

## Pre-Operative Risk Scores To Predict the Surgical Outcomes in Laparotomies

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**Abstract: Background:** Laparotomies are the most commonly performed surgical procedures in both emergency as well as elective setups in most hospitals and is associated with a high mortality. Therefore it is important to estimate the risk of mortality using a suitable scoring system by assessing the preoperative and intra-operative findings and parameters. Various scoring systems like APACHE-2, P-POSSUM are most commonly used scoring systems.

**Method:** We are going to identify risk scores in patients admitting at the Department of General Surgery, Coimbatore Medical College hospital who are requiring laparotomies both emergency as well as elective by using P-POSSUM scoring system.

**Conclusion:** This study proves the effectiveness of P-POSSUM score in predicting the post operative outcomes. P-POSSUM can be used for surgical audit to assess and improve the quality of surgical care and result in better outcome of the patient

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### I. Introduction

Prediction of complications and mortality are important part of risk management in surgery. Estimating the preoperative risk factors helps in improving the quality of surgical cases and cost reduction in surgery. Surgeons have to inform the patient about the potential risks involved with a particular surgery. Therefore it is important to identify high risk patient and make appropriate decision to prevent mortality and morbidity.

Various scoring systems are available for predicting these risks. The scoring systems may be general scoring system or surgery specific scoring system. Some of them designed to predict post operative mortality and some to predict post operative morbidity. The following are some of the scoring systems available to predict post operative outcomes-Universal ACS NSQIP Surgical Risk Calculator, ASA physical status score, APGAR score for surgery, CORES, E-PASS, APACHE 2,SAPS,MODS,SOFA,MOF score.

The Physiological and Operative Severity Score for the enumeration of Mortality and Morbidity [POSSUM] has been used to produce numerical estimate of expected mortality and morbidity after variety of surgical procedures. It integrates well in the existing hospital programs without causing any disruptions of hospital activities and requires intra operative information's.

Compared to other scoring systems, POSSUM results were much more useful in predicting the outcome of surgery. It was noted that the POSSUM score has been over predicting the mortality especially with minor procedures, the Portsmouth POSSUM model was developed which utilizes a linear method of analysis providing a 'good fitness' on the observed mortality.

This study is performed to identify risk scores in patients who are requiring laparotomies both elective as well as emergency by using P-POSSUM scoring.

### II. Aim And Objective

To study the impact of preoperative and intra-operative risk scores on the surgical outcomes in emergency as well as elective laparotomies using P-POSSUM scoring system. To predict post operative morbidity and mortality in patients undergoing laparotomies.

### III. Materials And Methods

STUDY DESIGN : Cohort study  
STUDY PERIOD : January 2017 to December 2017  
STUDY PLACE : Department of General Surgery,  
Coimbatore Medical College Hospital,Coimbatore.  
STUDY POPULATION : A total number of hundred patients who underwent laparotomy both elective and emergency in all the surgical units of Coimbatore Medical College Hospital.

**INCLUSION CRITERIA:**

- Patients undergoing emergency as well as elective laparotomies at the Department of General Surgery, Coimbatore Medical College Hospital
- Age 18 years and above

**EXCLUSION CRITERIA:**

- Patients below 18 years of age
- Associated co-morbidities like decompensated liver disease, chronic kidney disease, sepsis, Immunocompromised states.

**IV. Methodology**

Hundred patients undergoing emergency as well as elective laparotomy in the General Surgery Department at Coimbatore Medical College Hospital were studied during the period of January 2017 to December 2017 for a period of twelve months.

A detailed clinical history was taken, clinical examination and relevant investigations done and patients are prepared for surgery. Anaesthetic assessment and fitness are obtained. After complete evaluation patient is taken up for surgery. Informed and written consent obtained. The surgical procedure and its complications are well explained. The findings are recorded and the patients are monitored during surgery.

After smooth recovery from anaesthesia, patients are observed and managed with adequate analgesia. Vitals, wound site care, drains are monitored frequently.

The pre-operative and post-operative findings are recorded. Patient is followed up post-operatively. After oral diet, drain removal, oral drugs, patient reviewed after one week, one month and followed up for three to twelve months and observations recorded.

**V. Outcome:**

P-POSSUM is a commonly used scoring system which can be used for evaluating the preoperative risks and to predict the outcomes of laparotomies and also has an impact on improving the quality of treatment provided to patients undergoing laparotomies. It has a physiological severity score with fourteen variables with a minimum score of 12 and maximum of 88 and operative severity score with six variables with a minimum score of 9 and maximum of 44.

**VI. Discussion**

The main goal in medical care is to provide quality care to the patient to reduce the adverse outcome. Therefore it is mandatory to compare these adverse outcomes to assess the adequacy of patient care and to identify new treatment protocols. But the comparison of outcomes following surgeries based on crude death rates alone will not be sufficient as it is important to consider other factors like the disease, the general condition of the patient, the type of surgical procedure, etc.. To overcome these drawbacks the POSSUM scoring system was developed.

P-POSSUM, a modification of POSSUM, has been developed as a better scoring system as it correlates with the observed mortality rate. For an effective P-POSSUM scoring it has been correlated with the general health of the patients. In our study we assessed the validity of P-POSSUM in 100 major gastrointestinal surgeries by comparing the observed mortality rate with expected mortality rate. 4 patients died (mortality rates of 4% (emergency), the total crude mortality rate being 4%). Tekkis and others obtained results as follows (elective = 3.9%, emergency 25% and overall mortality rate of 11.1. Similar findings were obtained by Yii MK and Ng KJ19 (O: E = 1.28), Tekkis15 (O: E = 0.98) and Mohil 20 (O: E = 0.66,  $\chi^2 = 5.33$ , 9 d.f.,  $p = 0.619$ ). On analysing the risk factors we found positive rate of increment with all the risk factors studied but it was found to be statistically significant with respect to physiological severity score ( $p = 0.000 < 0.05$ ), operative severity score ( $p = 0.003 < 0.05$ ). Various factors like decreased immunity and cachexia resulting from malignancy, ischemia and impaired haemostasis resulting from blood loss, uraemia resulting in decreased healing rates, impaired immunity, leucocytosis correlating with the degree of inflammation, toxemia, hyponatremia resulting into impaired physiological response could be attributed to the effect of these factors on post-operative mortality rate. Therefore adequate and prompt correction can definitely be expected to cause a decrease in adverse outcome rates.

Tekkis and others found that total blood loss was not significant enough to alter their statistical analysis in their study but their study predominantly involved elective cases (66%) in a super speciality setting. Wound infection (92 cases, 34%) and chest infections (71 cases, 26%) accounted for the majority of complications. Similar results were obtained by Mohil RS (35% and 20% respectively). Wound infections could be attributed to the large number of patients who had gross peritoneal contamination resulting from hollow visceral perforation

resulting in local contamination of the incision site. A raised diaphragm, upper abdominal incision and gross peritoneal contamination resulting into higher rates of chest infections in our group.

## VII. Conclusion

We studied 100 laparotomies, both elective (36%) and emergency cases (64%), which resulted in 4 deaths (4% mortality rate). The present study suggests that P-POSSUM is an accurate scoring system for predicting post operative adverse outcome among patients undergoing major general surgeries.

Wound infection and chest infection are major post operative complications following laparotomies, which should be prevented. Septicemia is the cause for almost all the deaths and care should be given to prevent septicemia.

All the deaths occurred were following emergency laparotomy and with higher physiological and operative severity score, which should be taken into account.

Therefore this study proves the effectiveness of P-POSSUM score in predicting the post operative outcomes. P-POSSUM can be used for surgical audit to assess and improve the quality of surgical care and result in better outcome of the patient.

## Summary

About 100 patients who were admitted in the Department of General Surgery and underwent laparotomy—both elective and emergency—were studied over a period of 1 year from January 2017 to December 2017. The study group consisted of 36 elective and 64 emergency cases. Duodenal perforation (17 cases), malignancy (15 cases), intestinal obstruction (12 cases), ileal perforation (5 cases), gastric perforation (6 cases), appendicular perforations (2 cases), obstructed hernia (2 cases), open cholecystectomy (7 cases), sigmoid volvulus (4 cases) and colostomy (11 cases) were the indications for which the patients were subjected for surgery. They were scored using P-POSSUM scoring system, physiological scoring was done at the time of admission and operative scoring was done intraoperatively. The physiological severity score had 14 variables with a minimum score of 12 and maximum score of 88. The operative severity score contains 6 variables with a minimum score of 9 and maximum score of 44. They were followed up for the first 30 day post operative period for any complications and the outcome was noted.

Wound infection and dehiscence (4 cases), chest infections (4 cases), faecal fistula (4 cases), septicemia (4 cases) are the complications that developed.

The mean hospital stay also showed an increment with the increase in physiological as well as operative severity scores and also with an increase in the overall score.

The mortality rate was found to be about 4%, all following emergency laparotomies. The deaths were associated with both high physiological severity score as well as high operative severity score.

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