

## ORIGINAL ARTICLE

# The role of pre-operative investigations in relatively healthy general surgical patients- a retrospective study

Alka Chandra, MD, DNB, MBA (HM)\*, Vijay Thakur, DA\*\*,  
Nikhil Bhasin, DNB\*\*\*, Dheeraj Gupta, DNB\*\*\*\*

*\*Senior specialist; \*\* Consultant & Head; \*\*\*3rd year trainee; \*\*\*\*Specialist  
Department of Anesthesiology and Critical Care, Hindurao Hospital, New Delhi (India).*

**Correspondence:** Dr Alka Chandra, 802 South Delhi Apartments, Dwarka, New Delhi (India); E-mail: dralkadelhi@yahoo.co.in

## ABSTRACT

**Background:** Pre-operative testing has been criticized as having little impact on peri-operative outcomes. The aim of this study was to establish the number of unnecessary pre-operative investigations undertaken in American Society of Anesthesiologists (ASA) Grade I patients undergoing general surgery.

**Methodology:** The clinical record of 1200 patients, who underwent surgery in a period of 6 months from June 2012 to December 2012, were screened, out of which record of 500 ASA-I patients, aged 15-50 years, undergoing cholecystectomy and hernia repair were reviewed. Pre-operative investigations were assessed in terms of frequency of use and abnormalities detected. It was also checked whether the abnormal results altered the patient's management. The peri-operative complications if any were noted and their co-relation to the investigations was established. The total cost of investigations was calculated.

**Result:** All 100% of the patients had had preoperative tests for hemoglobin, total leucocyte count, differential leucocyte count, urine routine examination, random blood sugar and blood urea levels. Platelet count was done in 90%, serum creatinine in 50%, liver function tests in 55%, x-ray chest in 94% and electrocardiogram in 84% of the patients. No change in the plan of anesthesia was made in any of these cases. 7.5% of the patients required some intra-operative or post-operative intervention. The total cost of processing the requested investigations as per the list provided by the Central Government Health Services (CGHS) was Rs 3,62,125 or IRs. 724.25 per patient.

**Conclusion:** We conclude that routine pre-operative investigations are unnecessary in ASA Grade-I patients undergoing low to moderate risk general surgery. There is a need to have guidelines for indicated tests in different groups of diseases and procedures, to be ordered by the anesthesiologists to prevent unnecessary wastage of time, money, and resources and to avoid overburdening laboratory staff.

**Key words:** Preanesthetic evaluation; Routine pre-operative tests; Screening tests

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## INTRODUCTION

Traditionally, routine investigations prior to surgery are considered an important element of preanesthetic evaluation to determine the fitness for anesthesia and surgery. During the past few decades this practice has been a subject of close scrutiny due to low yield and high aggregate cost. Performing routine screening tests in patients who are otherwise healthy is invariably of little value in detecting diseases and in changing the anesthetic management or outcome. Thorough history

and investigations of positive answers by the clinician, combined with physical examination of patient represents the best method for screening diseases followed by few selective tests as guided by patients health condition, invasiveness of planned surgery and potential for blood loss.<sup>1</sup> The preoperative risk assessment is an important part of the anesthetic care of patients and contributes in determining the required anesthetic policy and the resources needed during and after surgery.<sup>2-4</sup> Studies have shown that collecting unnecessary information and doing

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unnecessary tests leads to diverting attention to issues that are unimportant for the preoperative assessment.<sup>5,6</sup>

The investigations requested for surgery are often ordered by either the surgeon, or the anesthesiologist running the PAC clinic, in our hospital. We hypothesized that ordering selective investigations for clinically healthy surgical patients as directed by the anesthetic staff in the preanesthetic clinic will reduce the cost, save time and reduce laboratory loads, without sacrificing quality of care.

### METHODOLOGY

Approval of our ethics committee was obtained before the study and the requirement for informed consent from patients was waived off because of the observational nature of the study. A retrospective data analysis of ASA grade-1 patients in the age group of 15-50 years, undergoing either cholecystectomy (laparoscopic/open) or hernia repair during a 6 month period from June 2012 till December 2012 was done. Data were obtained from inpatient files of medical record department (MRD) of our hospital. Preoperative investigations ordered in these patients were assessed in terms of frequency of each test and any abnormalities detected. Tally marks were used manually to calculate the number of investigations done and the number of abnormal investigations from the pre-anesthetic check-up (PAC) sheets of the patients. The abnormal results were checked for clinical significance and whether the results altered the patients' management by reviewing the anesthetist's notes as well as the case sheets of the patients for any perioperative complications. The cost of each blood test was calculated so that potential savings could be identified.

The interpretation of the test results was based on the normal range of values recommended by the pathology department of the hospital. The type and number of blood tests were established and any abnormal results were checked to see whether the results were significant. A significant abnormal result was defined as that which led to a change in patient management or could be related to a perioperative adverse event as documented in the case file. The total cost of all investigations was calculated based on the rates fixed by Central Government Health Services.

**Data Analysis:** Our study was a cross-sectional retrospective study. The data were collected from the MRD as per the protocol and the observations were tabulated by calculating the percentage.

### RESULTS

We reviewed the medical records of 1200 patients, out of which 500 patients fulfilled our inclusion criteria. The types of operations are summarized in Table 1. The percentage of patients undergoing each preoperative test and percentage of abnormal results are summarized in Table 2.

**Table 1: Types of surgical operations**

Surgical operations	N(%)
Open cholecystectomy	160(32)
Laparoscopic cholecystectomy	190(38)
Inguinal hernioraphy.	115(23)
Epigastric hernia repair.	35(7)

**Table 2: Summary of pre-operative tests and treatment changes**

Test	Tests ordered*	Abnormal tests (%)
Hemoglobin	100	32.50
Total leucocyte count	100	
Differential leucocyte count	100	
Urine R/E**	100	7
Random blood sugar	100	0
Blood urea	100	0.50
X-Ray chest	94	11
Platelet count	90	7.50
Electrocardiogram	84	9
Liver function test	55	8.50
Serum creatinine	50	0.50

**Key:**

\*Percent patients in which test ordered

\*\*Routine examination including tests for sugar, albumen, and microscopic slide examination

In spite of the abnormalities detected in the preoperative investigations all the patients proceeded for the elective surgeries. No specific change in the anesthetic management was made in any of these patients. With 55(11%) of patients with positive x-ray findings only 10(2%) of them developed bronchospasm which was managed with inhaled bronchodilators and steroids. The adverse events that occurred in the post-operative period were inadequate pain control, nausea and/or vomiting.

From the charts reviewed of all the patients in the study group 37(7.5%) of patients required perioperative intervention, which was mainly in the form of administration of nitroglycerin infusion for high blood pressure in laparoscopic surgery for patients, who were not known hypertensives, and treatment for bronchospasm. Surgical complications like damage to bile ducts and excessive blood loss also occurred in some patients which were not related to anesthesia. The total cost of processing the requested investigations as per the list provided by Central Government Health Services was IRs. 362,125.00 or IRs. 724.25 per patient.

## DISCUSSION

In our study all patients of ASA grade-1 undergoing low to moderate risk surgery had preoperative screening tests. Table 3 shows the percentage of the patients who had a deviation from the normal values of their screening tests. There were no tests that resulted in a change of patient management nor required treatment. The abnormal results from the blood tests were mildly raised white blood cells, increased eosinophil count, decreased platelet count and increased values of liver enzymes. The abnormal biochemistry results were marginal from the normal values and did not help in establishing new medical diagnosis for any of the patients. The explanation to these abnormal results in ASA-1 patients may be given as; the normal range of values of most blood test includes only 95% of the healthy population. If more tests are performed on healthy individuals more abnormal results will be seen. The false positive results are another reason beyond these abnormal results.<sup>7</sup>

Turnbull and Buck conducted a study on the value of preoperative screening investigations in otherwise healthy individuals and stated that when compared with the results of the history and physical examination, routine preoperative investigations provided little further information that altered management in otherwise healthy surgical patients undergoing cholecystectomy.<sup>8</sup> Smetana and Macpherson have shown that all “routine” laboratory tests before surgery have limited clinical value. They have advised that clinicians should order only a small number of routine tests based on patient age. Selective use of other preoperative tests should be based on history and physical examination findings that identify subgroups of patients who were likely to have abnormal results. In general, clinicians should order tests only if the outcome of an abnormal test will influence management. Physicians and institutions recommending routine preoperative testing for all patients provide no clinical value to their patients and they do so at considerable cost.<sup>9</sup>

In our study, we found abnormal findings in chest x-rays of 11% (55) patients commented as prominent bronchovascular markings, calcified lesions suggestive of old healed Koch's, fibrotic bands, emphysematous changes and signs of chronic obstructive airway disease. Two percent (10) of these patients developed intraoperative bronchospasm which was successfully managed by inhaled bronchodilators and steroids. A few patients, who had no positive history nor any x-ray findings, also developed bronchospasm which could be linked to lighter plane of anesthesia. The benefit of chest x-ray examination performed as a part of preanesthetic evaluation processes has long been debated.<sup>10</sup> There is convincing evidence that chest x-ray examination yields little information of benefit in reducing the risk of surgical procedure even if

abnormalities are detected.<sup>11</sup>

In our study, 45(9%) of the patients had abnormal findings in the ECG which were reported as left axis deviation, non-specific ST-T changes, right bundle branch block, T wave inversion in few leads or slurring of 'R' waves in inferior leads. None of these changes required any active intervention nor changed the anesthetic management. A few patients developed intra-operative hypertension without significant previous history of hypertension or any significant ECG changes.

Most institutions use age as a criterion for ordering tests especially ECG. If such a policy is used, a threshold of 60 years or older is probably most appropriate. However, a patient with good functional capacity who is undergoing a low risk procedure does not need cardiac testing.<sup>12</sup> A test is likely to be indicated only if it can correctly identify abnormalities and will change the diagnosis, the management plan or the patient's outcome. Needless testing is expensive, may unnecessarily delay the operation and puts the patient at risk for unnecessary interventions.<sup>13</sup> Minimum tests of hemoglobin and urinalysis seems to be adequate in clinically healthy patients for standard surgeries of less than two hours. Diagnostic studies should only be used as an adjunct to the findings obtained from a review of medical history followed by physical examination to preclude the silent condition which can influence the anesthetic management and perioperative outcome. Individualization of test selection to a minimum would be preferred approach to the diagnostic services in the preanesthetic assessment.<sup>14</sup> Alazzarvi did a retrospective study to establish the number of unnecessary preoperative blood tests undertaken in ASA grade-1 patients undergoing minor/moderate orthopedic trauma surgery. 75% had either one or more preoperative blood tests, of which 41% were abnormal but of no clinical significance. They concluded that preoperative blood tests are unnecessary in ASA grade-1 patients undergoing minor/moderate orthopedic trauma surgery. Unnecessary blood tests can waste time, resources and overburden laboratory staff.<sup>15</sup> An important reason of overtesting in teaching institutes is the belief among junior staff that consultants wanted them or simply by force of habit that is passed down through successive generations of junior staff.<sup>16</sup> When compared to surgeon-ordered testing, anesthesiologist-ordered testing was more focused and less costly.<sup>17</sup>

We calculated an amount of Rs 362,125.00 spent in 6 months time. In developing countries there should be a rational use of limited resources when the demand is unlimited. In addition to cost-saving the man hours of the laboratory staff could be reduced if only indicated tests were carried out. The waiting time of the patients and their satisfaction level has, however, not been taken into consideration.

## CONCLUSION

A large percentage of preoperative tests ordered by either the surgeon or the anesthetist at our institution are not indicated. Eliminating unindicated tests would reduce the financial burden of the hospital and prevent the wastage of

time. The existing international guidelines or protocols can be implemented as such or modified based on local needs. Alternatively, the regional societies of anesthesiologists could come up with their own consensus guidelines that suit local population and hospitals.

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