

# Clinical professionals' perceptions of laboratory procedures and their use of laboratory investigations in Saudi Arabia 2024

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## ABSTRACT

**Background:** A key component of getting the right clinical diagnosis for patients is laboratory testing. Nonetheless, it is still usual to order pointless or improper laboratory tests, which results in the use of both people and material resources. In recent years, the outcomes of laboratory tests have grown more and more important in patient care. Laboratory tests have been and will remain a crucial component of clinical practice. Physicians concentrate on the more general topic of protocols as a way to handle medical information.

**The study aims:** To assess the utilization of lab investigations by clinicians and also to take their perspective of lab practices so that it would help as a feed back and aids in improvement of lab services.

**Materials and Methods:** A cross sectional study was used. A questionnaire consisting of 15 questions was distributed to 30 clinicians and their response to different questions was converted to percentage scale.

**Results:** The majority of clinicians (86.6%) frequently used lab services. 33.3% of respondents claimed that lab services were overused, and they cited the need for early diagnosis and medical legal reasons as justifications. Of them, 10% had never heard of quality control, and 33.3% had heard the word but were unaware of its significance. According to 76.6% of clinicians, the MBBS curriculum should cover quality control and fundamental lab procedures.

**Conclusion:** Clinical professionals frequently use laboratory services. According to the majority, the lab services are being used appropriately. Quality control and fundamental laboratory procedures must be incorporated within the MBBS curriculum.

**Keywords:** Laboratory services, Quality control, Clinicians, Early diagnosis and treatment.

## INTRODUCTION

Medical laboratory tests are critical for the diagnosis, management, and prevention of disease. Clinical laboratories are acknowledged as being essential to guaranteeing the precision of disease diagnosis, treatment, and mentoring, and it serves the significance to preserve laboratory quality and test availability for every request for medical testing. Furthermore, it is crucial to confirm if the proposed testing is adequate<sup>(1, 2)</sup>. "The process of requesting tests at the right time for the right time using the right methods with knowledge of the right cost is known as necessary or appropriate laboratory testing"<sup>(3, 4)</sup>. Ten to seventy percent is unnecessary laboratory testing contribute to incorrect diagnosis and treatment as a result<sup>(5)</sup>.

In recent years, the outcomes of laboratory tests have grown more and more important in patient care. Clinical laboratories are becoming a vital part of healthcare delivery. Laboratory tests have been and will remain a crucial component of clinical practice. Physicians concentrate on the more general topic of protocols as a way to handle medical information<sup>(6)</sup>. Wong and Lincoln discovered that physicians seemed to carry the weight of authority because they ordered lab tests in accordance with well-informed guidelines that were the result of accumulated experience approved by widespread use<sup>(7)</sup>.

According to Zhi et al., (2013)<sup>(8)</sup> there are two types of inappropriate testing: overutilization and underutilization. Overutilization is when tests are ordered without being suggested, whereas underutilization is when indicated tests are not ordered<sup>(8)</sup>. About 20% of requested laboratory testing is over utilized, according to

several studies<sup>(9, 10)</sup>. Both overutilization and underutilization can endanger patients' lives and cause financial and bodily harm. Underutilization could have major repercussions, such as morbidity from insufficient or delayed laboratory testing requests, whereas overutilization could result in needless blood sample collection, increased costs, and erroneous test findings<sup>(8)</sup>.

In many nations, overuse particularly is a cause for worry. In order to encourage doctors and patients to talk about inappropriate tests, procedures, and disease management, the "Choosing Wisely" campaign was launched in the United States in 2014 and then expanded to Canada. Since then, numerous healthcare providers throughout other nations have embraced this initiative<sup>(11)</sup>.

The experience and specialization of the practitioners are among the many factors that contribute to the overuse of laboratory tests<sup>(12)</sup>. The greatest and most accessible laboratory tests for patients are presumed to be known and understood by seasoned medical professionals. On the other hand, when less experienced doctors or residents request too many unnecessary laboratory tests, they may use up laboratory resources<sup>(9, 13)</sup>.

In order to effectively manage the use of laboratory tests, it is necessary to discourage unnecessary testing while simultaneously guaranteeing proper use. A number of reasons impacting labs, doctors, the law, or patients themselves have contributed to the rise in the usage of lab testing in recent years<sup>(14)</sup>. Among the many ways to evaluate the effectiveness of laboratory testing, the opinions or input of medical professionals is a crucial one. Given the inherent expenses, health practitioners should strive for a more sensible use of diagnostic and treatment resources. Appropriate lab utilization is essential for the best possible medical practice. It must be fixed if it is being used improperly<sup>(15)</sup>.

In lab utilization management, identifying what overutilization is using an evidence-based method is a common subject. There is frequently no agreement on what tests are appropriate or not. Even while there are clinical standards for many tests, there is frequently no peer-reviewed literature outlining proper use<sup>(16)</sup>. These days, with managed care, medical necessity, and an outcome-oriented approach, it is even more important to understand the principles for choosing and ordering the most rational test. Regarding quality and accreditation, the majority of clinicians are not as knowledgeable about the kind of test or which lab to obtain it from. The medical specialty that almost all active physicians use on a daily basis is the field of laboratory medicine, for which training in many medical schools consists of a few irregular lectures throughout the curriculum<sup>(17)</sup>.

Whereas studies are available in Saudi Arabia, regarding the utilization of lab services among clinicians are limited. Therefore, this study aimed to assess the utilization of lab investigations by clinicians and also to take their perspective of lab practices so that it would help as a feedback and aids in improvement of lab services.

## METHODS

A cross sectional study was taken up among the clinicians working in hospital in Jeddah, Saudi Arabia from February to May 2024. All the clinicians involved were informed about the study and an informed consent was taken up. Ethical clearance was obtained from institutional ethical clearance committee. A questionnaire was provided to 30 clinicians. The clinicians were given the questionnaires of various questions to survey their knowledge, attitude and practice towards laboratory services and their perspective of lab services. Responses to selected questions were analyzed, tabulated, converted to percentages and presented below.

## RESULTS

There were a total of 30 physicians. All of them had a master's degree. The mean duration of experience was 8.0±7.6 years.

Table (1) illustrates the frequency of ordering a diagnostic test. Most of the clinicians (86.6%) indicated that they often ordered a laboratory test.

**Table 1:** Frequency of ordering a diagnostic test

Response	Percentage
Always	None
Often	86.6%
Rarely	13.8%

Table (2) displays the response to selection of a lab. Of the 30 clinicians 63.3% indicated that the selection of lab was left to the patient.

**Table 2:** Selection of lab

Response	Percentage
At workplace	36.6%
Patients choice	63.3%
Suggest a lab outside workplace	None

Table (3) demonstrates the response to utilization of lab services. 33.3% felt that lab services are over utilized. 33.3% gave the reason for overutilization was to aid in early detection and management, 13.3% gave the reason as medico legal factors.

**Table 3:** Utilization of lab services

Response	Percentage
Underutilized	10%
Over utilized	33.3%
Properlyutilized	56.6%

Table (4) displays the response to role of lab in decision making. 11 clinicians (36.6%) indicated that role of lab is always important in decision making.

**Table 4:** Role of lab in decision making

Response	Percentage
Always important	36.6%
Important most of the times	63.3%

Table (5) illustrates the awareness of clinicians regarding quality control. 33.3% clinicians did not know the importance of quality control and 10% had not heard about quality control. Only 13 clinicians (43.3%) were aware of accredited labs and always considered it for referral. 66.6% of clinicians were not aware of preanalytical variables having impact on test results.

**Table 5:** Awareness about quality control in lab services among clinicians

Response	Percentage
Aware about its importance in giving correct results	56.6%
Heard but do not know its importance	33.3%
Notaware	10%

Table (6) displays the response regarding inclusion of quality control and basic lab practices in MBBS curriculum. majority of clinicians (76.6%) felt there is a need to include a chapter on basics of quality control & diagnostics in MBBS curriculum. 10 (33.3%) physicians indicated that lab services they were using was deficient and 83.3% indicated that the lab results correlates with the clinical finding of the patient most of the time.

**Table 6:** Opinion regarding inclusion of quality control in MBBS curriculum

Response	Percentage
Should be included	76.6%
Not essential	23.3%

## DISCUSSION

Managing healthcare providers' resources is essential to delivering high-quality treatment<sup>(18)</sup>. Keeping lab resources up-to-date is important because diagnostic labs are considered vital departments in the health sector<sup>(19)</sup>. Enhancing laboratory use, in particular, depends on the management of laboratory resources in hospitals that offer government-sponsored laboratory testing to patients at no cost. Furthermore, it is of relevance to safeguard patients' finances against additional expenses resulting from needless laboratory testing in the private sector.

Clinical laboratories are becoming a significant part of the provision of healthcare, and patient treatment is increasingly reliant on the findings of laboratory tests. Laboratory services are essential to clinical decision-making and support many facets of health services, such as disease monitoring and prevention, as well as the decision-making process for patient diagnosis and treatment<sup>(20)</sup>. Under-resourced and incompetent laboratories have been a feature of underdeveloped nations. Clinicians' mistrust of laboratory data has been exacerbated by these problems, which has led to cycles of insufficient investment in laboratory systems. However, the necessity for diagnostics in settings with low resources has significantly increased due to recent emphasis on enhancing testing accessibility to fulfill the demands of expanding treatment and prevention<sup>(21, 22)</sup>. Of the different methods to test the efficacy of lab tests, the feedback or perspectives of clinician is considered to be an important one.

In this study taken up, more than half of the clinicians (86.6%) said that they ordered a lab test most of the time and 33.3% of them indicated that lab services are over utilized. It is in accordance to study conducted by Bakarman et al., (1997)<sup>(6)</sup> where 25% of clinicians believed lab services are over utilized. The important factors mentioned for overutilization were free lab services, clinicians' lack of knowledge and patients demand.

However, in this study, the clinicians who thought the lab services are over utilized cited early diagnosis & management as a major reason followed by medicolegal reasons.

In another study conducted by William et al., (1982)<sup>(23)</sup> reasons of overuse were habitual ordering of a group of tests and medico legal reasons. Wong et al., (1983)<sup>(7)</sup> found that clinicians ordered laboratory tests according to an informal protocol which was a product of accumulated experience sanctioned by general use, and thus appeared to have the weight of authority. The problem of laboratory test misuse was therefore not a defect in cognitive knowledge, but a primarily protocol. In various other studies<sup>(6, 24-26)</sup> different clinician related variables were also studied which led to overutilization of lab services. 33.3% of clinicians had heard the term quality control not knowing its importance and another 10% were not even aware of the term.

This highlights the need for a basic course or update to clinicians about these important practices to help them in proper interpretation of results & proper advice to patients regarding selection of lab. A study conducted by Thue et al., (2011)<sup>(26)</sup> a similar conclusion that there is still a need to update clinicians knowledge about basic lab practices and quality control through visits to practices, courses and written information. Furthermore the study concluded that there is a need of quality assurance of doctors' clinical use of lab tests as part of comprehensive quality assurance. Most of the clinicians graded their lab services as good (43.3%) to satisfactory (23.3%).but about 10 physicians among 30 still felt their lab services was deficient the reasons why they thought so were not elucidated in this study.

But in another similar study<sup>(6)</sup>, quality of lab services was cited as the reason by those who thought lab services were deficient. 16.6% clinicians felt the lab results always correlated with clinical condition of the patient & 83% said it correlated most of the time. In modern medicine, clinical laboratory correlations are part of everyday practice every clinical diagnostic process begins with the patient. Constant communication between clinicians and laboratory professionals, exchange of information and opinions should facilitate diagnostic process and improve patient treatment<sup>(27, 28)</sup>. Regarding the inclusion of quality control and basic lab practices in MBBS curriculum, majority of clinicians (76.6%) felt it is necessary. Similar suggestion was made in another study<sup>(6)</sup>.

In 2015, a survey study was conducted in MOH hospitals, Taif city, Saudi Arabia. In this study, 45.8% of expatriate doctors had at least one medical malpractice litigation, and 76.3% of them were prevented from travel more than two years until the end of the investigations. About 90% had no employers support in their cases. Overall, patient care was negatively affected in the opinion of 78% of expatriate doctors<sup>(29)</sup>. Increased public awareness regarding health matters, concerns regarding the quality of care and advancement in healthcare has resulted in increased medical malpractice litigation against physicians in Saudi Arabia<sup>(30)</sup>.

According to the medico-legal committee in Saudi Arabia, malpractice claims increased by 41.6% between 2008 and 2013. About 74% of claims placed blame on the practitioners' themselves<sup>(31)</sup>. Now, the law of practicing healthcare professionals in Saudi Arabia, issued on the 6th of December 2005, has made it compulsory for all physicians and dentists of public and private health institutions to have malpractice insurance<sup>(32)</sup>.

## CONCLUSION

Laboratory services are utilized very often by most of clinicians. More than half of them felt the lab services are properly utilized of those who felt they were overutilized, medico legal reasons & early diagnosis was cited as main reasons for overutilization. There is a need for update regarding QC practices and basic lab practices among clinicians. There is a growing interest in reducing healthcare costs and better utilization of resources. Excessive utilization of laboratory investigations is considered as a significant source of waste in healthcare. Physicians are ordering unnecessary laboratory investigations to protect themselves from medico-legal lawsuits, which are growing as a regular clinical practice. Efforts to efficiently use the resources should address this deviated practice as a potential source for significant savings in cost and better patients' outcomes.

## REFERENCES

1. Regan M, Forsman R. The impact of the laboratory on disease management. *Dis Manag.* 2006;9(2):122-30. doi: 10.1089/dis.2006.9.122.
2. Wians FH. Clinical Laboratory Tests: Which, Why, and What Do The Results Mean? *Lab Med.* 2009;40(2):105-13. doi: 10.1309/LM4O4LOHHUTWWUDD.
3. Lippi G, Bovo C, Ciaccio M. Inappropriateness in laboratory medicine: an elephant in the room? *Ann Transl Med.* 2017;5(4):82. doi: 10.21037/atm.2017.02.04.
4. Lippi G, Mattiuzzi C. The biomarker paradigm: between diagnostic efficiency and clinical efficacy. *Pol Arch Med Wewn.* 2015;125(4):282-8. doi: 10.20452/pamw.2788.
5. Beriault DR, Gilmour JA, Hicks LK. Overutilization in laboratory medicine: tackling the problem with quality improvement science. *Crit Rev Clin Lab Sci.* 2021;1-24. doi: 10.1080/10408363.2021.1893642.
6. Bakarman MA, Kurashi NY, Hanif NY. Utilization of laboratory investigations in primary health care centers in Al-Khobar, Saudi Arabia. *J Family Community Med.* 1997 Jan-Jun;4(1):27-45.
7. Wong ET, Lincoln TL. Ready! fire!.. Aim! An inquiry into laboratory test ordering. *JAMA.* 1983;250:2510-3.

8. Zhi M, Ding EL, Theisen-Toupal J, Whelan J, Arnaout R. The landscape of inappropriate laboratory testing: a 15-year meta-analysis. *PLoS One*. 2013;8(11):e78962. doi: 10.1371/journal.pone.0078962.
9. Vrijnsen BEL, Naaktgeboren CA, Vos LM, van Solinge WW, Kaasjager HAH, Ten Berg MJ. Inappropriate laboratory testing in internal medicine inpatients: Prevalence, causes and interventions. *Ann Med Surg (Lond)*. 2020;51:48-53. doi: 10.1016/j.amsu.2020.02.002.
10. Bindraban RS, Ten Berg MJ, Naaktgeboren CA, Kramer MHH, Van Solinge WW, Nanayakkara PWB. Reducing Test Utilization in Hospital Settings: A Narrative Review. *Ann Lab Med*. 2018;38(5):402-12. doi: 10.3343/alm.2018.38.5.402.
11. Levinson W, Kallewaard M, Bhatia RS, Wolfson D, Shortt S, Kerr EA, et al. 'Choosing Wisely': a growing international campaign. *BMJ Qual Saf*. 2015;24(2):167-74. doi: 10.1136/bmjqs-2014-003821.
12. Jalbert R, Gob A, Chin-Yee I. Decreasing daily blood work in hospitals: What works and what doesn't. *Int J Lab Hematol*. 2019;41 Suppl 1:151-61. doi: 10.1111/ijlh.13015.
13. Sedrak MS, Patel MS, Ziemba JB, Murray D, Kim EJ, Dine CJ, et al. Residents' self-report on why they order perceived unnecessary inpatient laboratory tests. *J Hosp Med*. 2016;11(12):869-72. doi: 10.1002/jhm.2645.
14. Alonso-Cerezo MC, Martin JS, Gracia Montes MA, de la Iglesia VM. Appropriate utilization of clinical lab tests. *Clin Chem Lab Med*. 2009;47(12):1461-5.
15. Walraven CV, Naylor CD. Do we know what inappropriate laboratory utilization is? A systemic review of laboratory clinical audits. *JAMA*. 1998;280(6):550-558.
16. Kent L, Baron J, Dighe E. Utilization management in clinical lab: An introduction and overview. Springer International Publishing Switzerland. 2017. DOI 10.1007/938-3-319.
17. Wians FH. Clinical laboratory tests: which, why, and what do the results mean? *Laboratory Medicine*. 2009;40(2):105-113.
18. Callender C, Grasman SE. Barriers and Best Practices for Material Management in the Healthcare Sector. *EngManag J*. 2010;22(4):11-9. doi: 10.1080/10429247.2010.11431875.
19. Cadamuro J, Ibarz M, Cornes M, Nybo M, Haschke-Becher E, von Meyer A, et al. Managing inappropriate utilization of laboratory resources. *Diagnosis (Berl)*. 2019;6(1):5-13. doi: 10.1515/dx-2018-0029.
20. Nkengasong N. Strengthening laboratory services and systems in resource poor countries. *Am J Clin Pathol*. 2009;131(6):774.
21. Abimiku AG. Building laboratory infrastructure to support scale-up of HIV/ AIDS treatment, care, and prevention: In-country experience. *Am J Clin Pathol*. 2009;131(6):875-886.
22. Massambu C, Mwangi C. The Tanzania experience: Clinical laboratory testing harmonization and equipment standardization at different levels of a tiered health laboratory system. *Am J Clin Pathol*. 2009;131(6):861-866.
23. Williams SV, Esinberg JM, Pascale LA, Katz DS. physicians perceptions about unnecessary diagnostic testing. *Med Care*. 1982;19:363-70.
24. Naugler C. Laboratory test use and primary care physician supply. *Can Fam Physician*. 2013 May;59(5):240-245.
25. Freeborn DK, Baer D, Greenlick MR, Bailey JW. Determinants of medical care utilization: physicians use of laboratory services. *AJPH*. 1972; 62(6):846-53.
26. Thue G, Jevanaker M, Gulstad GA, Sandberg S. Quality assurance of laboratory work and clinical use of laboratory tests in general practice in Norway: a survey. *Scand J Prim Health care*. 2011;29(3):171-5.
27. Radman I, Vodanovic M, Radman I. Clinical laboratory correlations and communications in diagnostic process. *Informatol* 2013;46(1):17-25.
28. Nakamura A, Baba M, Matsuto T, Okada M. Communication between hospital laboratory personnel and physicians. *Rinsho Byori*. 1998 Nov;46(11):1103-10.
29. Alkindy SAR. Expatriate doctors, medical litigations, and overall patient care: Taif study. *Saudi Surgical Journal*. 2016;4(3):104.
30. Alhajjaj MS. Medical practice in Saudi Arabia the medicolegal aspect. *Saudi Medical Journal*. 1996;17(1):1-4.
31. Aldakhil LO. Obstetric and gynecologic malpractice claims in Saudi Arabia: Incidence and cause. *Journal of Forensic and Legal Medicine*. 2016;40:8-11. doi:10.1016/j.jflm.2016.02.001
32. Jones W, Karim S, McDonald L. Saudi Arabia: An Overview Of Medical Malpractice In The Kingdom Of Saudi Arabia. 2014 UK: Clyde & Co. Available from: <http://www.mondaq.com/saudi-arabia/x/361000/Professional+Negligence/An+Overview+Of+Medical+Malpractice+In+The+Kingdom+Of+Saudi+Arabia>