A study of 'Rational Use of Investigations' in a tertiary hospital

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ABSTRACT

Introduction: A cross-sectional study for the prevalence and features associated with Rational Use of Investigations in a tertiary hospital of North India. A scope is always there to further enhance evidence based teaching and practice in healthcare. Medical students should develop at some point of time of their studies or early in their career, a set of preferred investigation (P-investigation) which they could use rationally and regularly. Somehow, this choice of investigations is often made on irrational background e.g. by copying pedagogically the prescribing behaviour of their teachers or peers without considering alternatives or knowledge gained by them in choosing the best, efficacious, economical and productive set of investigations.

Objective: The objective of the study is to estimate the prevalence of rational use of investigations and its associated factors; to give practical advice on how to assist patients with reference to investigations; to enable the faculty to produce case specific P-investigations for their ready-reference.

Method: This study was conducted at the In-patient Department (IPD) of Jawaharlal Nehru Medical College & Hospital (JNMCH), Aligarh, India. In a period of 3 months, 90 patients were selected by random sampling with proportionate number from surgery and medicine wards. The prescribed investigations were analysed and compared by standard algorithm, made after group discussion with experts of the diagnosed case, in relation to investigations sought from the patients. Finally, a list of P-investigations was noted with proper reasons.

Result: In our study, we observed 42 different types of clinical and laboratory investigations out of 2653 investigations ordered by physicians before any intervention. These investigations were done in 90 patients. Among those, 70.1% were not considered to have contributed towards management of patients (mean avoidable 3.07% tests/patient/day). 20% of the patients were advised thrice or more routine blood test. Senior residents (SRs) ordered more laboratory examinations, but the percentage of avoidable tests requested by junior residents (JRs) was higher.

Conclusion: Patient of geriatric age groups, and those who are hospitalised for many days for reasons including case difficulty to establish a diagnosis were the factors independently associated with overuse of laboratory tests. We found that there is no set guideline for laboratory

investigations, physicians themselves decide to order investigations which may be rational or irrational. We must have logic based flow chart or algorithm in all investigations for diagnosis as a part of good laboratory or good clinical practices.

KEYWORDS: Rational investigations, tertiary hospital, P-investigations

INTRODUCTION

Traditional teaching in medicine was characterized by passive transfer and memorizing of information about drug classes and individual compounds. Medical science in general and therapeutics in particular is undergoing rapid change with an information explosion and it is important to train doctors for self-directed learning. Learning how to evaluate and analyze information is becoming an important skill. Solving problems in therapeutics, prescribing appropriate drugs for a disease condition and delivering drug and disease-related information in a meaningful way to patients should be regarded as key 'transferable skills' in Pharmacology. Irrational prescribing is a common problem and has been referred to as a 'habit which is difficult to cure'. Traditional teaching in medical schools does not prepare students for rational therapeutics. A survey in a medical school in the United Kingdom had revealed that medical students felt the need for more teaching of therapeutics in the undergraduate medical curriculum. Medical schools till recently used to spend less than 1% of the total teaching time on prescribing issues.

A method of orientating students towards therapeutics is to expose them to a sequential decision-making process for solving therapeutic problems. In 1994, a manual on the principles of rational prescribing called 'Guide to Good Prescribing' was developed by the World Health Organization (WHO) Action Program on Essential Drugs. In 2001, 'Teachers' Guide to Good Prescribing' was developed as a companion volume to help medical teachers better use the 'Guide to Good Prescribing' to teach undergraduate medical students (De Vries, et al). These manuals present students with a normative model for pharmacotherapeutic reasoning. Students are taught to develop a standard treatment for common disorders and a set of first-choice drugs called Personal or P-drugs. Students develop their set of P-drugs using National and International treatment guidelines, formularies, textbooks and other sources of drug information. A six-step problem solving approach is used to apply this set of P-drugs to specific patient problems.

Till now no exercise and teaching methodology is adopted for review of P-investigation. Like P-drug, similar approach can be applied for selecting of rational investigations. No comprehensive work is found on this subject. However, there are some algorithms for management of few diseases, but no precise algorithms are available to pursue investigations rationally (Fowkes F G et al).

The rational use of investigations requires that patients receive investigation(s) appropriate to their clinical needs, appropriate in number that meets their own individual requirements, at an adequate period of time, and at the lowest cost to them and their community (Winkens R, et al). It is observed, in principle, rational prescribing of investigation is not in practiced at most of the medical institutes. Structured training in rational approach for clinical investigations is relatively uncommon. Hence, there is a need to further enhance evidence based teaching and practice in healthcare (Knottnerus JA et al). In many medical schools, teaching is characterized by the transfer of knowledge including how to diagnose and use of drugs, rather than by skill to treat patients. Howsoever, in the last few decades a number of education programs have been developed to improve the teaching of pharmacotherapy but not rational approach to diagnose with minimal investigations. Medical student should develop at some time in the course of their studies or early in their career, a set of P-investigation similar to P-drugs concept which they could use regularly. This choice of investigation is often made pedagogically e.g. by copying prescribing behaviour of clinical teachers or peers without considering alternatives or knowledge how to choose between them. Logical structure to guide teachers and students through the process of rational approach of diagnosis particularly in selection of specific investigation from the long list of investigations and using the project for self study is probably beneficial in itself. However, medical students need to be trained in additional to the skill necessary to apply the method successfully in rational choice of investigation. Based on our observation, 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.

OBJECTIVES

Physicians are subject to many influences on their prescribing or ordering of investigations including scientific publications in favour of a particular investigation, commercial information and patient pressures. Thus, the objective of this study is to estimate prevalence of rational use of investigations and its associated confounding factors; explain the educational approach underlying the study; to explain how to teach rational approach of investigations; to assist in mobilizing support from problem based clinically oriented investigational teaching, to train the faculty of conventional medical school in rational choice of investigational techniques and enable the faculty to produce case specific preferred investigation (P-investigations) for their ready-reference.

METHOD

This study was conducted in the In-patient Department of a tertiary hospital (JNMCH, Aligarh, India). Ethical clearance was sought before embarking this study. In a period of 3 months, 90 patients were selected by simple random sampling with proportionate number from surgery and medicine wards. The prescribed investigations were analysed and compared by our own study. Patients were excluded from the analysis if (a) they were discharged in less than 48 h after admission; (b) they were admitted for a reason other than investigation (ie, patients diagnosed with cancer admitted for chemotherapy); (c) their medical records were incomplete or did not

contain information adequate for evaluating the rationale for and the usefulness of the ordered tests; and (d) if they had hospitalisation prolonged for social reasons unrelated to their disease course.

A standard algorithm for rational investigations were made after group discussion with experts of the diagnosed case, in relation to investigations sought from the patients. In these algorithm, a list of P-investigations was discussed with proper reasoning.

To assess the utility of laboratory tests ordered, an effort was made to determine whether they were ordered in logical combinations or sequences as listed in P-investigation. In this context, we adopted our modified method (Spiros Miyakis et al; Stillwell JA et al) for ordering of a laboratory test was regarded 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 dictate for ordering new laboratory tests at the given stage. In the same way, an abnormal result of a laboratory test was considered to be a case finding when there was no medical record documentation of clinical conditions associated with an abnormal test. For such case-finding tests, patients' charts were reviewed to determine the consequences of the abnormality; those tests were judged as inappropriate when they were not considered in planning for subsequent evaluation by the doctors ordering the test (Solomon DH et al).

All medical records were initially reviewed by two authors independently. When the two author gave discordant opinions on the usefulness of a test, the case was reviewed by a third, senior investigator. A preliminary analysis of data from 25 randomly selected medical records, performed before the beginning of the study showed that agreement between the two authors, as well as between the authors and the senior investigator was significantly beyond chance ($p<0.05$ in both instances).

RESULTS

For the 90 patients analysed, 2653 laboratory investigations were ordered overall. In all, 615 investigations were ordered in the wards on the day of admission, 359 (58.4%) among which were considered to be avoidable. By contrast, 1501 (73.6.%) of the 2038 investigations ordered beyond the first day of hospitalisation could have been avoided, without any effect on patient management (Figure 1).

The mean total number of laboratory investigations performed/patient/day was 4.38, whereas the mean number of avoidable tests/patient/day was 3.07. Thus, 70.1 % of the laboratory investigation ordered did not seem to have contributed towards the management of patients (Figure 2).

The most common investigation was full blood count, blood sugar, and renal function test which influenced the diagnosis in only 13.3%, 18.8 and 0% of cases respectively and influenced the management of 8.8%, 11.2% and 14.1% of patients respectively .

Amylase (47.1%) and artirial blood gas (34.4%) was found to be most helpful investigation while cardiac enzymes, clotting studies, blood cross-match were not helpful in influencing the diagnosis and most of other investigations were helpful in less than 10% of patients.

Analysis of patient groups showed that overall, as well as avoidable, ordering of investigations was higher for patients ⩾60 years in comparison with the younger patients, for patients staying in hospital for >5 days and for patients who died or were discharged without a definite diagnosis. Investigations ordered by consultants and senior residents were more in comparison with those by junior residents (see table 1). However, the number of avoidable tests ordered did not differ significantly between senior and junior trainees, but the percentage of avoidable investigations requested by junior residents was higher. Of all patients we studied none (100%) had any medical insurance to cover costly investigation ordered to them (see table 2 for average cost of investigations). Furthermore none of the patients knew ADR related to ordered investigations.

There were only 6 noninvasive procedures out of 42 total procedures. These 6 noninvasive procedures account for 291 total investigations out of total 2653 investigations, i.e. only 10.9%. Additionally, in 72 patients minimum one of noninvasive investigation was done out of 90 patients.

It was seen that many investigation were used more than once in same patient but they were according to rational use, i.e. Haemogram was advised on an average 3 times to 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 who only required once. For example USG, X-ray, Malaria parasite, Bone marrow aspiration were seen advised more than once in some patients which could be avoidable.

DISCUSSION

Patient of geriatric age groups, and those who are hospitalized for many days and increased case difficulty to establish a diagnosis were factors independently associated with overuse of laboratory tests. We found that there is no set guideline for laboratory investigations, physicians themselves decide to order investigations which may be rational or irrational. We must have at least most logic based flow chart or algorithm in all investigations for diagnosis.

Our results are in consonance with other similar studies (Miyakis S et al; Ruangkanchanasetr S). Reasons for unnecessary testing may include overzealous documentation, medicolegal considerations, fear of malpractice, excessive use of tests for monitoring treatment and progress or in searches for unforeseen problems, fear of censure by seniors, entertainment of obscure diagnoses, abnormal prior test results, increase in automation, contacts with private investigations labs, building of a personal data base, public relations, and profit, in addition to

valid clinical indications. On obtaining abnormal test result, doctors go for more investigations, not knowing that about 5% results are outside reference range (Tierney WM et al & Bulusu S).

This practice has led to decreased utilization of the basic skills of history taking and physical examination (Shankar PR et al). It affects the quality of patient care as 'quality' is meeting the needs and expectations of those whom we serve, most efficiently, with a minimum of waste. Inappropriate uses of laboratory services impose a burden not only on the patient but also on the healthcare system as a whole (van Walraven C et al). Investigation check list which is common in some private hospital should be available in Government tertiary hospital. WHO should publish guidelines for good rational use of investigations like guideline available for rational use of medications (Tisonova J et al).

Problem-based learning of pharmacotherapy and the P-investigation concept should be introduced in medical schools the world over (Michel MC et al). Problem-oriented pharmacotherapy teaching has been identified as a key intervention for promoting the more rational use of medicines (Eisenberg JM & Joshi MP).

The steps will certainly be helpful in developing an attitude of correct, precise and rational investigations (Nardella et al). Student will take the usual formative and summative tests with the added input on rational selection of investigations.

Guidelines on Rationing, Form design, Resource management, Financial unbundling, Education relating to test requesting, Cost awareness, Decision support systems, Protocols, Personal incentives, Feedback and Review of patient notes should be brought in practice for decreasing the over utilization of laboratory investigations (Young DW & Weydert et al). UG and PG exams should focus more on clinical case based MCQ as seen in USMLE and PLAB. There should be audit represents monitoring system for rational; use of investigations which review and discuss the rationality.

Ironically, sometime patients are asked to get investigated repeatedly from private laboratory set-up just for the sake of convenience and satisfaction of few doctors (Bates DW et al). Thus, the rational use of investigations depend upon correct diagnosis, correct order of investigation, appropriate indication, appropriate tests and examinations as regards to efficacy, safety, suitability for the patient and cost, appropriate in number, administration and duration, contraindications, correct order, including appropriate information for patients, patient adherence to analysis of various tests methodology. Similarly strategies to promote the rational use of investigations should be made such as identification of the problem, noting of trends in the prescribing and use of investigations, developing evidence based standard investigational guidelines, lists and methods of various investigations (Hindmarsh JT et al & Walley T et al), drugs and therapeutics committees (DTCs), independent information on investigations through bulletins, leaflets, articles, media etc, educational strategies to inform health providers and health professionals, public education about irrational and rational use of investigations so that consumers are well informed, managerial strategies to guide clinical practice through information systems, formularies, therapeutic and investigational guidelines, etc., appropriate and enforced investigational regulation (Wong ET el al).

CONCLUSION

Our study will help in saving time, resources, rapid diagnosis and minimization of unnecessary burden which indirectly helps the society, healthcare setup and is also environmental friendly.

P-investigation or Rational Use of Investigations in the management of patient as a part of Good Clinical Practice is appreciated by all clinicians. The assessment process including formation of algorithm requires improvement. Training on P-investigations during the clinical years and internship training is to be started. Formative assessment for this new method can be considered. The physical infrastructure needs improvement. There were practical problems in certain aspects of the P-investigation selection process. Practical prescribing skills should be more emphasized

STUDY LIMITATIONS

Rationality is not only based on clinical diagnosis and patients, but also on many other factors such as condition of patient at the time of ordering investigations, patient's pressure, contacts with private investigations labs, which cant not be completely evaluated in this short research. Also existing culture is that no physician wants to take risk in order to avoid act of omission perhaps because of laws like Consumer Protection Act (CPA).

ACKNOWLEDGMENT

The authors acknowledge Indian Council of Medical Research (ICMR) for granting STS ICMR project to Yasir Alvi, and FAIMER Regional Institute, Christian Medical College, Ludhiana, for granting FAIMER project to Syed Ziaur Rahman. The authors are also grateful to all the experts of clinical departments, JNMC, AMU, Aligarh, for giving their frank opinion on rational approach for investigations, and to many hundreds of patients participating in the Study.

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Table 1: Important demographical results obtained

No. of patients	90
Mean age	40.5 yr
Males %	71.1
No. of different types of investigations	42
Total no. of investigations	2653
Inv. ordered by consultants and SR	2071
Inv. ordered by JR	582
Invasive : Noninvasive	2362 : 291
Mean duration of hospital stay	8.8 days

Table 2 Average cost of ordered investigations in Rs.

Average cost of ordered investigations in Rs.			
		Charge in hospital	Charge outside
Hb		free	50
TLC DLC		free	50
GBP		35	100
ESR		free	50
Ab. Eosinophil		free	70
Plateletes		free	50
Blood sugar		free	50
Blood urea		free	100
SC		free	75
SP		30	100
S Amy/Lipase		free	50
LFT		free	250
Acid Base		100	100
SE		70	200
SE with S.Cal		105	250
RFT		free	75
Lipid profile		200	250
BT CT		10	50
PT		100	100
Urine	Exam	free	50
	Culture	50	150
Stool	Exam	free	50
	Culture	50	150
ECG		70	150
USG		150	500
Xray		70	150
CT Scan	Small without contrast	800	1500
	Small with contrast	1200	2000
	Large withcontrast	2400	6000
Colour doppler		300	500
MRI		2500	4500 to 7500
Endoscopy		200	1000
Malaria paracite	smear	Free	50
	QBC	75	150
Cytology/FNAC		free	150
Ascitic fluid ta		75	200
BM aspiration		50	200
PFT		25	100
Blood culture		25	150
Pus culture		free	150
HIV ELISA		free	150
Mtx PPD		free	100
WIDAL		30	150
HBS Ag		75	200
Thyroid pro		300	500

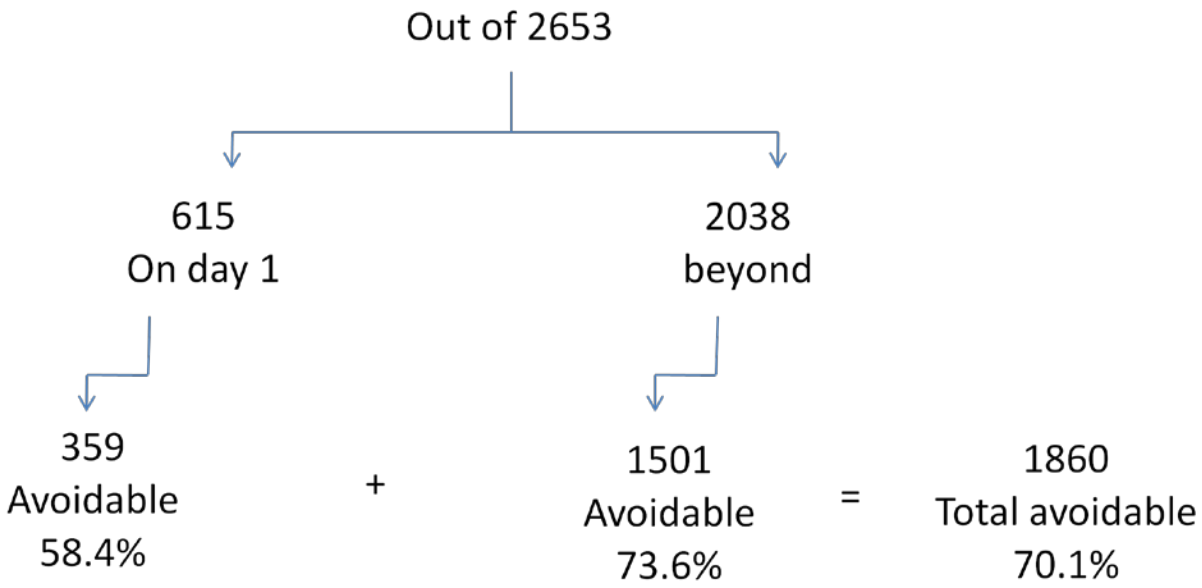

Figure 1: Flow chart of the number of avoidable investigations on different days

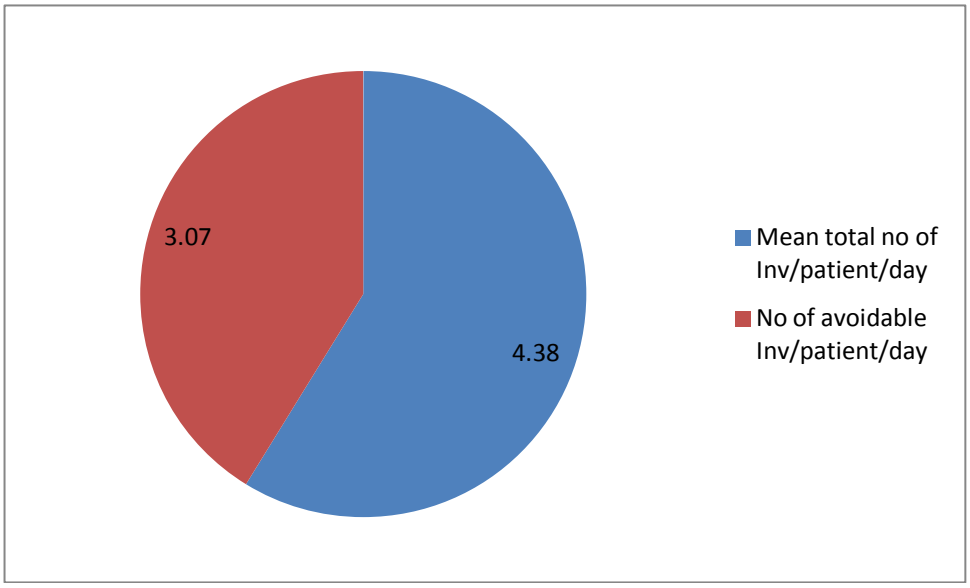

Figure 2: Laboratory investigations (total and avoidable) /patient/day