ORIGINAL ARTICLE | ASIAN JOURNAL OF MEDICAL SCIENCES

A study of "rational use of investigations" in a tertiary hospital

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Submission: 30-05-2022 Revision: 28-08-2022 Publication: 01-10-2022

ABSTRACT

Background: Rational laboratory use is defined as effective and correct laboratory use by providing the most appropriate test selection with the right clinical approach in line with the evidence-based data and considering the cost and patient safety. The present study was thus conducted for the prevalence and features associated with rational use of investigations in a tertiary hospital. **Aims and Objectives:** The objectives of the study were to estimate prevalence of rational use of investigations and its associated confounding factors; to explain the educational approach underlying the study; and to explain how to teach rational approach of investigations so that we reduce the use of unnecessary and inappropriate tests which are not likely to have any ill effects on the patient. **Materials and Methods:** A cross-sectional study including 100 patients was selected by random sampling from medicine and orthopedic wards and OPD. **Results:** In our study,we observed 29 different types of clinical and laboratory investigations out of 2155 investigations ordered by physicians before any intervention. These investigations done in 100 patients, among those 39.16% were contributed to the management of patients and 60.83% were not considered to have contributed toward management of patients. **Conclusion:** Several external and internal factors can promote irrational use of investigation at different stages. Hence, understanding these factors and implementing appropriate measures are key steps to change behavior of prescriber and nursing staff. We must have logic-based flow chart or algorithm in all investigations for diagnosis as a part of good laboratory or good clinical practices.

Key words: Rational; Investigations; Tertiary hospitals

Access this article online

Website:

http://nepjol.info/index.php/AJMS

DOI: 10.3126/ajms.v13i10.45449

E-ISSN: 2091-0576

P-ISSN: 2467-9100

INTRODUCTION

Rational laboratory use is defined as effective and correct laboratory use by providing the most appropriate test selection with the right clinical approach in line with the evidence-based data and considering the cost and patient safety.[1] Laboratory tests are used for many purposes such as disease detection, diagnosis, and monitoring. The use of rational laboratory tests is aimed at ordering tests that may be beneficial in patient management and that will not harm them. Due to the advances in laboratory technology and availability of free tests and increasing level of medical knowledge, the number of tests required is gradually increasing. Moreover, the side effects brought by the treatments initiated after the false-positive results increase the risk of injury to the patients during the screening and diagnosis processes. In addition, once an abnormal test result is found, clinicians may order further investigations, not realizing that on average 5% of test results are outside their reference ranges and a cascade of testing may result.[2,3] The total testing process (TTP) based on the "brain-to-brain loop" concept described by Lundberg[4,5] begins with the clinicians' clinical question and ends when the test result is interpreted and acted upon, both steps also called pre-pre- and post-post-analytical phases.[6,7] Between these two important

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steps in the TTP, the following additional phases exist: Patient identification, sample collection, transport and preparation, and analysis, and report.[8] Hence, most commonly forgotten issue is the preparation of the patient for getting thetest. Recent studies suggest that the highest incidence in laboratory-related errors occurs in these two phases (pre-pre and post-post).[9-12] A review of laboratory audits showed that the number of inappropriate tests requested by clinicians varies from 5% to 95%. The common perception among physicians is that these tests are cheap. Their unit cost may be low, but they have a high cumulative cost. The annual bill for operating laboratory tests is greater than the annual cost of operating computed tomographic scanners.[13]

This is illustrated by the observation in one acute tertiarycare hospital that clinical laboratory test charges averaged 24% of the total hospital bill of patients coming to autopsy in 1984 compared with the national laboratory test cost average of 10% of overall health care costs.[14] Overuse of investigations and there is a reason to believe that some requests are illogicalleads to overloading of the diagnostic services and over expenditure: More efficient usage is therefore needed. Clinical laboratory testing is integral to the delivery of health care, as a significant majority of medical decisions are influenced by the results of laboratory tests. However, it is accepted that approximately 20–50% of laboratory testing may not be appropriate.[15] Over utilization of tests may lead to unnecessary use of health services and interventions whose benefit can be questioned, while underutilization of appropriate tests may lead to adverse health outcomes and increased future use of health-care resources. There is a need to balance the desirable and undesirable consequences of tests results for the patients to laboratory tests. That's why, medical students need to be trained in additional to the skill necessary to apply the method successfully in rational choice of investigation.

In this study, we will assess the appropriateness of routine ordering of laboratory tests in medicine, surgery, and orthopedic department as well as their awareness about the examination cost. The main message of this study is that of teaching based on rational approach to clinical investigation. The proposed intervention stores a lot on training of the faculty to enable it to acquire a new role which is substantially different from that of conventional approach of physicians.

Aims and objectives

Aim

This study aims to estimate the prevalence of rational use of investigations and its associated confounding factors.

Objectives

The objectives of the study were as follows:

1. To assess the utility of laboratory tests ordered,
2. To explain the educational approach underlying the study; to explain how to teach rational approach of investigations sothat we reduce the use of unnecessary and inappropriate tests which is not likely to have any ill effects on the patient.

MATERIALS AND METHODS

After taking necessary permission from Institute Ethics Committee and Department of Medicine,the study was conducted at Central Lab, Department of Biochemistry and the Department of Medicine at M.B.S Hospital, Kota. This hospital-based observational cross-sectional study was donefrom the period of January 2022 to May 2022. The informed written consent was obtained from all the study participants.The present study comprises 100 patients aged 30–70 years identified by simple random sampling with proportionate number from medicinewards. The prescribed investigations were analyzed and compared by rational investigations that were made after discussion with experts of the diagnosed case and detailed history was asked and physical examination was done in all study subjects. Patients who willing to participate were included after obtaining an informed consent.

Patients were excluded from the analysis if,

(1) They were admitted for a reason other than investigation (patients diagnosed with cancer admitted for chemotherapy).
(2) Their medical records were incomplete or did not contain information adequate for evaluating the rationale and the usefulness of the ordered tests.
(3) If they will hospitalize for social reasons unrelated to their disease course.
(4) Not willing to participate in the study.

All participants were assessed for the investigationssuch as blood sugar and renal function test (RET) (ureaand creatinine), liver function test (LFT) (bilirubin, serum glutamic oxaloacetic transaminase, serum glutamic pyruvic transaminase (SGPT), total protein, albumin, globulin, albumin-globulin ratio, alkaline phosphatase, and gamma-glutamyl transpeptidase), electrolyte, serum calcium, phosphorus, acid phosphatase, lipid profile (very low-density lipoprotein [VLDL], low-density lipoprotein [LDL], high-density lipoprotein [HDL], and triglyceride [TG]), uric acid,creatine kinase MB (CKMB), creatinekinase N acetyl cysteine (CKNAC), lactate dehydrogenase (LDH), amylase, and lipase and to assess the utility of laboratory tests ordered. An effort was made to determine whether they were ordered in logical combinations or sequences or as avoidable, when the test was not relevant to the patient's symptoms and provisional diagnosis, when a normal result was not used to exclude a suspected diagnosis, when a repeated test was not used for monitoring treatment, and when the test result did not make any difference to the course of patient care and careful review of the patient's chart and hospital course did not indicate any change in the clinical status that could potentially judge as inappropriate.

RESULTS

We were analyzed 100 patients, in which 50 from outpatient department (OPD) and 50 from IPD (inpatient department). A total of 2155 laboratory investigations were ordered overall. In all, 1178 investigations were ordered in 50 OPD patientsamong which 430 were considered to be useful for diagnosis and 748 were considered to be avoidableand 977 investigation were ordered in IPD patient among which 414 were considered useful and 563 were considered avoidable. Hence, the proportion of rational investigation was 844 (39.16). By contrast, 1311 (60.83%) of the 2155 investigations ordered could have been avoidable without any effect of patient conditions and management. Hence, the proportion of irrational is more than rational. The most common investigations were blood sugar, RFT, LFT, lipid profile (TG, VLDL, LDL, and HDL), and electrolyte which influences the diagnosis 47.8%, 29.4%, 32.7%, 9.4%, and 6%, respectively, and influences the management of 54.4%,23%, 30%, and 4% and 3% of patients, respectively. Blood sugar, bilirubin, and SGPT were found to be most helpful investigation while cardiac enzymes, lipid profile, electrolyte, amylase, lipase, albumin, globulin, total protein, andalkaline phosphatase were not much helpful in influencing the diagnosis.

Analysis of patient groups showed that avoidable, ordering of investigations was higher for OPD patients comparison with IPD patients. Investigations ordered by residents were more in OPD compared with IPD. In IPD, most of the irrational investigation done by technical staff because of pre-set pro forma. Mistake was mainly done by newly appointed technical staff. Usually, when they come for blood sample collection, they marktests without much focus on doctor's prescription. In OPD, most of the patient come for routine checkup because of free availability of test, they requested to the doctor "please doctor write down all the tests," they did not know cumulative cost of test, and the number of avoidable tests ordered were significantly increase, that's why load oflabis increasing day by day so chances of errorsalso increases and we will miss the emergency reports. It was seen that many investigations were used more than once in same patient in IPD but they were according to rational use, that is, blood sugar and bilirubin (especially in newborn) were advised more than once times in same patient but it was rational because it was essential for prognosis of disease. At the same time, few investigations were advised twice or thrice from same patient which requires only once. For example, kidney function test, lipid profile, amylase, lipase, complete profile of liver, LDH, CKNAC, and CKMB were seen advised more than once in some patients which could be avoidable.

DISCUSSION

In the present study, we observed that the number of avoidable test is 60.83% which is more in OPD as compared to IPD patients. Many different factors decrease the rationality of investigation and increase the irrational use of investigation. Most important, first, free test availability and, second, they are so easy to request on the laboratory request forms, third islack of regulation and protocol and lack of appropriate evaluation. Without trained nursing staff also mark whole investigation in flow without over concentrate in doctor's prescription.The impact of inappropriate use of investigation can be seen in many ways; first is reduction in the quality of test because of increase chance of pre-analytical error, analytical error, and post-analytical error.

We all know that the reagent's cost is very high and not supplying easily if demand increases too much but generally in govt hospitals supply is not much and taking long time to fulfill the formalities, in this case, some tests are not available for some time and emergency patient suffers more and more.

The common perception among most of patient and doctor is that these tests are cheap and their unit cost may be low, but they have high cumulative cost. This was concluded in a study conducted by Shaw, S. T., Jr., and J. M. Miller who concluded that clinical laboratory test charges averaged 24% of the total hospital bill of patients coming to autopsy in 1984 compared with the national laboratory test cost average of 10% of overall health-care costs.[14] A review of laboratory audits showed that the number of inappropriate tests requested by clinicians varies from 5% to 95%. When Dr. obtaining abnormal test results go for more investigations, not knowing that about 5% results are outsides references ranges (Tierneyet al., and Bulusu S). This practice has led to decrease utilizations of the basic skills of history taking and physical examination.

Strategies to tackle irrational uses of investigation

According to the WHO, irrational use is a "disease" which is difficult to treat whereas prevention is, however, possible.[16]

There are various strategies to change prescriber's behavior toward the promotion of rational prescribing. These strategies can be grouped broadly as targeted or system-oriented approaches. Targeted approaches comprise educational and managerial intervention, whilesystem-oriented strategies include regulatory and economic interventions. Simple strategy would be to remove them from the standard forms or to ask for explicit justification for ordering them. Therefore, changes in request forms should be designed very carefully. Guidelines, protocols, and standards are needed to formalize optimal practice. The standards developed for general practitioners by the Dutch College of General Practitioners are a good example of guidelines that have already been developed.[17,18] Since 1989, the college as set up some 70 guidelines on a variety of common clinical problems, one dealing specifically with rational ordering of investigations.[19] Some study wasshowinginterventionfor irrational use of investigations and improvement was noticeable. In 2013, a study conducted by Levick et al.,[20] in the USA, a computer-assisted system was used to remind the results of previous test if the same test was ordered from patients who were previously ordered for B natriuretic peptide [BNP]. With this practice, it was observed that BNP orders decreased by 21% and this led to an annual decrease of 92,000 dollars from hospital expenses.In a study conducted by Vegting et al., (2012),[21] in the Department of Internal Medicine at Vrije University in Amsterdam, the effect of such as increasing inspections by senior doctors, removing tests panels, distributing the information cards about cost of tests to doctors, weekly meetings on ordered tests, and facilitating access to ministry protocols interventions on health authority has been investigated. During the year in which the interventions were practiced, the laboratory test costs of the internal medicine department decreased by 21% and the following year, the test costs of the entire hospital were reduced by 14%. In a study conducted by Baricchi et al., (2012),[22] in Italy, all general practitioners in the region were trained about some tests. After course, it was asked to write the possible diagnosis in their test request forms when they ordered test. It was observed that the total number of test ordered by physicians trained the following year decreased by 5%, and the total number of test ordered by the control group increased by 1%. A range of interventions provides both information and monitoring of the clinician's performance, such as audit, feedback, peer review, and computer reminders.Investigations that clinician has ordered are reviewed and discussed by expert peers, audit panels, or computerized systems. Hence, intervention is needed forimprovement.

Limitations of the study

There were a few limitations in this study; the sample size was limited. Studies with large sample size would draw a better conclusions. This study was a observational cross-sectional study which is not an ideal study.

CONCLUSION

Irrational use of investigation is a major challenge in health-care system. Several factors can promote irrational use of investigation at different stages. Hence, understanding these factors and implementing appropriate measures are key steps to change behavior of prescriber and nursing staff. We found that there are no set guidelines for laboratory investigations. Physician themselves decide to order investigations which may be rational or irrational. We must have logic-based flowchart or algorithm in all investigations for diagnosis as a part of good laboratory or good clinical practices.

ACKNOWLEDGMENT

I would like to acknowledge my sincere thanks to the Department of Biochemistry and the Department of Medicine and Orthopedic Govt. Medical College and M.B.S. Hospital, Kota.

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Source of Funding: None, **Conflicts of Interest:** None.