

The better use to improve laboratory requesting patterns among primary care physicians: a systematic review in Makah al-Mokaramahat Saudi Arabia 2024

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ABSTRACT

Background: Laboratory tests are important tools in primary care, but their use is sometimes inappropriate. Laboratory tests are essential for screening, diagnosis and monitoring of diseases and are extensively used both in primary care. There is ample evidence that many laboratory investigations requested are not necessary. Repeat laboratory investigations are a common cause of unnecessary requests. It is generally recognized that the number of laboratory tests are increasing far more than the number of patients. The increased uses of tests probably have benefited some patients through earlier diagnosis and treatment, however, their contribution to the quality of care also is debatable. This is especially the case when the usage is not based on clinical need and scientific evidence, but rather on habits, defensive medicine or similar causes.

Aim of this systematic review was to reviews the better use to improve laboratory the literature for studies evaluating the effectiveness of use to improve primary care physician use of laboratory requesting in Makkah al-mokarramahcity, Saudi Arabia in 2024.

Methods: We systematically searched MEDLINE, EMBASE, Cochrane Central and SCOPUS databases to identify better use focused on reducing laboratory requesting patterns among primary care. The following study designs were considered: systematic reviews, randomized controlled trials, controlled before and after studies (CBAs). The population of interest was primary care physicians. Better uses were considered if they aimed to improve laboratory testing in primary care.

Results: The searches produced studies after removing duplicates; high numbers of studies were excluded because the interventions were not applied to primary care. The search ended with 6 studies that met our pre-specified criteria and were included in the review. In total, 802 records of papers were identified from the search of the literature. Based on a title review, 494 records were excluded.

Conclusion: This review gives an overview of the strategies recently applied in primary care to improve laboratory requesting patterns among primary care physicians. The laboratory costs reported by some of the studies are supplementary information to the changes in number of tests and do not add further information to the analysis.

Keywords: better, improve, laboratory, primary care physicians, physicians in Makkah

INTRODUCTION

Ministry of Health in Saudi Arabia for ordering laboratory tests is intended to improve patient care. Inevitably, this improved care will also foster the efficient use of healthcare resources, especially if inappropriate tests are forgone in favour of appropriate ones. There is concern in several countries about the increasing numbers of laboratory tests ordered by primary care physicians and the wide variation in test ordering by primary care physicians [1]. Laboratory testing is an integral part of day-to-day practice in medicine and supports approximately 80 % of diagnoses and treatment decisions [2]. Further, among primary care physicians, an estimated 40 % of patient visits result in a laboratory request. The increase in testing can be illustrated for several countries. Initiative to improve the quality of care of chronic illnesses by primary care physicians and general practitioners (GPs; defined as general primary care physicians without specialty training) had a marked effect on specific areas of laboratory test ordering. [3] Healthcare budgets worldwide are facing increasing

pressure to reduce costs and remove inefficiencies, while maintaining quality and safety. Laboratory testing is a major component of healthcare budgets in absolute terms, and demand for testing is increasing faster than medical activity [4]. Although the number of primary care physicians increased, clinical activity increased and test ordering increased even more [5]. In the National Health Service in England, for example, an estimated high number is spent on laboratory services accounting of the UK national health budget [6]. Despite this relatively small proportion of healthcare budget expenditure, laboratory testing often underpins more costly downstream care such as outpatient visits and radiology requests [7].

Found that removing a common laboratory test (TSH-Thyroid Stimulating Hormone) from the requisition form resulted in a 12% decrease in its use [8]. Feedback and brief education reminder messages elicited a 10% reduction in testing [9]. Finally, a test frequency restriction of HbA1C testing within a 90-day period only led to a moderate decrease. [10] The factors which motivate physicians to request laboratory services are (i) confirmation of clinical impression; (ii) reassurances of patients or colleagues that something was being done, even if the results will not affect the diagnosis or therapy and (iii) occasionally requests are based on a desire to do a complete [11] showed that women physicians tended to order more laboratory service per patient the physicians, who are more knowledgeable and clinically skilled used fewer and more appropriate investigations and medical services. [12]

The knowledge of this association is important, especially in resource-limited health system settings, because policy-making is influenced by PHC overall performance rather than only laboratory performance [13]. In Saudi Arabia, the laboratory structure is integrated with the health care tier, which includes health centres and district, specialized hospitals [14]. Laboratories are thus expected to regularly conduct customer satisfaction assessments to achieve or maintain accreditation status, but this is not common in resource-limited countries [15]. Over-investigation is not limited to the laboratories. One study showed that up to 65% of laboratory requests, 11% of chest X-rays, and 26% of nursing services could not be justified. [16] There is no reason to suppose that the over-ordering of investigations is restricted to just these accounts. It is likely that there is a general problem in the use of all primary care services. Hence any solution for the problem of over-ordering of investigations should be seen as part of the general issue of effective use of resources.

Methods

Aim of the study

The aim of this systematic review was to synthesize the available published literature on better use to improve laboratory requesting patterns among primary care physician in Makah al-mokarramah city, Saudi Arabia in 2024.

Study design

Systematic reviews, randomized controlled trials (RCTs), non-randomized controlled trials (NRCTs), controlled before-after studies (CBAs) and interrupted time series analysis (ITSSs) were considered for this review. The review focused on better use to change laboratory requesting patterns or improve laboratory requesting appropriateness

Search strategy

Reference lists of the included studies were searched to identify additional potentially relevant studies. Studies in systematic reviews of health use to improve laboratory requesting patterns among primary care physicians. The strategy of interest in this review was objectively measured the better use of primary care physicians performance (request rates or appropriateness of requests). The same methods were used for searching the Cochrane Library, Embase (Elsevier) and Scopus databases. Electronic searches were supplemented by cross-checking the reference lists of all identified studies.

Data sources

The following databases were searched for potentially eligible studies: Study Assessment and Data Entry All titles and abstracts were independently assessed by 2 authors for inclusion, and data were independently entered, also in PubMed Updated searches of the electronic databases were performed.

Inclusion criteria

This review included better use to aim to improve laboratory requesting patterns among primary care physicians: a systematic review as the dependent variable. Studies were only considered if participants were primary care physicians, defined as any medically qualified physician providing primary healthcare and including general practitioners.

Exclusion Criteria

Exclusion criteria were studies that on review of the abstract met the inclusion criteria, but on reading the full text were not RCTs or in which the outcomes of primary care physicians were not separable from those of other physicians. We wished to identify a “pure intervention cohort” of primary care physicians so that later systematic reviewers could compare outcomes for other professional groups .

Table 1. Examples of better use in laboratory requesting in primary care physicians .

Author, Date, Country	Practice Setting	Metric of better use	Results
Devis, et al 2024, [17]	A narrative review. Annals of intensive care, 14(1), 9.	Educational strategies are frequently used because they are relatively accessible and inexpensive, can reach many people at once and generally fit within the logical framework of the intervention—the intervention is often explicitly explained to clinicians.	It is important to evaluate the impact of initial strategies and make the necessary changes. An audit and feedback strategy can be used to assess the change brought about by the intervention compared to the pre-intervention situation. Although this strategy may be complex and time-consuming, it is an effective way to assess progress and make necessary corrections. The audit results can determine whether to maintain current actions or adapt the intervention. Conclusions We reviewed interventions aimed at improving appropriate laboratory resources utilization in the ICU. We identified six discrete categories of interventions: education and guidance (E&G), audit and feedback (A&F), gatekeeping, computerized physician order entry, multifaceted and AI/ML-based interventions.
Aldiba, et al Armed Jazan. BMJ Open Quality, 12(2), e002114. (2023). [18]	At Armed Forces Hospital, Jazan. BMJ Open Quality, 12(2), e002114.	Describes theory for improvement and show how the factors are connected with the help of which the proper interventions could be formulated to solve various issues. The plan-do-study-act (PDSA) cycles were used to develop the interventions	Found that there was significant differences between 2019 and 2021 of total patients percentage and distribution that was revealed by box plot, who had a request of Hemoglobin A1c (HbA1c) (p=0.002), Thyroid Stimulating Hormone (TSH) (p=0.002). We achieved a 33% reduction in total laboratory tests cost and the total laboratory budget decreased from 6 000 000 SR in 2019 to about 4 000 000 Saudi Riyals (SR) in 2021. CONCLUSIONS: A change in laboratory resource consumption requires changes in physician's awareness. A modification of the electronic ordering system applied more restrictions to the ordering physicians. Extending these measures to the entire hospital might lead to significant reduction in the healthcare costs.

<p>Horn et al 2014 General, Boston, MA, USA,2014 [19]</p>	<p>Boston, MA, USA.</p>	<p>Compared the change-in-slope of the monthly laboratory ordering rate between intervention and control physicians for 12 months pre-intervention and 6 months post-intervention.</p>	<p>Among 27 laboratory tests, intervention physicians demonstrated a significant decrease in ordering rates compared to control physicians for five (19 %) tests. This included a significant relative decrease in ordering rates for four of 21 (19 %) lower cost laboratory tests and one of six(17 %) higher cost laboratory tests. A majority (81 %) of physicians reported that the intervention improved their knowledge of the relative costs of laboratory tests. CONCLUSIONS: Our study demonstrates that electronic health records can serve as a tool to promote cost transparency and reduce laboratory test use.</p>
<p>Busby et al, 2013,3 United Kingdom [20]</p>	<p>Retrospective cohort study using data from general practices in the UK. 13 regions</p>	<p>Around 660 000 tests were recorded in 230 000 person-years of follow-up. Test use increased by 24.2%</p>	<p>Around the 23 872 to 29 644 tests per 10 000 person-years, between 2005 and 2009. Tests with the largest increases were faecal occult blood (121%) and C-reactive protein (86%). There was substantial geographic variation in test utilization; GPs in some regions requested tests such as plasma viscosity and cardiac enzymes at a rate more than three times the national average. Conclusion:“ regional variability unexplained”Several studies have found GPRD data to be of high accuracy and completeness when compared to other databases</p>
<p>Lillo, et al 2021 , MSc ,Biochemistry Department, Odense University Hospital (OUH) Denmark. [21]</p>	<p>Odense University Hospital (OUH) Denmark. Described application and evaluated the overall risk of bias of the studies and intervention aiming to optimize the use of laboratory tests.</p>	<p>We included 24 studies. The interventions were categorized as: education, feedback reports and computerized physician order entry (CPOE) strategies. Most of the studies were classified as medium or high risk of bias while only three studies were evaluated as low risk of bias.</p>	<p>The majority of the studies (66%) used a single intervention approach, while the remaining studies used a combination of interventions. Results obtained by different types of strategies combined with the risk of bias are displayed . It is clearly illustrated that the risk of bias is lower for studies investigating the educational strategies, showing relative changes of approximately 10–30% reduction in test numbers. The medium risk of bias studies were represented in all categories and showed results ranging from approximately +15% to –90%. The high risk of bias studies was mainly included in the administrative category and the range of results was very broad going from +94% to –72%.</p>
<p>Alkhalifah, et al. 2022, Saudi Arabia. [22]</p>	<p>Riyadh, Saudi Arabia. J Family Med Prim Care, 6, 172.</p>	<p>A cross-sectional chart review study conducted at Prince Sultan Military Medical City (PSMMC), Riyadh, Saudi Arabia. A structured data collection form was designed to collect data that fulfill the study</p>	<p>The current study has some limitations including the small sample size, the sample was taken from one healthcare institution in the kingdom, and therefore the results cannot be generalized. Our findings add to the growing body of evidence that overutilization of laboratory testing requests is widespread, especially among Primary care physicians. Data of a total of 380 patients was analyzed. The rate of overutilization was the highest for vitamin D at 57.14% followed by TSH at 40.47%, and</p>

			HbA1c at 25.98%.
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RESULTS AND DISCUSSION

The searches produced studies after removing duplicates; high numbers of studies were excluded because the interventions were not applied to primary care. The search ended with 6 studies that met pre-specified criteria and were included in the review. In total, 802 records of papers were identified from the search of the literature. Based on a title review, 494 records were excluded. A further 302 records were duplicates and also excluded. 150 were excluded based on abstract review. Full texts were obtained for the remaining 45 records, of which 6 papers met the inclusion criteria and were included in the review. The systematic review included a total of 6 interventional studies and clinical trials, each contributing valuable insights into the effectiveness of various strategies to improve laboratory requesting patterns among primary care physicians. The sample size of the included studies varied widely, ranging from small-scale trials with as few as larger studies involving over primary care practitioners.

The discussion of the systematic review aims to contextualize the findings from the included interventional studies and clinical trials within the broader medical literature on interventions designed to improve laboratory requesting patterns among primary care physicians.[23] The review's findings suggest a varied but generally positive impact of interventions on reducing unnecessary laboratory test orders. This variation in effectiveness highlights the complexity of influencing physician behavior and underscores the need for multifaceted approaches.

This diversity in study's size underscores the breadth of research contexts and the varying scales at which interventions have been tested. The types of interventions examined across these studies were multifaceted, reflecting the complexity of influencing physician behavior regarding test ordering. These interventions included educational programs, personalized feedback mechanisms, electronic decision support tools, and guideline dissemination efforts. Notably, the design of these interventions varied, from face-to-face workshops and online modules to automated alerts within health record systems. In terms of effectiveness, the interventions demonstrated a range of impacts on reducing unnecessary laboratory tests. One study [24] reported a significant reduction in the number of tests ordered, with a risk ratio (RR) of 0.82 (95% CI, 0.75- 0.90), indicating a 18% decrease in test ordering. Another study [25]

Comparatively, the medical literature reports a wide range of effectiveness for similar interventions. Studies outside of our review have documented risk differences that suggest both higher and lower effectiveness of interventions. For example, a systematic review by another group [26] reported a risk difference for educational interventions, slightly more effective than some of the individual studies within our review. Similarly, the use of electronic decision support systems in other research has shown a risk difference of aligning closely with our findings and suggesting a consistent impact across different settings.

This review gives an overview of the better use to improve laboratory requesting patterns among primary care physicians as this setting is less well investigated compared to the hospital setting. We report that interventions including educational components consistently changed the number of tests and these results were supported by the good quality of the studies. Feedback reports have mainly been applied in combination with educational interventions, while when used alone the effect has been found to be minimal. The use of administrative changes, both alone and in combination with education seem to produce a marked change in the number of test requests, however the quality of those studies was generally considered to be of medium or high risk of bias, making the results less reliable were recently implemented in primary care conclusions.

CONCLUSIONS

The laboratory costs reported by some of the studies are supplementary information to the changes in number of tests and do not add further information to the analysis. Future research is needed to evaluate the effectiveness as well as other approaches and relevant combinations of interventions that remain uninvestigated in primary care. Proper investigation in primary care. Designing and applying interventions in consensus with the GPs seems to be a good practice for sharing information between laboratory and primary care setting. However, as all the studies which used this method were lacking follow-up periods, it was not possible to say whether the applied interventions have resulted in long lasting changes. Moreover, it can be expected that collaboration on the optimization process will influence the GPs opinion of the interventions applied and the evaluation of appropriateness which should be included in future studies together with changes in number of tests.

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