 17025 accreditation, also uses "reasonable laboratory applications" integrated with HIMS by a different company (10).

CONCLUSION

Our hospital intended to improve the efficiency of the biochemistry laboratory with applications integrated with HIMSS as part of the reasonable medication applications introduced by the Ministry of Health in 2020.
HIMS applications implemented at our hospital's test order division, which is in the laboratory pre-analytical phase, began in 2020.

The number of tests in 2019 and 2022 were compared as a result of the applications of testing day restriction, matching testing with speciality, not being able to order the same test again in another department on the same day, accessing e-nabız (e-pulse) data to the patient's testing performed in different facilities in HIMSS.

A 65% reduction in the number of tests performed per patient indicates that the measures appear to be effective. While the number of tests performed per patient was 2.15 in 2019, this rate dropped to 1.4 in 2022.

The fact that all health data entries are stored as electronic health records, allows traceability of all health services in the health facility. It provides cost and time benefits from the work done not only in the laboratory but also in the phases of material, medicine and health services delivered to the patient. If Applications in these areas encompass all health facilities, it will be cost-effective for the country.

REFERENCES

1. Hindmarsh JT, Lyon AW. "Strategies to promote rational clinical chemistry test utilization." Clinical Biochemistry. 1996, 29,4, 291-299. https://doi. org/10.1016/0009-9120(96)00042-2.
2. Maria Werner "Appropriate utilization and cost control of the hospital laboratory: panel testing and repeat orders" Clinica Chimica ActaVolume 233, Issues 1–2, 16 January 1995, Pages 1-17
3. HMSS-EMRAM stages
4. SAS Göstergeleri https://www.tuseb.gov.tr/enstitu/tuska/tuska-hakkinda (19.03.2019
5. SKS Göstergeleri

6. Sağlık Bakanlığı “Akılcı laboratuvar uygulamaları” .https://dosyamerkez.saglik. gov.tr/Eklenti/15140,akilci-laboratuvar-kullanimi-aek42422915pdf.pdf?0. Erişim Tarihi: 24.09.2019.
7. E.Özkan, A.Ün “laboratuvar göstergelerinde preanalitik, analitik ve postanalitik süreçlerin değerlendirilmesi” Sağlıkta Kalite ve Akreditasyon Dergisi, 27-35 (2020)
8. Dilek Tarhan “SKS Bakış Açısıyla Preanalitik Evre Kalite Yönetimi”
9. Andrew Georgiou (2009)”The organisational and communicationimplications of electronic orderingsystems for hospital pathology services” Faculty of Health SciencesThe University of Sydney A thesis in fulfillment of the requirements for thedegree of Doctor of Philosophy
10. Üregil, D. (2011). ‘TS EN ISO/IEC 17025 Laboratuvar Akreditasyonu Ve Bir Uygulama’, Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Toplam Kalite Yönetimi Anabilim Dalı Yayımlanmamış Yüksek Lisans Tezi, İzmir