DISSERTATION ON

Efficacy of the P-POSSUM Scoring system in prediction of post operative mortality and morbidity in patients undergoing emergency laparotomy in our institute

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CERTIFICATE

This is to certify that dissertation entitled, **Efficacy of the P-POSSUM Scoring system in prediction of post operative mortality and morbidity in patients undergoing emergency laparotomy in our institute**; is a bonafide record of work done by **Dr.Atreya Subramanian**, in the Department of General Surgery, Stanley Medical College, Chennai, during his Post Graduate Course from 2015-2018 under the guidance and supervision of **Prof.Dr.T.SIVAKUMAR, M.S.**, This is submitted in partial fulfilment for the award of **M.S. DEGREE EXAMINATION- BRANCH I (GENERAL SURGERY)** to be held in April 2018 under the **Tamilnadu, DR.M.G.R. Medical University, Chennai.**

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DECLARATION

I declare that this dissertation entitled" Efficacy of the P-POSSUM Scoring system in prediction of post operative mortality and morbidity in patients undergoing emergency laparotomy in our institute" is a record of work done by me in the Department of General Surgery, Stanley Medical College, Chennai, during my Post Graduate Course from 2015-2018 under the guidance and supervision of my unit chief **PROF.DR.T.SIVAKUMAR M.S.** It is submitted in partial fulfillment for the award of M.S. DEGREE EXAMINATION – BRANCH I (GENERAL SURGERY) to be held in April 2018 under the Tamilnadu Dr.M.G.R. Medical University, Chennai. This record of work has not been submitted previously by me for the award of any degree or diploma from any other university.

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CONTENTS

INTRODUCTION

In an era where resources are constrained and the expectations of medical personnel are insurmountable, scoring systems provide us with an indispensable tool for not only triage of critically ill patients but to provide a quantitative assessment of the degree of severity of the particular condition to allow more than just an intuitive idea, and to provide a more realistic expectation of the patient's outcome.

It is also imperative to assess the efficiency of a particular procedure along with the quality of health care provided. Comparing crude mortality and morbidity rates is a fallacious exercise, owing to variations in general health of a local population and variable presentations in the patient population.

Scoring systems are designed to rate the severity of an illness at an early stage, and used for comparison of different clinical settings to identify different standards of care and to allocate adequate resources.

An accurate risk adjusted scoring system, is one which should be patient specific and incorporate the influence of the diagnosis for which he or she is being subjected for surgery. It should take into consideration whether the procedure is elective or emergency and incorporate all the

variable presentations of each patient as well as be an indicator of the efficiency of the procedure itself. Such scoring systems should be used as indicators for quality of health care provided for patients as well as an index to evaluate the outcome of the procedure to compare operative techniques among surgeons.

One such popular scoring system is the Acute Physiology and Chronic Health Evaluation (APACHE) system which is designed to assess the severity of illness of patients in intensive care units (ICUs). [1] But this system doesn't take into consideration intra-operative parameters. Another system of assessment of operative severity is the POSSUM scoring system which compiles both physiological and intraoperative criteria to predict post operative mortality and morbidity. This scoring system has proven to be not very cumbersome at the same time fairly accurate.

Sagar P M[2] evaluated the feasibility of POSSUM scoring system for predicting adverse outcome rate following colorectal resection and its use for comparative audit. 248 patients undergoing colorectal resection in 2 different units were studied and POSSUM scoring system was applied . POSSUM predicted mortality rates of 5.02% in unit A(observed 6%) and 9.8% in unit B(observed 9%) denoted that observed to expected ratio was

nearly identical in both the units. They concluded by validating POSSUM scoring system in patients undergoing colorectal surgery and also its efficacy in comparative audit.

The efficacy of POSSUM and its modification of the scoring system i.e P-Possum (Portsmouth possum) has been claimed to be an improvement over its predecessor and has been discussed in detail in this thesis.

AIM AND OBJECTIVES

This study aims to assess the efficacy of the scoring system by comparing the observed and expected rates of mortality**.**

- To calculate the rates of predicted mortality in the cases taken for emergency laparotomy and calculate efficacy in predicting the mortality rates.

- To calculate the rates of predicted morbidity in the cases taken for emergency laparotomy and calculate efficacy in predicting the morbidity rates by taking into account factors like:

    1. Wound site infection

    2. Other systemic infections(UTI, Pneumonia etc.)

    3. Deep vein thrombosis and its complications

    4. Fistula formation

    5. Burst abdomen and wound dehiscence

- To assess the most common causes for taking a patient emergency laparotomy and most commonly encountered morbidities associated with emergency laparotomy.

REVIEW OF LITERATURE

POSSUM stands for Physiological and Operative Severity Score for the enUmeration of Mortality and Morbidity. It was developed by Copeland et al[3] in 1991in an effort to normalize patient data so as to allow direct comparisons of patient outcome despite varying patterns of referral and populations. The study originally assessed 48 physiological and 14 intra-operative and post-operative factors for each patient. Using multivariate analysis techniques, these were reduced to 12 physiological and 6 operative factors. The difference between the 2 sets was not found to be very significant which is why the less cumbersome procedure of taking only 12 physiological and 6 intra-operative variables has become popular.

The physiological and operative scores as shown in the table are assigned 4 grades , each with an increasing exponential score (1,2,4 and 8). The physiological variables are those which are apparent at or just before the time of surgery and include clinical symptoms and signs (Age , GCS, cardiovascular and respiratory findings),vital parameters (systolic BP and pulse rate) standard biochemical(serum urea, sodium and potassium), hematological tests (hemoglobin and total white cell count) and any ECG changes.

The intra-operative variables include operative severity which is a measure of the scale of the surgery. Minor procedures include excision of small swellings in the subcutaneous plan like lipomas or excision of other swellings like a fibroadenoma. Surgeries of moderate severity include any appendicectomy, cholecystectomy, mastectomy or a transurethral resection of prostate. Surgeries of major severity include any laparotomy, bowel resection , cholecystectomy with choledochotomy, peripheral vascular procedure or any major amputation. Surgeries of major+ severity includes any aortic procedure , abdominoperenial resection, pancreatic or liver resection, oesophagectomies etc.

The other factors include the number of procedures done(the chronology of the procedure within 30 days), the total intra-operative blood loss, the extent of peritoneal soiling in case of a perforation or abscess collection. It also includes the extent of spread in case of malignancy and the urgency of the surgery i.e whether the patient needs to be resuscitated or needs to be wheeled in immediately for some life saving intervention.

The highest score is given to the most deranged value. The minimum total score is 18 and the maximum score is 136. The highest physiological score being 88 lowest being 12.The highest operative score

is 48 and the lowest being 6.POSSUM scores derived from the physiological score is an index of pre-operative severity, and that derived form intra-operative data is operative severity. The combination hence provides a better system in predicting morbidity and mortality rates. Once the data of both the physiological and operative scores are combined, the following equation is applied to predict the morbidity and mortality rates.

Morbidity:

$$\text{Log}_e[R/1-R] = -5.91 + (0.16\text{x physiological score}) + (0.19\text{xoperative score})$$

Where R=risk of morbidity.

Mortality:

$$\text{Log}_e[R/1-R] = -7.04 + (0.13 \text{ x physiological sore}) + (0.16\text{x operative score})$$

Where R= risk of mortality.

The predictive value of these equations was assessed and validated by the determination of receiver operative characteristic curves.

Murray G D[4] suggested that statistical remodelling is required for predicting the quality of care and comparison using crude mortality rates as not a good method.

Jones H J S and De Cossart L [5] performed a meta analysis of the various scoring systems available for risk scoring in surgical patients by comparing ASA, Goldman cardiac index, prognostic nutritional index, hospital prognostic index, APACHE II, POSSUM and P-POSSUM scoring systems. They suggested that POSSUM and P-POSSUM scoring systems could be used because of their easy applicability , usage of routine pre-operative investigations and could serve as an important risk scoring tool.

Whitley M S from Portsmouth University , England evaluated the POSSUM scoring system in a study that included 1485 patients undergoing general surgical procedures. Mortality rates were used to compare the observed and expected rates because of difficulties involved in defining morbidity and collecting data n complications. Mortality also being an objective measure of surgical outcome . The predicted deaths were 90, while the observed deaths were 37. They demonstrated an over prediction by a factor of 2 using the POSSUM scoring system and linear analysis as described by Hosmer and Lemeshow. Therefore, in order to

improve the predictive capability, they used linear regression analysis to derive a better equation , but using the same set of variables as the original POSSUM scoring system.[12]

The revised equation of mortality being:

$$\text{Log}_e[R/1-R]=(0.1692xPS\ ) +(0.155x\ OS)-9.065$$

Where R=risk of mortality ,PS=physiological score and OS=operative score

When Copeland G P[6] applied the POSSUM system for a comparative audit in 344 patients undergoing reconstructive vascular surgery to assess its efficiency in comparative audit between two units. They were able to demonstrate that POSSUM was a better predictor of adverse outcomes following surgery. The estimated mortality rate of 10.2% for unit A (observed 9.4%) and 20.2% for unit B(observed 20.2%) were obtained and using ROC curves curves it was proved that there was no statistically significant difference between the 2 units. They concluded that the POSSUM scoring system was a better guide for comparing efficiency of quality of care rather than crude mortality rates.

Copeland G P[6] analyzed the basis of comparative audit and suggested POSSUM scoring system to help fulfill the basic need of providing good comparative audit for general surgical patients.

Jones D R[23] compared the efficiency of POSSUM and APACHEII scoring systems in predicting the adverse outcomes in 117 patients in a general surgery unit , undergoing major surgery (elective and emergency). Preoperative and intraoperative data was collected and patients were monitored for any complications for the first 30 postoperative days. 13 patients (11%)died and the incidence of postoperative complications was 50%. ROC curve analysis was performed to calculate predictive value of POSSUM and APACHE II scoring systems. POSSUM was a good predictor of mortality (area under curve 0.753) and morbidity (area under curve 0.82). APACHE II scoring system showed a poorer predictive value (area under curve 0.54) and a statistically significant difference was seen ($p<0.002$). Therefore, POSSUM scoring system was recommended as an accurate predictor of post-operative outcomes.

Sagar P M[15] also used POSSUM soring system to compare adverse outcome following colorectal resection in 438 patients among 5 surgeons. While crude mortality rates varied from 5.6% to 6.9% and morbidity

rates between 13.6% and 30.6%, risk adjusted analysis using POSSUM showed no statistically significant difference and the overall observed to expected ratio for mortality was found to be 0.87 and for morbidity 0.97, they concluded that meaningful comparison of individual surgeon's efficiency was possible as POSSUM is a good indicator of adverse outcome.

The new Portsmouth modification was then created and considered to provide a better fit to the observed mortality rate. They concluded by suggesting geographical comparison of POSSUM, which could result in better application of risk adjusted scoring system as was done in their case.

Wijesinghe [11] compared POSSUM and Portsmouth POSSUM (P-POSSUM) for predicting mortality following vascular surgery in 312 consecutive patients . Data regarding the first 30 day post-operative period was collected , which revealed 41 deaths. Analysis was done using linear and exponential methods for POSSUM and P-POSSUM respectively. Using the POSSUM scoring system they obtained an observed to expected ratio of 0.59 using linear analysis and 1.14 using exponential analysis. P-POSSUM revealed an observed to expected ratio of 0.89 using linear analysis, which was simpler and could predict the

individual patient's mortality rate. They concluded that POSSUM and P-POSSUM are accurate in predicting the mortality rate if the correct method of analysis was used for each system and the scoring systems were valid not only in general but also in vascular surgery.

Prytherch D R[8] prospectively compared POSSUM and P-POSSUM in 10,000 general surgical patients between August 1993 and November 1995. The POSSUM scoring system was applied to all 10,000 patients , while the first 1,500 patients were used to derive a modified P-POSSUM equation, which was then applied prospectively to the remaining cases . While the POSSUM scoring system over predicted the mortality rate by a factor of 2, the observed mortality being 287 deaths and predicted was 697 deaths, the P-POSSUM scoring system when applied prospectively on the subsequent 7,500 cases showed an observed to expected ratio of 0.90 (x^2=1.63, 5 d.f) and 0.85(x^2=1.35, 4 d.f). They concluded by suggesting application of P-POSSUM scoring system for predicting mortality and also emphasized the need for evaluation of geographical variation in predicting the adverse outcomes.

Midwinter [12] compared POSSUM and P-POSSUM for assessing mortality and morbidity rates in patients undergoing vascular surgery. 221 patients undergoing elective and emergency vascular surgeries by a

single consultant were studied . Overall mortality and morbidity rates were 6.6% and 57.6% respectively . While the POSSUM scoring system showed a significant difference between observed and expected mortality rates x^2 test=24.04, 6 d.f. $p<0.001$) , P-POSSUM scoring system showed a good concordance between expected and observed mortality rates (x^2= 9 , 6 d.f. , p=0.17). They concluded that P-POSSUM was a better predictor of post operative mortality rates and also suggested that widespread application among different regions to assess its validity and if a good fit was obtained; the equation could be adopted as a standard for risk adjusted comparative audit as well as, enabling an individual surgeon or unit to assess the effectiveness of care provided.

Treharne GD [24] used the physiological component of POSSUM scoring system to compare the outcome among patients undergoing abdominal aortic aneurysm repair by conventional and endovascular procedures. 104 consecutive open surgery cases and 49 endovascular surgery patients were included in the study. P-POSSUM scoring system was used to match the two diverse groups of patients to achieve comparability among the cohorts. Even though the indications for the type of surgery depended upon the patient's physiological status , using P-POSSUM they were able to match the 2 groups. The observed to

expected ratio of 0.75 and 0.86 for open and endovascular groups served to validate the P-POSSUM scoring system for predicting the mortality rate , allowing the authors to conclude that endovascular method is better than the conventional method.

Tekkis P [15] analysed the mortality in patients undergoing gastrointestinal surgery using POSSUM and P-POSSUM scoring systems. A total of 505 consecutive patients undergoing major gastrointestinal surgeries (elective 66.1%, emergency 33.9%) were analysed. The observed mortality rate was 56 deaths, while the expected mortality rate using POSSUM was 108 deaths, which was found to be a significant over prediction (x^2= 44.82, 4 d.f., $p<0.001$) . Using the P-POSSUM scoring system , the expected rate was 57(x^2= 3.34, 4 d.f., $p=0.51$). Comparison suggests the P-POSSUM scoring system should be the risk adjusted scoring system for risk adjusted performance measurement.

Neary B [13] in a retrospective study used the physiological part of the POSSUM scoring system to predict the adverse outcome rate following intra arterial thrombolysis of acute leg ischemia, which is a non operative method . It was found that the physiological component of the

POSSUM scoring system accurately predicted the adverse outcome rate. They suggested application of POSSUM even in non operative cases.

Bann S and Sarin S assessed the applicability of POSSUM using the hospital based protocols for investigations and excluded patients with incomplete data. They found there was a significant lack of fit to the observed mortality and suggested clarifications regarding applicability of POSSUM and P-POSSUM in general surgical patients.

Yii M K and Ng K J evaluated POSSUM and the P-POSSUM scoring system for predicting mortality rates among patients undergoing general surgery in a tertiary referral hospital in Malysia, to assess is applicability in their scenario of a developing country. The observed rates among four different risk subsets were 6.1%, while the POSSUM scoring system predicted 10.5% showing a significant difference ($p<0.01$). The predicted mortality using the P-POSSUM scoring system was 4.8% which showed a good fit to the observed rate. They concluded by validating the P-POSSUM scoring system as an effective tool for predicting the adverse outcome rate in the Malaysian scenario and suggested further studies to validate the P-POSSUM scoring system, especially in other developing countries to allow for accurate comparison of data.

Copeland G P[27] explained the genesis of the POSSUM scoring system and described the correct analysis method. He suggested usage of the POSSUM scoring system to identify high risk patients who could be benefited from pre-operative optimization to provide better surgical care to the patients. He concluded by suggesting wider application of POSSUM in various surgical specialties and other countries to assess the quality of care by using the difference in the observed to expected ratio.

Zafirellis K D tested the applicability of the POSSUM scoring system for assessing the mortality rates in patients of oesophageal, undergoing oesophagectomy. A total of 204 patients were studied retrospectively and analyzed using linear method of analysis. The observes and expected mortality rates were 12.7% and 19.1 respectively, showing a poor assessment of mortality rate production. They concluded that POSSUM scoring system required to be re-calibrated to allow better prediction of mortality rates in their study group.

Neary W.D[13] performed a meta analysis of POSSUM and its modifications using Medline, Cochrane library and Embase databases. A description of the genesis of POSSUM was given, is method of application and analysis. They described the exponential method of analysis which is recommended method and also its limitations with

respect to its complexity and its inability to predict the individual risk of adverse outcome. A description of the P-POSSUM system was given and its results in various studies were highlighted. The limitations of these studies were described; regarding missing data and the timing of physiological scoring. The controversy regarding the recommended investigations was also cleared. The lack of facilities for accurate measurement of the total blood loss was explained to be not significant to alter the final score. The applicability of POSSUM in general surgery and its evolution for individual specialties was described and studies reviewed. A comparative analysis of POSSUM and APACHE II was given and its superiority was stressed upon. The authors concluded by validating POSSUM as an important comparative surgical audit tool.

Tekkis P[15] evaluated POSSUM and P-POSSUM in a prospective analysis in a study of 1017 patients undergoing colorectal surgery. The observed mortality rate was 7.5% while the predicted rates by POSSUM and P-POSSUM were 8.2% and 7.1% respectively. They found an over prediction in the young patients ($p<0.001$) and under prediction in emergency and elderly patients ($p<0.001$). They have suggested recalibration in these groups of patients undergoing colorectal surgery.

Mohil R S[17] used POSSUM and P-POSSUM for predicting the adverse outcome rate in patients undergoing emergency laparotomy at Safdurjung hospital, Delhi were studied prospectively to assess the applicability in their setup. All patients had physiological scoring done at the time of admission and intraoperative scoring was done to obtain the operative scoring variables, to calculate expected 30 day mortality and morbidity rates. 16 patients (13.3%) died within 30 days of surgery and 62(51.7%) developed significant complications. On analysis , they found an O:E ratio of 0.62 for POSSUM (x^2 =10.79, 9 d.f., p=0.148) and 0.66 using P-POSSUM scoring systems(x^2=.33, 9 d.f., p=0.148).They concluded by validating POSSUM and P-POSSUM scoring systems for accurate prediction of post operative mortality rates even in the Indian scenario, where the patients usually belong to the lower socioeconomic strata of society with limited resources. POSSUM and P-POSSUM scoring systems can be used to help remove any bias in the patient selection and serve as important methods for predicting the post operative adverse outcome rate, even in their setup.

Parihar V [18] performed a risk adjusted audit of low risk general surgical patients using the POSSUM and P-POSSUM in 788 patients. They found good prediction of mortality using POSSUM (O:E

ratio=0.94) and P-POSSUM (O:E ratio=1.525). In an effort to reduce over prediction in low risk surgical patients, they performed a multivariate analysis and obtained a new equation called the J-POSSUM (Jabalpur POSSUM) which provides a better fit to the observed mortality and morbidity rates.(O:E=1.04) in low risk general surgical patients. They validated POSSUM ,P-POSSUM and J-POSSUM in predicting the adverse outcome rates in general surgical patients in the Indian setup.

Gatt M. used POSSUM to randomize 2 groups of patients undergoing major colonic resection in a randomized controlled trial to evaluate multi modal optimization of surgical care.

Tambyraja A.L evaluated POSSUM scoring system in predicting outcome after laparoscopic cholecystectomy in 76 patients aged over 40years. They found an O:E ratio for morbidity is 1 and 0 for mortality. They concluded by approving POSSUM scoring system and suggested further correction for predicting mortality , morbidity following other laparoscopic procedures.

PHYSIOLOGICAL SCORE

	Physiological parameters		Score
1	Age	0-60	1
		61-70	2
		>70	4
2	Cardiac parameters	No failure	1
		Diuretics, digoxin, antianginal/antihypertensives	2
		Peripheral edema, warfarin/mild cardiomegaly	4
		Raised JVP, Cardiomegaly	8
3	Respiratory parameters	No dyspnea	1
		Dyspnea on exertion	2
		Limiting dyspnea	4
		Dyspnea at rest	8
4	Systolic blood pressure	<90	8
		90-99	4
		100-109	2
		110-130	1
		131-170	2
		>171	4

5	Pulse	<40	8
		40-49	2
		50-80	1
		81-100	2
		101-120	4
		>120	8
6	GCS	15	1
		12 to 14	2
		9 to 11	4
		Less than 8	8
7	Hemoglobin	<=9.9	8
		10-11.4	4
		11.5-12.9	2
		13-16	1
		16.1-17	2
		17.1-18	4
		>=18.1	8
8	White cell count	<=3	4
		3.1-4	2
		4.1-10	1
		10.1-20	2
		>20.1	4

9	Urea	<21	1
		21-27	2
		28-42	4
		>42	8
10	Sodium	>=136	1
		131-135	2
		126-130	4
		<=125	8
11	Potassium	<=2.8	8
		2.9-3.1	4
		3.2-3.4	2
		3.5-5.0	1
		5.1-5.3	2
		5.4-5.9	4
		>=6.0	8
12	ECG	Normal	1
		Atrial fibrillation	4

OPERATIVE SCORE

	Operative scoring		
1	Operative severity	minor	1
		moderate	2
		major	4
		major+	8
2	Number of procedures	1	1
		2	4
		>2	8
3	Total blood loss	<100	1
		100-500	2
		501-1000	4
		>1000	8
4	Peritoneal soiling	None	1
		minor	2
		Pus/ local collections	4
		Faecal collection	8
5	Malignancy	None	1
		Primary only	2
		Nodal mets	4
		Distant mets	8
6	Mode of surgery	Elective	1
		Surgery with resusctitation of >2hrs	4
		Immediate	8

Even the P-POSSUM model still over predicts mortality in low-risk groups, but is a better 'fit' than POSSUM. Furthermore, there have been reports of over prediction in different surgical specialties. This has led some to produce specialty-specific POSSUM such as V-POSSUM for use in elective vascular surgery (Prytherch 2001).

One criticism of the P-POSSUM scoring system has always been the variation of patient populations causing an aberration in the validity of the scoring system. Due to stark differences in physical characteristics(Height , weight, BMI e.t.c) whether the same score can be used on varying populations and whether the test will remain accurate in predicting the outcome has always been a plaguing question.

In a study done by SJ Mercer et al, 145 cases were evaluated over a period of one year, including all cases of neurosurgical cases taken for craniotomy. Preoperative variables were collected prior to induction of anaesthesia, and operative variables were also collected. Chi-square test was used for expected and actual mortality differences. Survivor and non-survivor demographics were compared by one-way ANOVA for continuous and Chi-square for categorical variables.

One hundred and forty-five patients were studied. Mean [SD] physiologic score of the patients was 18.83 [5.07], and mean [SD] operative score was 18.09 [3.75]. P-POSSUM was a better predictor for elective patients and for those undergoing immediate life-saving surgery. This study confirms and validates the findings of previous work that P-POSSUM is an accurate and reliable tool for estimating in-hospital mortality. It also confirms its usefulness in comparison of results across health care systems internationally across surgical specialties , allowing it to be used as a universal tool for surgical audit[23].

The Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity (POSSUM) model, its Portsmouth (P-POSSUM) modification and the Estimation of physiologic ability and surgical stress (E-PASS) are three surgical risk scoring systems used extensively to predict postoperative morbidity and mortality in general surgery. In a study conducted by Hui wang et al[25] to determine predictive value of these models in patients undergoing surgical treatment of hilar cholangiocarcinoma, a retrospective analysis was performed on data collected prospectively over a 10-year interval from January 2003 to December 2012.It was found that of one hundred patients that underwent surgical treatment of hilar cholangiocarcinoma ,

complications were seen in 52 of 100 patients (52.0%). There were 10 postoperative in-hospital deaths (10.0%). Of 31 preoperative and intraoperative variables studied, operative type ($P = 0.000$), preoperative serum albumin ($P = 0.003$) and aspartate aminotransferase ($P = 0.029$) were found to be factors multivariate analysis associated with postoperative complications. Intraoperative blood loss ($P = 0.015$), Bismuth-Corlette classification ($P = 0.033$) and preoperative hemoglobin ($P = 0.041$) were independent factors multivariate associated with in-hospital death. The POSSUM system predicted morbidity risk effectively with no significant lack of fit ($P = 0.488$) and an area under the ROC curve (AUC) of 0.843. POSSUM, P-POSSUM and E-PASS scores showed no significant lack of fit in calculating the mortality risk ($P > 0.05$) and all yielded an AUC value exceeding 0.8. POSSUM had significantly more accuracy in predicting morbidity after major and major plus operations (O:E (observed/expected) ratio 0.98 and AUC 0.901) than after minor and moderate operations (O:E ratio 1.13 and AUC 0.759).

In another study by W.Chen et al[26], he concluded that the Portsmouth predictor equation (P–POSSUM) was highly predictive of mortality in a study of elective craniotomies for neurosurgery but as it

had yet to be validated in spinal, peripheral nerve or acute cranial neurosurgery, the study was conducted on this specific patient population. The West Australian Categorization of Operative Severity (WA classification) was created for all neurosurgical procedures. Case notes and laboratory results of 531 consecutive patients undergoing neurosurgery were reviewed retrospectively. All POSSUM variables were collected and the POSSUM and P–POSSUM mortality equations were applied. The observed mortality rate was 4.52% and the WA P–POSSUM predicted mortality rate was 4.58% ($p > 0.951$). The WA P–POSSUM rate was more predictive than either the WA POSSUM rate (10.9%, $p < 0.0001$) or the previously proposed elective craniotomy P–POSSUM classification (5.8%, $p < 0.198$). Therefore, it was concluded that the P–POSSUM model with WA classification has the potential to be used in mortality audits for general neurosurgery. By quantifying preoperative risk, P–POSSUM might provide a useful denominator to observed death rates for meaningful comparison of individual neurosurgeons and between departments.

V.J Ramesh et al[27] in an attempt to evaluate surgical outcomes to compare mortality and morbidity felt such crude comparisons may be misleading without a proper case mix. The POSSUM scoring system

was developed to overcome this problem. The score can be used to derive predictive mortality and morbidity for surgical procedures. POSSUM and its modified version P-POSSUM have been evaluated in various groups of surgical patients for the accuracy of predicting mortality. These scoring systems have not been fully evaluated in neurosurgical patients. Thus, they tried to evaluate the usefulness of POSSUM and P-POSSUM scoring systems in neurosurgical patients in predicting in-hospital mortality. POSSUM physiological and operative variables were collected from all neurosurgical patients undergoing elective craniotomy, from April 2005 to Feb 2006. In-hospital mortality was obtained from the hospital mortality register. The physiological score, operative score, POSSUM predicted mortality rate and P-POSSUM predicted mortality rate were calculated using a calculator. The observed number of deaths was compared against the predicted deaths. A total of 285 patients with a mean age of 38 ± 15 years were studied. Overall observed mortality was nine patients (3.16%). The mortality predicted by the P-POSSUM model was also nine patients (3.16%). Mortality predicted by POSSUM was poor with predicted deaths in 31 patients (11%). The difference between observed and predicted deaths at different risk levels was not significant with P-POSSUM (p = 0.424) and was significantly different with POSSUM

score ($p < 0.001$). P-POSSUM scoring system was highly accurate in predicting the overall mortality in neurosurgical patients. In contrast, POSSUM score was not useful for prediction of mortality, showing the superiority of P-POSSUM over POSSUM for prediction of mortality.

In a study conducted by T.S Ramanathan et al[28], to analyze the POSSUM scoring system to validate it as an audit tool in general and orthopaedic surgery and as a means of preoperative triage to assess perioperative risk. They found that POSSUM and P-POSSUM's ability to predict mortality in specific surgical subgroups, such as patients with fractured neck of the femur, had not been studied. Their study assessed the predictive capability of POSSUM for a 30-day mortality period after surgery for fractured neck of femur.The cohort study was conducted in Queen's Medical Centre, Nottingham over a period of nearly 2 years. Complete data from 1164 patients was analyzed to compare the mortality predicted by POSSUM and the observed mortality. POSSUM risk of death was calculated using the original POSSUM equation, with modifications to the operative score appropriate for orthopaedic surgery. Results showed that POSSUM predicted 181 (15.6%) deaths and the observed mortality was 119 (10.2%). The area under the receiver operating characteristic curve was 0.62, indicating poor performance by

the POSSUM equation. Therefore, it was concluded that the POSSUM score over predicts mortality in hip fracture patients. It should be used with caution as an audit tool or for preoperative triage in orthopaedic cases.

Risk scoring systems attempt to quantify the severity of an illness, the applications of which are seen in a multitude of situations.

The most commonly used are:

1)Predicting mortality in a hospital- APACHE III

2)Quantifying morbidity- ASA , APGAR

3)Predicting operative mortality-EUROscore, Parsonnet score, POSSUM

4)Predicting risk of dying of specific illness - Ransons and glasgow criteria for pancreatitis.

In this study, a detailed and comprehensive analysis of the P-POSSUM scoring system has been made which attempts to predict post-operative mortality and morbidity.

MATERIALS AND METHODS

SOURCE OF DATA

Patients admitted to Govt. Stanley Medical College and Hospital and underwent emergency laparotomy.

Study period

The period of study was from October 2016 to August 2017 including a 30 day post -operative follow up of each patient.

Sample Size: 50

Type of study: Prospective

Method of data collection:

Data was collected via a proforma prepared for the study from all patients undergoing emergency laparotomy in the stipulated time period. All the patients had their physiological scores recorded on admission. An operative severity score was calculated based on the intra-operative findings recorded by the operating surgeon.

Using the following equations the morbidity and mortality rates were calculated.

$Log_e[R/1-R]=(0.1692xPS) +(0.155x OS)-9.065$

Where R=risk of mortality

$Log_e[R/1-R]= -5.91 + (0.16x PS) + (0.19x OS)$

Where R=risk of morbidity.

PS=physiological score and OS=operative score

Any post-operative morbidity or death in the hospital was recorded in accordance with definitions described previously. Subsequent statistical analysis was done of the findings.

Inclusion criteria

Patients undergoing emergency laparotomy

Exclusion criteria

-Patients aged 12 years or less

-Follow up period criteria not met

-Patients with significant immunosuppression(Patients who are HIV or HBsag positive and those on immunosuppressive drugs/ anti cancer chemotherapeutic drugs).

METHODOLOGY

Patients were informed regarding the aims and objectives of the study and a detailed informed written consent was taken prior to inclusion into this study.

During hospitalization relevant history was collected and appropriate investigations as deemed necessary were done using standard procedures.

The patients were then scored depending on their physiological parameters and the intra-operative findings were noted and a final expected mortality rate was calculated.

Physiological and Operative severity score for the enumeration of mortality and morbidity (POSSUM) .

The details of the scoring system have been enumerated in the upcoming table. It follows an exponential sequence.

PHYSIOLOGICAL SCORE

	1	2	4	8
Age	<60	61-70	>70	
Cardiac signs	No failure	Diuretic, Digoxin , anti-anginal or anti-hypertensive therapy	Peripheral edema, warfarin therapy, borderline cardiomegaly	Raised jugular venous pressure, Cardiomegaly
Respiratory signs	No dyspnea	Dyspnea on exertion	Limiting dyspnea, Mild COPD	Dyspnea at rest (>30/min) Fibrosis/ Consolidation
Blood pressure (Systolic)	110-130	131-170 100-109	>171 90-99	<89
Pulse	50-80	81-100 40-49	101-120	>121 <39
Glasgow coma scale	15	12-14	9-11	<8
Hemoglob	13-16	11.5-12.9	10-11.4	<9.9

in(g/dl)		16.1-17	17.1-18	>18.1
White cell count	4-10	10.1-20 3.1-4	>20.1 <3.1	
Urea(mmol/L)	<7.5	7.6-10	10.1-15	>15.1
Sodium(mmol/L)	>136	131-135	126-130	<125
Potassium (mmol/L)	3.5-5	3.2-3.4 5.2-5.3	2.9-3.1 5.4-5.9	<2.8 >6
ECG	Normal		Atrial fibrillation (rate 60-90)	Any other abnormal rhythm or >5 ectopics/min or ST/T wave changes

OPERATIVE SCORING

	1	2	4	8
Operative Severity	Minor	Moderate	Major	Major +
Multiple procedures	1		2	>2
Total blood loss	<100	100-500	501-999	>1000
Peritoneal soiling	None	Minor (serous fluid)	Local pus collection	Free bowel content, diffuse pus
Presence of maligancy	None	Primary only	Nodal metastasis	Distant metastasis
Mode of Surgery	Elective		Emergency resuscitation >2 hours and surgery <24 hrs from admission	Emergency surgery < 2hrs of resuscitation .

All laparotomies are classified as major in severity .

Physiological score ranges from 12-88

Operative score ranges from 6-48

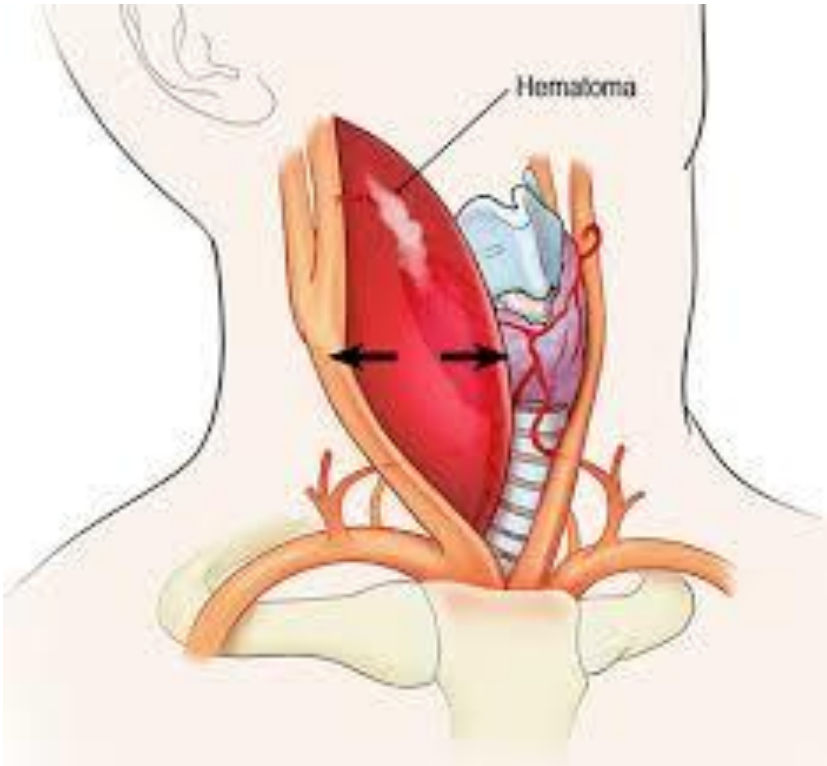
The minimum total score is 18

The maximum total score is 136

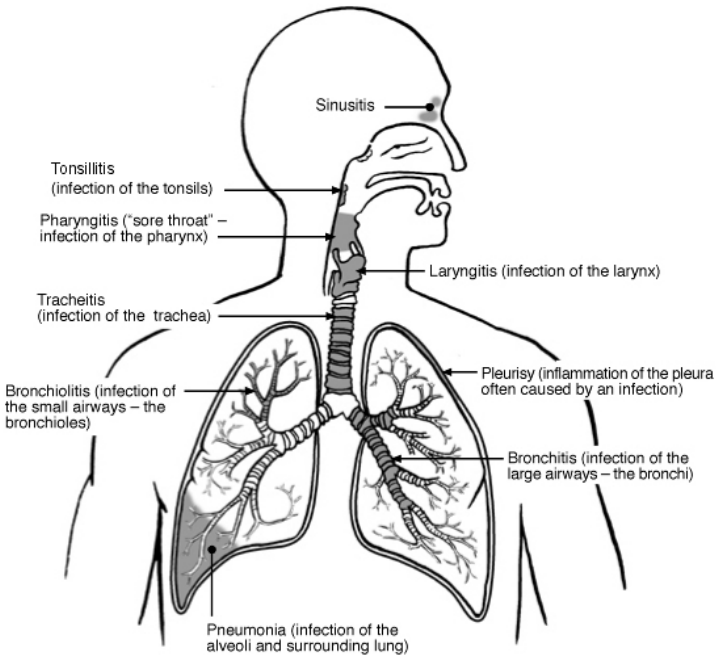
The combination of the two scores in the equation predicts the mortality and morbidity for the patient and doesn't matter on the total score alone i.e two patients with the same total score can have different predicted rates of mortality and morbidity if the operative and physiological scores differ .

The patients were followed up for a period of 30 days following the surgical procedure and complications if any, were noted depending upon the following criteria as defined for POSSUM scoring system.

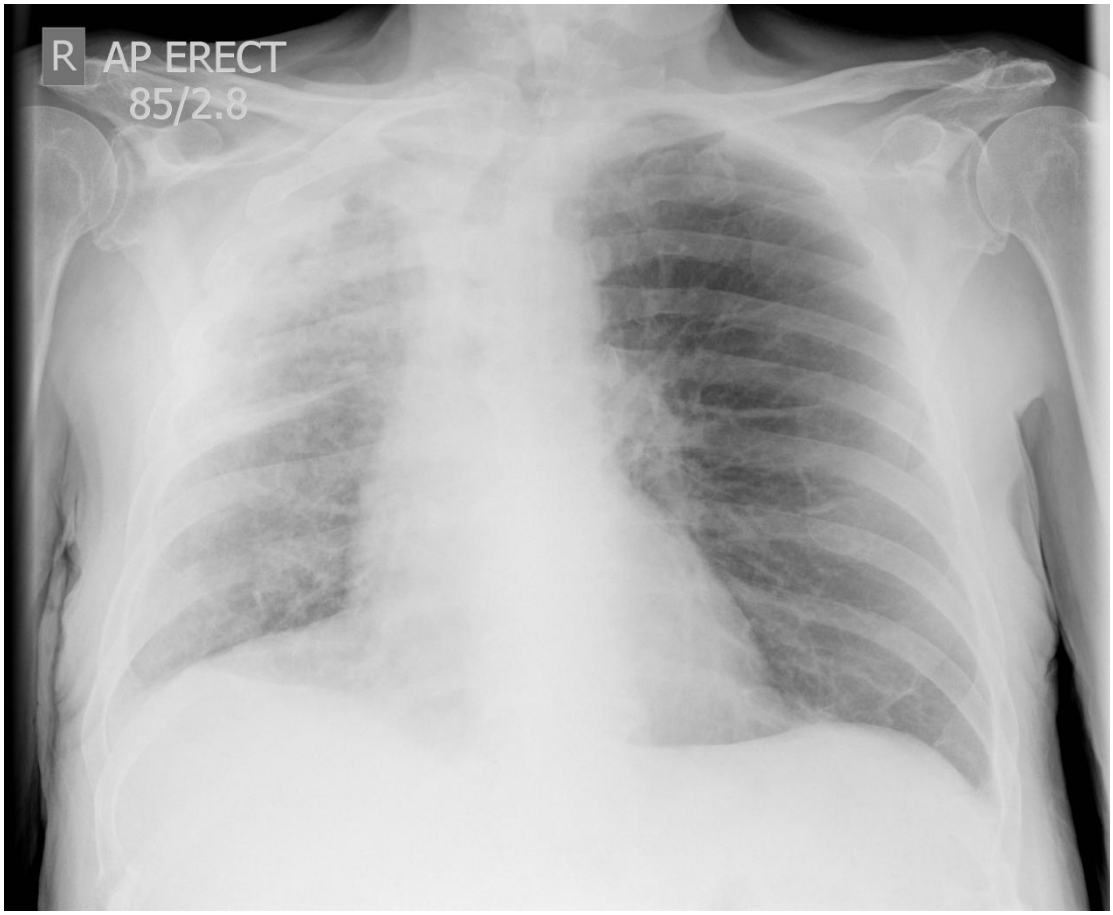
1. **Wound haemorrhage** : Local haematoma requiring evacuation.
2. **Deep haematoma** : Postoperative bleeding requiring evacuation.



3. **Chest infection**: Production of purulent sputum with positive bacteriological cultures, with or without chest radiography changes or pyrexia or consolidation seen on a chest radiograph.

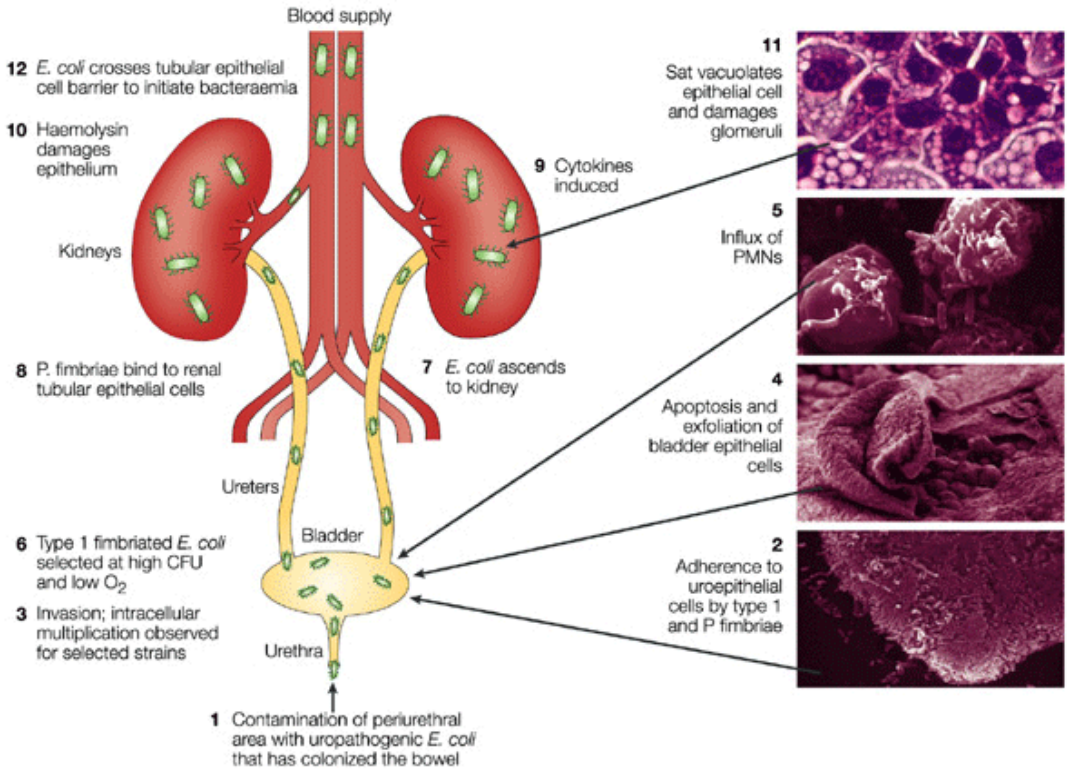


Infections of the respiratory tract

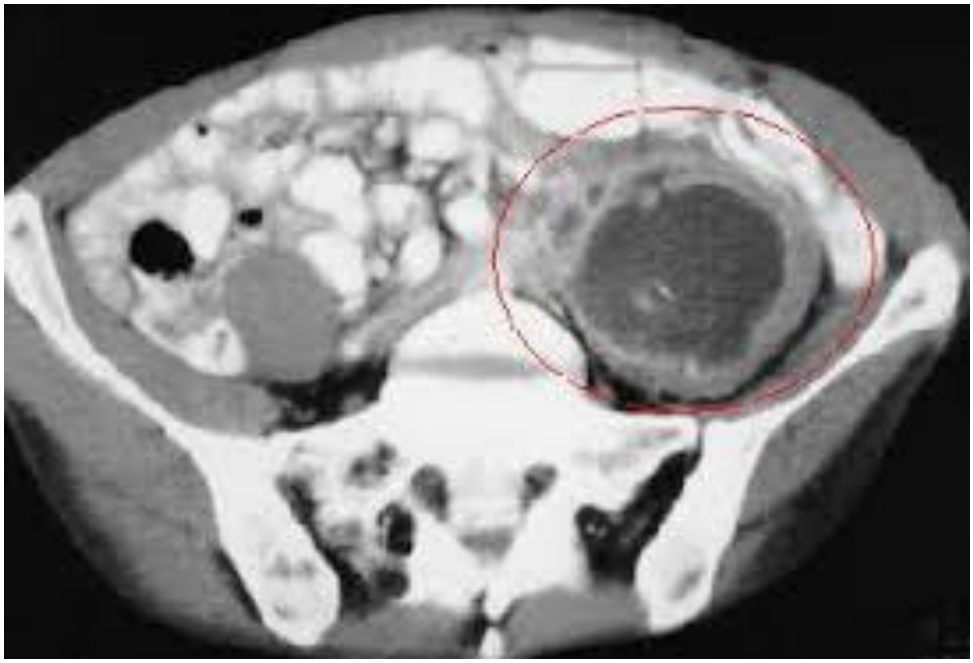


4.Wound infection: Wound cellulitis or the discharge of purulent exudates from the wound post surgery

5. **Urinary infection**: The presence of >10^5 bacteria/ml with the presence of white cells in the urine, in previously clear urine.



6. **Deep infection**: The presence of an intra-abdominal collection confirmed clinically or radiologically. The most common being a pelvic abscess which will present with high grade fever, tachycardia, loose stool and leucocytosis. A boggy feeling on per rectal examination will aid us in the diagnosis. Very often it can be drained without the need for a repeat laparotomy.



7. **Septicemia**: Invasion of the bloodstream by virulent microorganisms and especially bacteria along with their toxins from a local seat of infection accompanied especially by chills, fever, and prostration. A positive blood culture will confirm the diagnosis and appropriate antibiotics can be started based on the culture reports.

8. **Pyrexia of unknown origin**: Any temperature above 37 degrees Celsius for more than 24 hours after the original pyrexia following surgery(if present) has settled, for which no obvious cause could be found.The common causes of which have been listed below, particular attention to which should be given o nosocomial infections with reference to this study.

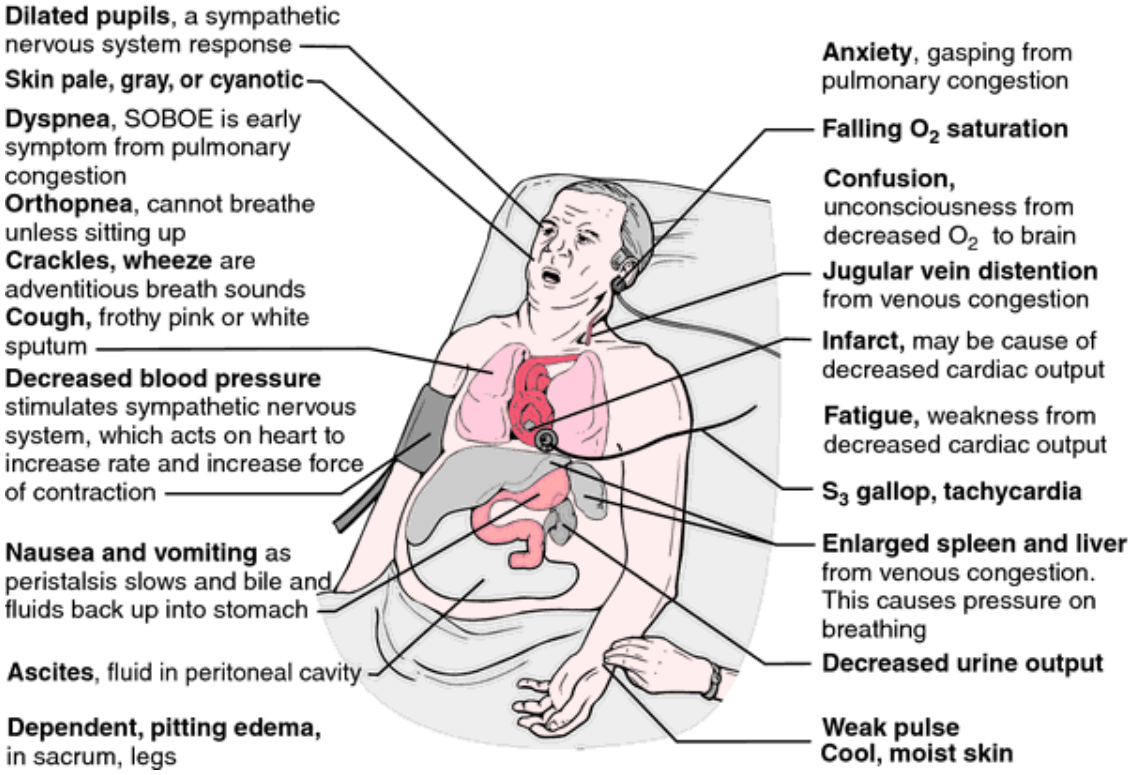
Classification of PUO

Category	Definition	Aetiologies
Classic	• Temperature >38.3 C (100.9 F) ; • Duration of >3 weeks • Evaluation of at least 3 outpatient visits or 3 days in hospital	• Infection • Malignancy • collagen vascular disease
Nosocomial	• Temperature >38.3 C • Patient hospitalized ≥ 24 hours but no fever or incubating on admission • Evaluation of at least 3 days	• *Clostridium difficile* enterocolitis • drug-induced • pulmonary embolism • septic thrombophlebitis, • sinusitis
Immune deficient (neutropenic)	• Temperature >38.3 C • Neutrophil count ≤ 500 per mm3 • Evaluation of at least 3 days	• Opportunistic bacterial infections, • aspergillosis, • candidiasis, • herpes virus
HIV-associated	• Temperature >38.3 C • Duration of >4 weeks for outpatients, >3 days for inpatients • HIV infection confirmed	• Cytomegalovirus, • *Mycobacterium avium-intracellulare* complex, • *Pneumocystis carinii* pneumonia, • drug-induced, • Kaposi's sarcoma, lymphoma

9. **Wound dehiscence** : It is a surgical complication in which a wound ruptures along the line of the surgical incision. Superficial to deep wound breakdown occurs.

10. **Deep vein thrombosis and pulmonary embolism:** When suspected, confirmed radiologically or by venography or ventilation /perfusion scanning, or diagnosed post mortem. A high index of suspicion should be maintained for all cases especially those that can not be mobilised. It usually presents between the 2nd and 10th post operative day. Adequate prophylaxis with heparin / IVC filters is a must especially in high risk cases(Elderly, Obese Pelvic and orthopedic surgeries)

11. Cardiac failure : Symptoms or signs of left ventricular or congestive cardiac failure which required alteration from pre-operative therapeutic measures.



12. **Impaired renal function** : Arbritarily defined as increase in blood urea>5 mmol/L from pre-operative values.A creatinine value >1.5mg /dl or a urine output of < 0.5mg/dl for more than 6 hours indicates the first signs of acute kidney injury.

Cause of postoperative acute renal failure

INFLOW OR PRERENAL	PARENCHYMAL OR RENAL	OUTFLOW OR POSTRENAL
Sepsis	Renal ischemia	Cellular debris (acute tubular necrosis)
Medications	Drugs (aminoglycosides, amphotericin)	Crystals
Nonsteroidal anti-inflammatory drugs	Iodinated contrast media	Uric acid
Angiotensin-converting enzyme inhibitors	Interstitial nephritis	Oxylate
Intravascular volume contraction		Pigment
Hypovolemia		Myoglobin
Hemorrhage		Hemoglobin
Dehydration		
Atherosclerotic emboli		
Third spacing		
Cardiac failure		

13. **Hypotension**: A fall in systolic blood pressure below 90mmHg for more than 2 hours as determined by sphygmomanometry or arterial pressure transducer measurement.The most common causes in a post op patient are intra-vascular volume loss(Eg: dehydration), continued third space loss, sepsis , transfusion related lung injury, anaphylaxis and drug related causes.

Post-Op Hypovolemic Shock

- Signs and symptoms (Martel et al)

System	Early Shock	Late Shock
CNS	Altered Mental Status	Obtunded
Cardiac	Tachycardia Orthostatic hypotension	Cardiac failure Arrhythmias Hypotension
Renal	Oliguria	Anuria
Respiratory	Tachypnea	Tachypnea Respiratory failure
Hepatic	No change	Liver Failure
Gastrointestinal	No change	Mucosal Bleeding
Hematological	Anemia	Coagulopathy
Metabolic	None	Acidosis Hypocalcemia Hypomagnesium

14. **Respiratory failure** : Respiratory difficulty requiring emergency ventilation.One must look out for tachypnea , loss or alteration of consciousness , cyanosis and irregular heart rate.

Causes of Postoperative Respiratory Failure

- Factors extrinsic to the lung
  - Depression of central respiratory drive(anesthetics, opioids, sedatives)
  - Phrenic nerve injury/ diaphragmatic paralysis
  - Obstructive sleep apnea
- Factors intrinsic to the lung
  - Atelectasis
  - Pneumonia
  - Aspiration
  - Acute lung injury (ARDS)
  - Volume overload/ congestive heart failure
  - Pulmonary embolism
  - Bronchospasm/ COPD

15. **Anastomotic leak** : Discharge of bowel content via the drain , wound or abnormal orifice. One must look for alteration in the drainage tube output as well as the colour of the collected fluid. Signs of peritonitis warrant immediate re-opening to control the anastomotic leak site.

STATISTICAL METHODS

The observed mortality rates were tabulated and the expected mortality rates were calculated using the P-POSSUM equation and were also tabulated correspondingly.

Using linear regression analysis and the Hosmer–Lemeshow test, the O:E ratio was calculated. Using this value the chi-square test was then applied to obtain the p-value to note any significant difference between the predicted death rate and the actual outcome. A p-value of 0.05 was used as a test of significance.

RESULTS

This was a prospective study conducted under the department of General Surgery, from October 2016 to August 2017. The study included 50 cases of emergency laparotomies done over the aforementioned period of 11 months. It also included a 30 day follow up of all the patients post operatively. Vital parameters were tabulated and the demographic profile, profile of cases admitted on emergency including the kind of surgeries done were documented. With this information the statistical analysis was performed obtaining observed and predicted rates of mortality and morbidity. Thereby, obtaining the chi-square value along with p-values to find significance and efficacy of the score.

Sex distribution:

Of the 50 patients included in the study, 16 individuals (32%) were females and 34 individuals (68%) were males. This finding was probably due to a higher incidence of infection and alcohol induced complications which were more common in men when compared to women.

Chart 1

(Sex distribution)

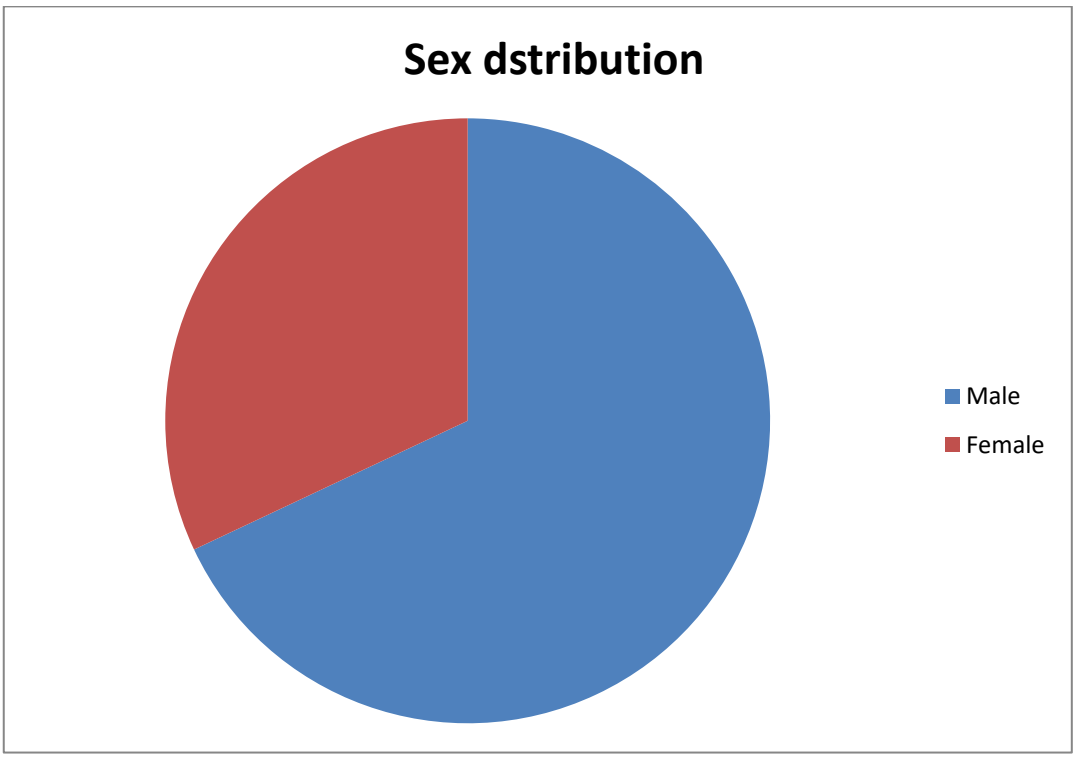


Table 1

Male	34
Female	16
Total	50

The predominant age group was 30-40 yrs constituting 22% of all patients, again owing to the fact that alcohol and infection related complications were highest in this age group. The youngest patient being 13yrs and the oldest being 73yrs.

Table 2

S.No	Age group	Frequency
1	10-20 yrs	4
2	20-30yrs	10
3	30-40yrs	11
4	40-50yrs	9
5	50-60yrs	9
6	60-70yrs	3
7	70-80yrs	4

Chart - 2

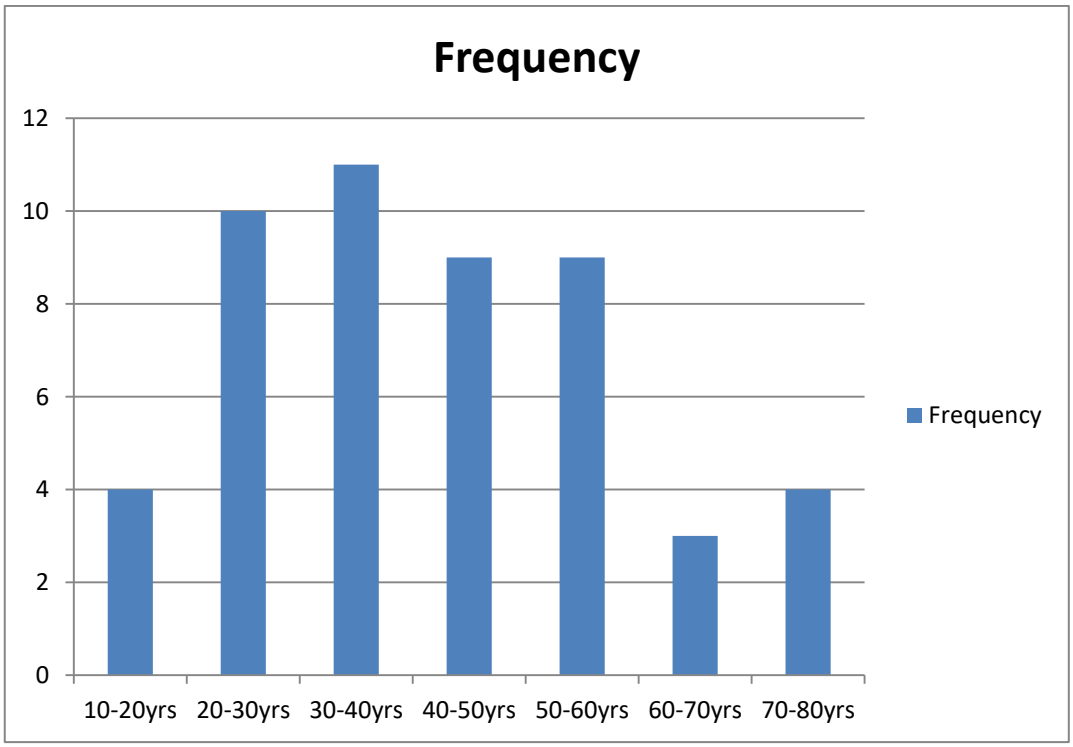
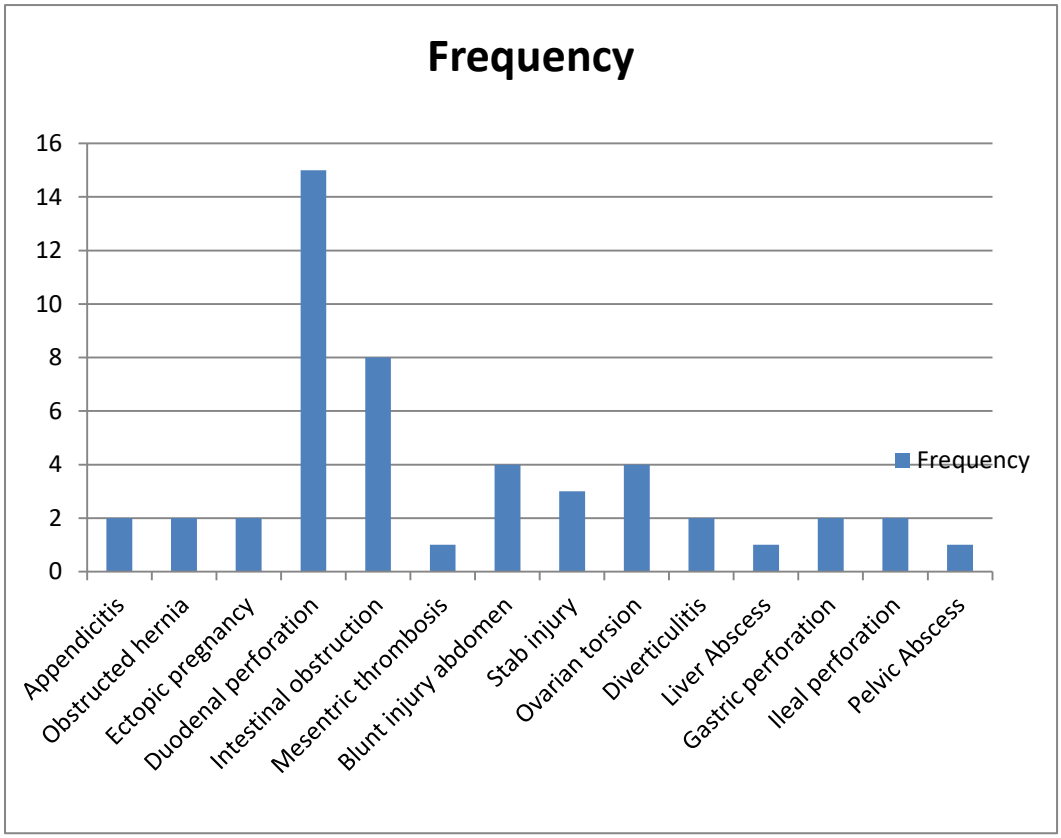


Table 3

S.No.	Cause	Number
1	Appendictis /appendicular mass	2
2	Obstructed Hernia	2
3	Ectopic Pregnancy	2
4	Duodenal perforation	15
5	Intestinal obstruction	8
6	Mesentric thrombosis	1
7	Blunt Injury abdomen	4
8	Stab injury	3
9	Ovarian Torsion	4
10	Diverticulitis	2
11	Liver Abscess	1
12	Gastric Perforation	2
13	Ileal perforation	2
14	Pelvic Abscess	1

Chart - 3

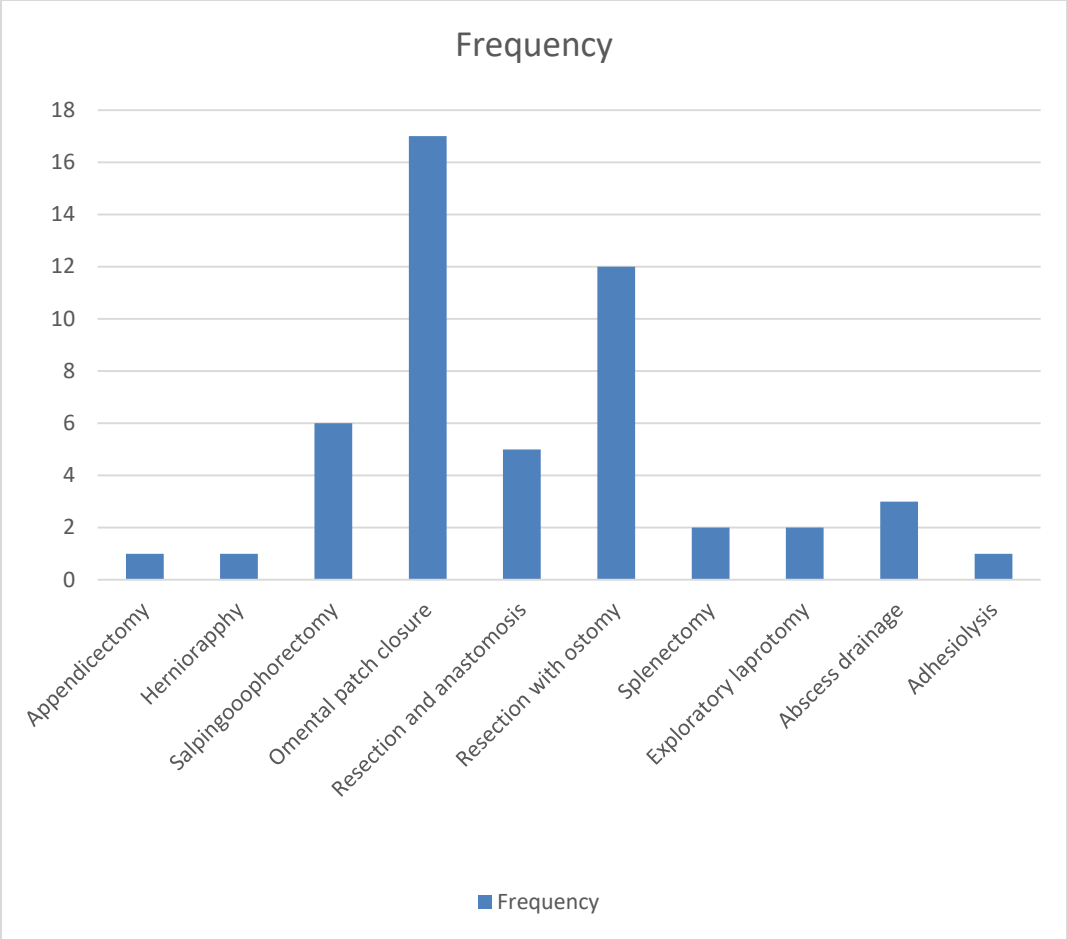


The most common indication for emergency laprotomy was a duodenal perforation, which included 30% of all cases. 7 cases were due to trauma (14%) 8 were due to infectious etiologies and 17 were due to alcohol related etiologies (34%).

Table - 4

	Surgery	Frequency
1.	Appendicectomy	1
2.	Herniorhapphy	1
3.	Salpingo-oophorectomy	6
4.	Omental patch closure	17
5.	Resection and anastomosis	5
6.	Resection with ostomy placement	12
7.	Splenectomy	2
8.	Explorative laprotomy	2
9.	Abscess drainage	3
10.	Adhesiolysis	1
	Total	50

Chart- 4



Out of the 50 cases taken for laprotomy , omental patch closure was the most commonly done procedure with a total of 17 cases (34%). This was followed by bowel resection with ileostomy/colostomy placement in 12 cases(24%). Salpingoophorectomy was done in 6 cases (12%).

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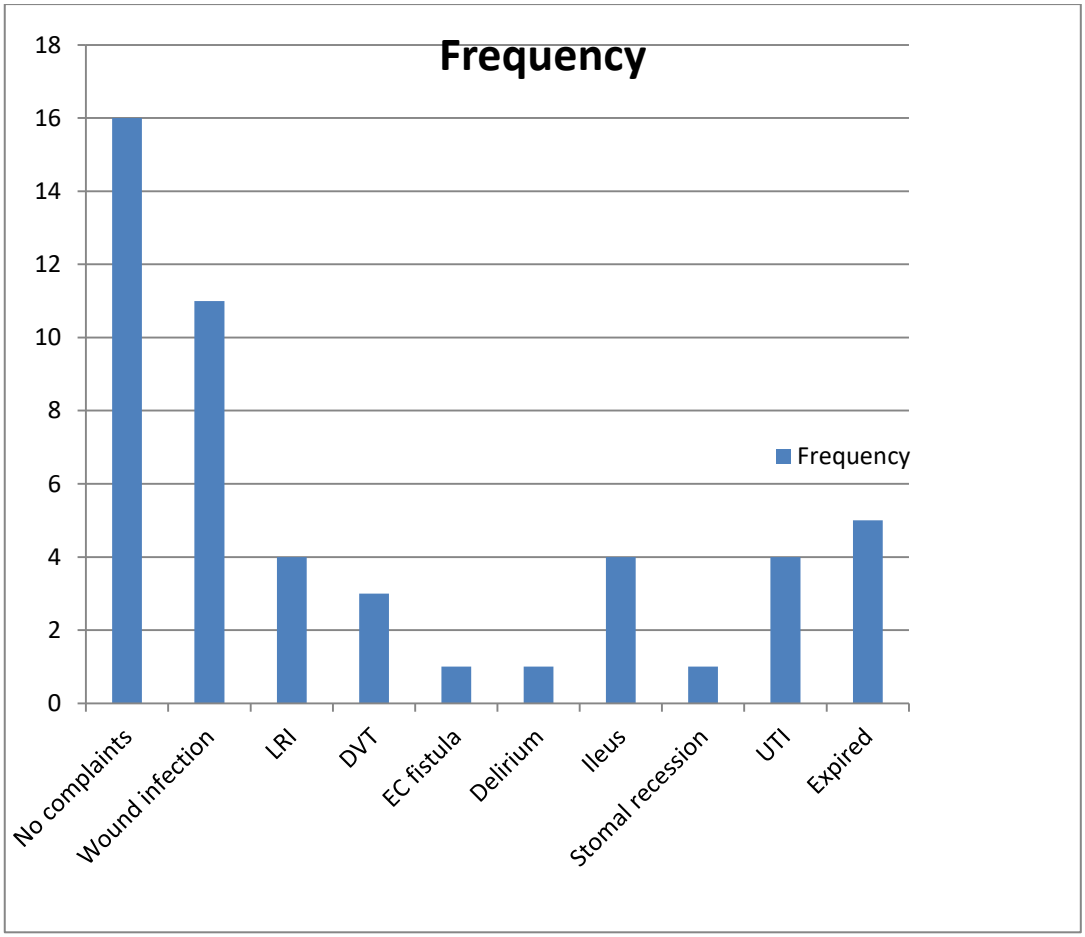
Table - 5

S. No	Complication	Frequency
1	No complaints	16
2	Wound site infection	11
3	Lower respiratory tract infection	4
4	DVT	3
5	Enterocutaneous Fistula	1
6	Delirium	1
7	Paralytic Ileus	4
8	Stomal recession	1
9	Urinary tract infection	4
10	Expired	5

Chart - 5

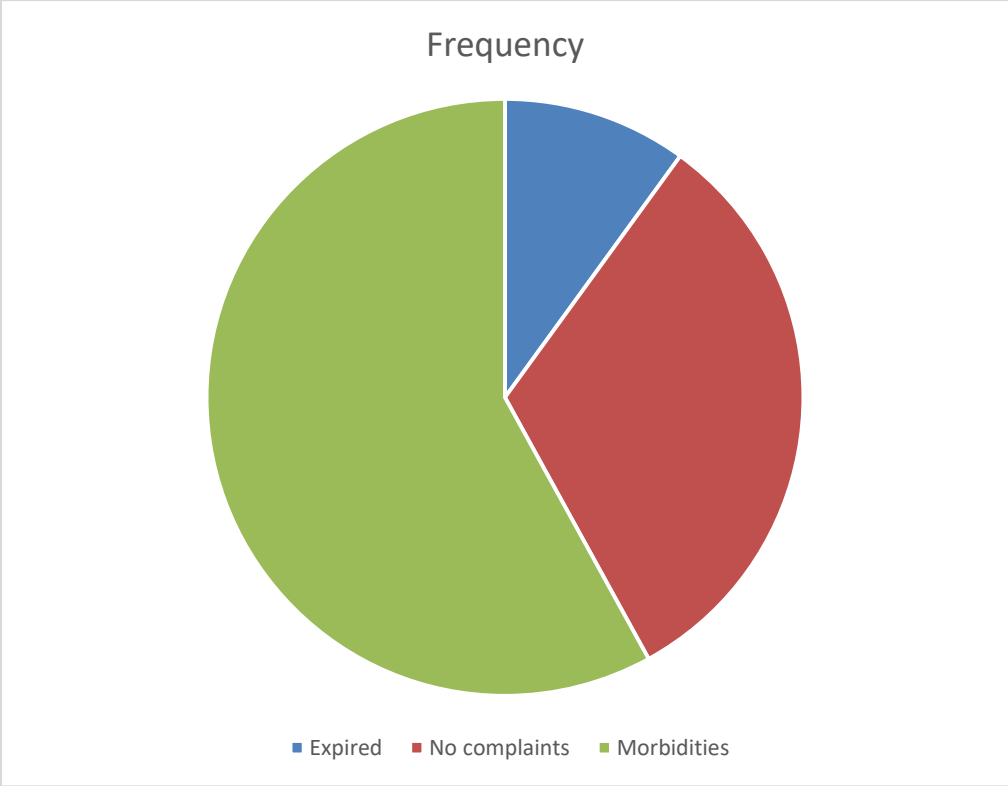


Out of the 50 cases taken for laprotomy 16 recovered without any significant post-operative complaint (32%).The most common post operative complication being wound site infection which affected 22% of he patients who underwent laprotomy. 5 cases expired which was 10% of the total.

Patient outcome post laprotomy

Out of the 50 patients taken for laprotomy , 5 expired (10%),29(58%) had some form of morbidity and16(32%) had no complaints.

Chart 6



STATISTICAL ANALYSIS AND INTERPRETATION OF DATA

The collected data were analyzed with IBM.SPSS statistics software. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significant difference between the bivariate samples in Independent groups the Unpaired sample t-test was used. The Hosmer–Lemeshow test is used for goodness of fit in logistics regression for mortality risk prediction model. In all the above statistical tools the probability value(p-value)of 0.05 is considered as significant level.

Logistic

Regression

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	50	100.0
	Missing Cases	0	0.0
	Total	50	100.0
Unselected Cases		0	0.0
Total		50	100.0

Analysis of mortality

Classification Table

Observed			Predicted		
			Mortality		Percentage Correct
			No	Yes	
Step 0	Mortality	No	45	0	100.0
		Yes	5	0	0.0
	Overall Percentage				90.0

Hosmer and Lemeshow Test

Step	Chi-square	Degrees of freedom	P-value
1	1.174	8	.997

Contingency Table for Hosmer and Lemeshow Test

		Mortality = No		Mortality = Yes		Total
		Observed	Expected	Observed	Expected	
Step 1	1	5	4.961	0	.039	5
	2	4	3.967	0	.033	4
	3	6	5.948	0	.052	6
	4	5	4.952	0	.048	5
	5	5	4.943	0	.057	5
	6	5	4.929	0	.071	5
	7	6	5.882	0	.118	6
	8	5	4.798	0	.202	5
	9	3	3.711	2	1.289	5
	10	1	.907	3	3.093	4

Classification Table

Observed			Predicted		
			Mortality		Percentage Correct
			No	Yes	
Step 1	Mortality	No	44	1	97.8
		Yes	2	3	60.0
	Overall Percentage				94.0

The cut off value is .500

The above contingency table shows the Observed and expected rates of mortality using the P-POSSUM score. From the interpretation of results using the Hosmer and Lemeshow Test, the P-POSSUM score was found to be an accurate predictor of mortality (x^2 =1.174, d.f=8) with a p-value of 0.997. As the p-value is >0.05 the P-POSSUM sore can be assumed to be an accurate measure of morbidity.

Analysis of morbidity

Classification Table

Observed			Predicted		
			Morbidity		Percentage Correct
			No	Yes	
Step 0	Morbidity	No	0	21	0.0
		Yes	0	29	100.0
	Overall Percentage				58.0

Hosmer and Lemeshow Test			
Step	Chi-square	df	P-Value
1	14.949	8	.0603

Contingency Table for Hosmer and Lemeshow Test						
		Morbidity = No		**Morbidity = Yes**		**Total**
		Observed	**Expected**	**Observed**	**Expected**	
Step 1	1	5	2.728	0	2.272	5
	2	2	2.553	3	2.447	5
	3	2	2.957	4	3.043	6
	4	3	2.256	2	2.744	5
	5	1	2.091	4	2.909	5
	6	1	1.978	4	3.022	5
	7	0	1.846	5	3.154	5
	8	1	1.725	4	3.275	5
	9	3	1.618	2	3.382	5
	10	3	1.249	1	2.751	4

The above contingency table shows the observed and expected rates of morbidity using the P-POSSUM score. From the interpretation of results using the Hosmer and Lemeshow Test, the P-POSSUM score was found to be an accurate predictor of morbidity (x^2 =14.949, d.f=8) with a p-value of 0.0603. As the p-value is >0.05 the P-POSSUM sore can be assumed to be an accurate measure of morbidity.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	50	13	73	41.06	15.710
SBP	50	80	130	102.24	9.652
DBP	50	50	80	66.12	6.957
Pulse rate	50	76	136	105.12	11.781
Hb	50	7	14	11.22	1.657
WBC	50	5100	24300	13802.00	4384.550
Urea	50	12	56	32.02	11.222
Sodium	50	123	147	136.62	5.038
Pottasium	50	2.5	5.3	3.800	.5406
GCS	50	13	15	14.96	.283
Total	50	13	40	23.12	6.898
Blood loss	50	40	800	226.80	170.371
Grand total	50	25	60	39.30	8.784
Total	50	12	27	16.24	3.027
Predicted Morbidity	50	20.42	98.65	63.8320	24.05195
Predicted Mortality	50	.78	69.06	12.8314	17.10394
Valid N (listwise)	50				

The above table shows the mean value of all the individual parameters analyzed in the study showing the degree of heterogeneity with the help of standard deviation.

DISCUSSION

The aim of any surgical procedure is to cause reduction in morbidity and mortality. The outcome of surgical intervention, whether death or an uncomplicated survival, complications or long term morbidity is not solely dependent on the abilities of a surgeon in isolation. The patient's physiological status, the disease that requires surgical correlation, the severity of the disease, the nature of the operation and the pre-operative as well as post-operative care will have a major effect on the final outcome. It is evident to a surgeon that the raw mortality and morbidity rates do little to explain these differences, and that the use of such statistics is at best inaccurate and misleading as each individual case is unique in its own right.

To provide a comparative audit[6] between different patient populations, measures of outcome must include methods to accommodate individual differences in an assortment of patients.

Operative mortality is an important and objective measurement of the final outcome. Monitoring the outcome is an increasingly important part of the governance of surgical activity. Both the purchasers of health care and individual patients value information concerning mortality and

morbidity rates of surgical procedures. Thus there has been a search for accurate risk scoring systems that can be used to compare patient outcomes according to the different units of different hospitals.

Risk scoring systems should quantify a patient's risk of death or morbidity based on the severity of the illness derived from data available at an early stage of the hospital stay. To overcome, this shortcoming, POSSUM and later its modification P-POSSUM was proposed . But P-POSSUM must be correlated to the general condition of the local population for it to be effective.[8,14] This is especially true in patients in developing countries like India, where the general condition of the patients is poor and have a high incidence of anaemia. Apart from malnutrition the delayed presentation of the patient to the emergency also compounds the problem.

In the emergency setting, the value of the POSSUM or P-POSSUM scoring system would be all the more important, where the comparison of observed to expected morbidity and mortality rates would be expected to yield significant results and, determination of the possible causes for the adverse outcome in patients who succumb following the surgical procedure, would be more beneficial.

In our study, we assessed the value of the P-POSSUM scoring system in 50 cases of emergency laparotomy by comparing the observed and expected mortality rates. 5 patients expired (crude mortality rate=10%), a total of 29 patients suffered some complications post-operatively (Morbidity rate=58%).The observed number of cases suffering some form of morbidity were 28 which was equal to the total number of predicted outcomes via the P-POSSUM scoring system. Therefore there was found to be no statistically significant difference between the observed and expected values for morbidity (x^2 =14.949, d.f=8, p-value 0.063) as well as mortality (x^2 =1.174, d.f=8, p-value of 0.997). Hence the P-POSSUM is capable of accurately predicting the morbidity and mortality following emergency surgeries.

Copeland G P[27] has applied POSSUM for comparative audit in 344 patients undergoing reconstructive vascular surgery to assess its efficiency in a comparative audit between 2 units. Estimated mortality rates were 10.2% for unit A(observed 9.4%) and 20.2% for unit B(observed 20.2%). Using ROC curves they proved that there was no statistically significant difference between the 2 units. This shows that we can use POSSUM as a better guide for comparing efficiency of quality of care, rather than crude mortality rates. Similar studies were done by

Sagar P M to compare adverse outco9mes, following colorectal resection in 438 patients among 5 surgeons. While crude mortality rates varied from 5.6% to 6.9% and morbidity rates between 13.6% and 30.06%, risk adjusted analysis using POSSUM showed no statistically significant difference and the overall observed to expected ratio for mortality was found to be 0.87 and for morbidity, it was 0.97. This shows that POSSUM can be used for meaningful comparison of individual surgeon's efficiency as it is a good predictor of adverse outcomes.

Mohil R S, used POSSUM for predicting the adverse outcome rates in patients undergoing emergency laparotomy. 120 patients who underwent emergency laparotomy at Safdurjung Hospital, Delhi, were studied to assess the applicability in their setup. All patients had physiological scoring done at the time of admission and intra-operative scoring to calculate expected 30 day morbidity and mortality . 16 patients (13.3%) died within 30 days of surgery and 62(51.7%) had complications. An analysis, they found an O:E ratio of 0.62 for mortality (x^2=10.71, P=0.148).

Wound infection(11 cases,22%) was the most common complication followed by Lower respiratory tract infection (4 cases,8%) along with paralytic ileus(4 cases,8%) and urinary tract infection(4 cases,8%).Wound site infection could be due to the large number of

patients who had gross peritoneal contamination from hollow viscus perforations or other infective foci. The incidence of lower respiratory tract infection could be due to a raised diaphragm, upper abdominal incision and gross peritoneal contamination. Although the incidence of lower respiratory tract infection in this study is less than in similar studies with similar settings probably due to better adherence to chest physiotherapy protocols(including respirometry) along with earlier ambulation forcing the patient to adequately ventilate. The incidence of urinary tract infections is mostly catheter induced and due to prolong periods of catheterisation. The incidence of paralytic ileus was found in cases where resection and anastomosis was done and primarily due to electrolyte abnormalities which were eventually corrected.

SUMMARY

A total of 50 patients taken for emegency laprotomies were studied, who were admitted to the surgery casualty at Govt. Stanley Hospital Chennai from the period of October 2016 to August 2017 including a 30 day post -operative follow up of each patient.

The study group included the following cases. The most common being duodenal perforation (15 cases=30%), followed by intestinal obstruction (8 cases = 16%). The others included blunt injury abdomen, ovarian torsion , appendical perforations, ileal perforations and other cases of lesser frequency.

Omental patch closure was the most commonly done surgery accounting for 17 cases (34%) followed by resection with ostomy placement in 12 cases(24%). The other procedures included resection and anastomosis (4 cases,8%) and salpingo-oophorectomy (4 cases, 8%) and others(13 cases).

They were scored using the P-POSSUM scoring system. Physiological scores were assessed at the time of admission and the operative score was determined based on the intra-operative findings. These patients were followed up for a 30 day period post-operatively and

all complications ,if any were noted. The observed mortality and morbidity rates were compared with the predicted scores determined by the P-POSSUM formula.

5 patients expired in this study(Mortality rate =10%). The P-POSSUM score was found to be an accurate predictor of mortality (x^2 =1.174, d.f=8) with a p-value of 0.997. 29 patients experienced some form of morbidity,the P-POSSUM score was found to be an accurate predictor of morbidity as well (x^2 =14.949, d.f=8) with a p-value of 0.0603. The most common morbidity experienced was wound site infection followed by lower respiratory tract infection.

There was no statistically significant difference between the observed and the predicted values in both the mortality as well as morbidity rates , which has proved it to be an accurate tool for assessing mortality and morbidity rates.

The research shows the scoring system is not 100% accurate, there were 7 cases where the scoring system predicted a significant chance of morbidity but no such morbidity was reported in these 7 patients.

CONCLUSION

A total of 50 cases of emergency laprotomy were studied, which resulted in 5 deaths. On applying the P-POSSUM score we found that the expected number of deaths in the study group were equal to that of the observed value. Similarly the observed cases of morbidity were 29 which was equal to the number of predicted cases.

No significant difference was noted between the observed as well as predicted morbidity and mortality rates. Therefore the present study suggests that the P-POSSUM scoring system is an accurate scoring system for predicting post-operative mortality and morbidity among cases taken for emegency laprotomy.

The common complications of wound site infection and chest infection should be minimized by appropriate use of antibiotics, minimal intra-operative handling and prevention of spillage of toxic contents during surgery. Post-operative measures such as early mobilization and adequate physiotherapy are essential for reducing complications like lower respiratory tract infection and deep vein thrombosis.

The scoring system also provides an adequate means to assess post-operative care provided to the patient. It has also proven to be an

invaluable tool for surgical audit to compare and contrast ,an individual surgeon's competence as well as surgical skill and can also be an indicator of comparison of different surgical techniques applied for the same condition.

Several studies have shown that the POSSUM scoring system overestimates the morbidity figures mainly in low-risk patients, but the P-POSSUM (Portsmouth-POSSUM) scoring system uses the same variables but estimates the risk of postoperative mortality through a linear regression model, thereby increasing its predictive value. However, it is not validated to estimate morbidity and has some limitations like the underestimation of mortality in the elderly and in emergent procedures . The scoring systems were modified and validated for application in colorectal procedures(CR-POSSUM), vascular (V-POSSUM) and gastroesophageal (O-POSSUM) surgeries to name a few

The P-POSSUM scores is not specific for a specific surgical procedure, with no discrimination of potential variables specific to certain surgical contexts, POSSUM and P-POSSUM scores have proven useful across different surgical specialties. Like other scores their use in clinical practice requires time and they do not allow for an accurate preoperative risk estimation because they are dependent on operative variables that can

only be obtained during and after surgery. So they just permit to do a prediction based on the presumptive values of operative values. However the impact of intraoperative variables in the patient outcome is unquestionable. Besides, they can be used as indirect indicators of the quality of health care by allowing comparison of the outcomes expected and observed in the institution for a specific surgical procedure for which those scores they are validated. Despite a few shortcomings including over prediction of morbidity in a few cases,the impact and use of the P-POSSUM scoring system has remained invaluable.

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PROFORMA

Name : Ip no:

Age: Date of admission:

Sex: Diagnosis:

Surgery done:

PHYSIOLOGICAL SCORE

	1	2	4	8
Age	<60	61-70	>70	
Cardiac signs	No failure	Diuretic, Digoxin , anti-anginal or anti-hypertensive therapy	Peripheral edema, warfarin therapy, borderline cardiomegaly	Raised jugular venous pressure, Cardiomegaly
Respiratory signs	No dyspnea	Dyspnea on exertion	Limiting dyspnea, Mild COPD	Dyspnea at rest (>30/min) Fibrosis/ Consolidation
Blood pressure (Systolic)	110-130	131-170 100-109	>171 90-99	<89

Pulse	50-80	81-100 40-49	101-120	>121 <39
Glasgow coma scale	15	12-14	9-11	<8
Hemoglobin(g/dl)	13-16	11.5-12.9 16.1-17	10-11.4 17.1-18	<9.9 >18.1
White cell count	4-10	10.1-20 3.1-4	>20.1 <3.1	
Urea(mmol/L)	<7.5	7.6-10	10.1-15	>15.1
Sodium(mmol/L)	>136	131-135	126-130	<125
Potassium(mmol/L)	3.5-5	3.2-3.4 5.2-5.3	2.9-3.1 5.4-5.9	<2.8 >6
ECG	Normal		Atrial fibrillation (rate 60-90)	Any other abnormal rhythm or >5 ectopics/min or ST/T wave changes

OPERATIVE SCORING

	1	2	4	8
Operative Severity	Minor	Moderate	Major	Major +
Multiple procedures	1		2	>2
Total blood loss	<100	100-500	501-999	>1000
Peritoneal soiling	None	Minor (serous fluid)	Local pus collection	Free bowel content, diffuse pus
Presence of maligancy	None	Primary only	Nodal metastasis	Distant metastasis
Mode of Surgery	Elective		Emergency resuscitation >2 hours and surgery <24 hrs from admission	Emergency surgery < 2hrs of resuscitation.

COMPLICATIONS RECORD SHEET

Name :

Ip no:

Age:

Date of admission:

Sex:

Diagnosis:

Surgery done:

Outcome:

Haemorrhage:

1.Wound

2.Deep

3.Other

Infection:

1.Chest

2.Wound

3.Urinary tract

4.Deep

5.Septicemia

6.Pyrexia

7.Other

Wound dehiscence:

1.Supeficial

2.Deep

Anastomotic Leak:

Thrombosis:

1.Deep vein

2.Pulmonary embolus

3.Cerbrovascular accident

4.Myocardial infarction

Cardiac failure:

Impaired renal function: (Urea increases >5mmol/l from pre-operative level)

Hypotension(<90mmHg for >2hours) :

Respiratory failure:

In the event of death:

1.Immediate cause -

2.Antecedent cause -

3.Contributing factors -

LIST OF ABBREVIATIONS

1. CVS- Cardiovascular system
2. R.S- Respiratory System
3. BP-Blood pressure
4. Hb- Hemoglobin
5. WBC- white blood cell count
6. GCS-Glasgow coma scale
7. PROC- Procedure type
8. LOSS- Blood loss
9. CONTA- Extent of contamination
10. MALIG- Extent of malignancy
11. CEPOD- Confidential enquiry into perioperative deaths score
12. Pred. Morb- Predicted Morbidity
13. Pred. Mort- Predicted Mortality

S.NO	Name	Ip No	Sex	Diagnosis	Surgery	AGE	CVS	RS	ECG	BP	PULSE	Hb	WBC	Urea	Na	K	GCS	**TOTAl**	TYPE	PROC	LOSS	CONTA	MALIG	CEPOD	**TOTAL**	**GRAND**	PRED. MORB	PRED. MORT	Out-come
1	Karthik	1718951	M	Appendicu-lar perforation	Appendicectomy	1 (27)	1	1	1	1 (110/70)	2 (96)	2 (11.7)	2 (18,000)	1 (29)	1 (138)	1 (3.8)	1 (15)	**15**	4	1	1 (40)	1	1	4	**12**	**27**	22.62%	0.93%	No complaints
2	Mahmuddha	1717309	F	Obstructed hernia	Herniorhapphy	1 (35)	1	1	1	2 (100/70)	2 (96)	2 (12.5)	2 (12,500)	1 (15)	1 (142)	1 (3.7)	1 (15)	**16**	4	1	1 (50)	2	1	4	**13**	**29**	29.32%	1.28%	No complaints
3	Fathima	1713430	F	Ectopic pregnancy	Salpingostomy	1 (24)	1	1	1	2 (100/60)	2 (98)	4 (10.8)	1 (7,300)	1 (20)	1 (140)	1 (3.9)	1 (15)	**17**	4	1	2 (200)	1	1	4	**13**	**30**	32.74%	1.52%	Urinary tract infection
4	Thirunavakaarasu	1712037	M	Duodenal perforation	Omental patch closure	1 (42)	1	1	1	2 (104/60)	2 (84)	2 (12.1)	2 (14800)	1 (18)	1 (139)	1 (4.2)	1 (15)	**16**	4	1	1(60)	2	1	4	**13**	**29**	29.32%	1.28%	No complaints
5	Shameen sultan	1709196	F	Duodenal perforation	Omental patch closure	1 (29)	1	2	1	2 (106/70)	2 (92)	4(10)	2 (16700)	1 (12)	1 (142)	1 (4.6)	1 (15)	**19**	4	1	1(80)	2	1	4	**13**	**32**	40.13%	2.11%	Wound site infection
6	Lakshmi	1721616	F	Intestinal obstruction	Resection and anastomosis	1 (32)	1	1	1	2 (100/64)	2 (88)	4 (10.6)	2 (13100)	1 (15)	1 (147)	1 (3.7)	1 (15)	**18**	4	1	2 (250)	2	1	4	**14**	**32**	40.85%	2.08%	Wound site infection
7	Manikandan	1720112	M	Duodenal perforation	Omental patch closure	1	1	1	1	1	1	1	2	1	1	1	1	**13**	4	1	1(50)	2	1	4	**13**	**25**	20.42%	0.78%	No complaints

						(28)				(110/70)	(76)	(13.6)	(11200)	(19)	(145)	(4.4)	(15)											
8	Lawrence Raj	1717284	M	Mesentric Thrombosis	Resection with ostomy placement	1 (55)	2	2	4	2 (106/70)	4 (112)	1 (13.8)	4 (22300)	2 (25)	1 (140)	2 (3.3)	1 (15)	**26**	4	1	2 (450)	8	1	4	**20**	**46**	88.95%	17.28%	Wound site infection, Lower respiratory tract infection
9	Meethu	1717280	M	Blunt injury abdomen	Splenectomy	1 (30)	1	1	1	4(94/60)	4 (118)	4 (10.1)	1(5100)	2 (26)	1 (136)	1 (5.3)	1 (15)	**22**	4	1	2 (400)	1	1	4	**13**	**35**	52%	3.46%	Lower respiratory tract infection
10	Renuga	1714491	F	Appendical mass	Saline wash , DT placemnent	1 (44)	1	1	1	1 (120/80)	2 (98)	1 (13.9)	2 (16500)	2 (27)	1 (138)	1 (4.1)	1 (15)	**15**	4	1	1(50)	2	1	4	**13**	**28**	26.11%	1.09%	No complaints
11	Kanthan	1711834	M	Stab injury	Resection and anastomosis	1 (50)	1	1	1	2 (100/60)	4 (116)	8 (9.6)	2 (12500)	2 (25)	1 (140)	1 (4.6)	1 (15)	**25**	4	1	2 (200)	2	1	8	**18**	**43**	81.91%	11.46%	Wound site infection
12	Kannan	1722165	M	Intestinal obstruction	Resection with ostomy placement	1 (46)	1	1	1	2 (104/64)	2(98)	4 (10.6)	2 (14800)	2 (22)	1 (143)	2 (3.1)	1 (15)	**20**	4	1	2 (200)	4	1	4	**16**	**36**	58.18%	3.91%	DVT
13	Rosena	1720513	F	Ovarian torsion	Oophorectomy	1 (35)	2	2	1	2 (106/70)	2(92)	4 (10.5)	1(8200)	2 (26)	1 (142)	1 (4.1)	1 (15)	**20**	4	1	1(80)	1	1	4	**12**	**32**	39.41%	2.14%	No complaints
14	Annapoorni	1720503	F	Blunt injury abdomen	Resection and anastomosis	1 (52)	1	1	1	8 (80/50)	8 (126)	8 (7.2)	1 (9100)	4 (38)	1 (137)	1 (4.8)	2 (13)	**37**	4	1	4 (650)	1	1	4	**15**	**52**	94.58%	38.23%	Expired

15	Kuppan	1717752	M	Duodenal perforation	Omental patch closure	1 (53)	1	1	1	2 (104/60)	2(98)	2 (12.1)	2 (16500)	4 (36)	1 (143)	1 (3.7)	1 (15)	**19**	4	1	1(80)	8	1	4	**19**	**38**	67.70%	5.19%	Fistula
16	Anand Raj	1716550	M	Stab injury	Explortory laprotomy (Rent closure)	1 (19)	1	1	1	4 (94/60)	4 (110)	2 (12.5)	1 (9100)	2 (22)	1 (139)	1 (3.8)	1 (15)	**20**	4	1	2 (150)	2	1	8	**18**	**38**	67.04%	5.26%	No complaints
17	Kutiyammal	1716424	F	Gastric perforation	Omental patch closure	4 (73)	2	4	1	8 (80/50)	4 (116)	8 (8.1)	2 (14800)	4 (38)	1 (143)	1 (4.8)	1 (15)	**40**	4	1	2 (200)	8	1	4	**20**	**60**	98.65%	69.06%	Expired
18	Chengodi	1713710	M	Intestinal obstruction	Resection with ostomy placement	1 (50)	2	2	1	1 (110/70)	4 (110)	4 (10.5)	2 (18000)	8 (56)	1 (136)	1 (4.1)	1 (15)	**28**	4	1	2 (400)	8	8	4	**27**	**55**	97.59%	46.45%	Expired
19	Beebi Jan	1712233	F	Diverticulitis	Resection with ostomy placement	4 (72)	2	1	1	1 (120/80)	2(92)	4 (10.8)	2 (16700)	4 (40)	2 (134)	1 (3.9)	1 (15)	**25**	4	1	2 (150)	4	1	4	**16**	**41**	75.58%	8.67%	Delirium
20	Savithri	1719175	F	Ovarian torsion	Oophorectomy	1 (37)	1	1	1	1 (130/80)	4 (116)	4 (10.6)	1(9100)	2 (26)	1 (139)	1 (3.9)	1 (15)	**19**	4	1	2 (120)	1	1	4	**13**	**32**	40.13%.	2.11%	Urinary tract infection
21	Shankar	1708123	M	Liver Abscess	Abscess drainage	1 (36)	1	2	1	2 (100/70)	4 (118)	2 (11.7)	4 (21300)	4 (38)	1 (136)	1 (3.8)	1 (15)	**24**	4	1	2 (200)	4	1	4	**16**	**40**	72.51%	7.42%	Wound site infection
22	Rajesh	1716388	M	Duodenal perforation	Omental patch closure	1 (33)	1	1	1	2 (104/60)	4 (116)	1 (13.6)	2 (18000)	4 (36)	1 (140)	1 (4.6)	1 (15)	**20**	4	1	1(80)	4	1	4	**15**	**35**	53.49%	3.37%	No complaints
23	Ganesh	1709468	M	Intestinal obstruction	Resection with ostomy placement	1 (40)	1	1	1	1 (110/70)	4 (110)	2 (11.7)	2 (11200)	8 (50)	4 (128)	8 (2.5)	1 (15)	**34**	4	1	2 (400)	8	1	4	**20**	**54**	96.54%	44.71%	Pneumonia

24	Santosh	1712276	M	Meckel's Diverticulitis	Resection and anastomosis	1 (18)	1	1	1	1 (110/70)	2 (96)	1 (13.8)	2 (12500)	1 (15)	1 (137)	1 (3.8)	1 (15)	**14**	4	1	2 (250)	8	1	4	**20**	**34**	53.25%	2.67%	No complaints
25	Sanjay	1708149	M	Duodenal perforation	Omental patch closure	1 (28)	1	1	1	2 (100/64)	2(98)	1 (13.7)	2 (13100)	1 (18)	1 (138)	1 (3.9)	1 (15)	**15**	4	1	1 (80)	4	1	4	**15**	**30**	34.07%	1.47%	Wound site infection
26	Chandraprakash	1712226	M	Duodenal perforation	Omental patch closure	1 (55)	2	2	1	2 (100/70)	4 (118)	2 (12.5)	2 (16500)	4 (38)	1 (142)	1 (4.2)	1 (15)	**23**	4	1	2 (120)	4	1	4	**16**	**39**	69.21%	6.34%	DVT
27	Kumar	1712287	M	Ileal perforation	Resection with ostomy placement	1 (23)	1	1	1	1 (110/70)	4 (112)	2 (12.1)	4 (24300)	4 (41)	2 (132)	2 (3.3)	1 (15)	**24**	4	1	2 (200)	8	1	4	**20**	**44**	84.94%	12.96%	No complaints
28	Vinoth Kumar	1782632	M	Blunt injury abdomen	Resection and anastomosis	1 (23)	1	1	1	2 (106/70)	4 (110)	4 (10.5)	2 (14800)	4 (36)	2 (134)	1 (3.9)	1 (15)	**24**	4	1	2 (400)	4	1	4	**16**	**40**	72.51%	7.42%	No complaints
29	Sekar	1711021	M	Gastric perforation	Omental patch closure	1 (38)	1	1	1	2 (100/64)	2(98)	4 (10.1)	2 (16700)	4 (36)	2 (132)	1 (3.7)	1 (15)	**22**	4	1	2 (120)	4	1	4	**16**	**38**	65.70%	5.40%	Wound site infection
30	Rajaiah	1713065	M	Duodenal perforation	Omental patch closure	1 (45)	1	2	1	1 (110/70)	2(92)	4 (10.5)	2 (11200)	2 (27)	2 (134)	2 (3.3)	1 (15)	**21**	4	1	1(80)	4	1	4	**15**	**36**	57.44%	3.97%	Pneumonia
31	Jayaraman	1709953	M	Ileal perforation	Resection with ostomy placement	1 (58)	2	2	1	2 (100/64)	4 (110)	2 (11.7)	2 (16500)	2 (25)	1 (137)	1 (3.8)	1 (15)	**21**	4	1	2 (250)	8	1	4	**20**	**41**	77.73%	8.23%	Paralytic ileus
32	Venkatesan	1703177	M	Intestinal obstruction	Adhesiolyis	1 (37)	1	1	1	2 (100/60)	4 (110)	4 (10)	4 (21300)	2 (27)	2 (132)	2 (3.1)	1 (15)	**25**	4	1	2 (350)	8	2	4	**21**	**46**	88.89%	17.08%	Pneumonia

33	Gajendran	1705765	M	Obstructed hernia	Resection with ostomy placement	2 (61)	2	2	1	2 (100/70)	4 (116)	4 (10.1)	2 (12500)	2 (25)	2 (134)	2 (3.3)	1 (15)	**26**	4	1	2 (150)	4	1	4	**16**	**42**	78.41%	10.10%	DVT
34	Mahendran	1719733	M	Blunt injury abdomen	Splenectomy	1 (19)	1	1	1	2 (100/70)	2(98)	2 (11.7)	1(8200)	2 (27)	1 (138)	1 (4.2)	1 (15)	**16**	4	1	4 (600)	2	1	4	**16**	**32**	42.31%	2.03%	No complaints
35	Suryamoorthy	1711464	M	Blunt injury abdomen	Resection with ostomy placement	1 (56)	1	2	1	4 (90/60)	4 (114)	4 (10.6)	1 (7300)	4 (41)	1 (138)	1 (3.9)	1 (15)	**25**	4	1	2 (400)	2	1	4	**14**	**39**	67.92%	6.51%	Wound site infection
36	Poorna chandra	1708708	M	Duodenal perforation	Omental patch closure	1 (30)	1	1	1	1 (110/70)	2 (92)	2 (12.0)	2 (12500)	2 (26)	1 (145)	1 (4.4)	1 (15)	**16**	4	1	2 (250)	4	1	4	**16**	**32**	42.31%	2.03%	No complaints
37	Nirmal	1782210	M	Duodenal perforation	Omental patch closure	1 (32)	1	1	1	2 (100/64)	2(98)	1 (13.6)	2 (13100)	2 (25)	1 (136)	1 (3.7)	1 (15)	**16**	4	1	2 (120)	4	1	4	**16**	**32**	42.31%	2.03%	Lower respiratory tract infection
38	Ashok	1709863	M	Stab injury	Explortory laprotomy (Rent closure)	1 (55)	1	1	1	4 (90/60)	4 (114)	4 (10.5)	1 (9100)	4 (38)	1 (137)	2 (3.3)	1 (15)	**25**	4	1	2 (350)	2	1	8	**18**	**41**	81.91%	11.46%	Paralytic ileus
39	Gokul	1707034	M	Duodenal perforation	Omental patch closure	1 (24)	1	1	1	2 (100/70)	2(96)	2 (12.5)	2 (13100)	2 (27)	2 (134)	1 (3.9)	1 (15)	**18**	4	1	1 (80)	2	1	4	**13**	**31**	36.35%	1.79%	No complaints
40	Amudha	1718293	F	Intestinal obstruction	Resection with ostomy placement	1 (40)	1	1	1	2 (100/64)	2(98)	2 (12.1)	2 (14800)	4 (41)	4 (128)	2 (3.3)	1 (15)	**23**	4	1	2 (150)	2	1	4	**14**	**37**	60.59%	4.73%	Stomal recession
41	Shankar	1717802	M	Intestinal obstruction(CA colon)	Resection with ostomy placement	2 (62)	2	2	1	1 (120/80)	4 (110)	4 (10.5)	2 (13100)	8 (52)	8 (123)	4 (3.0)	1 (15)	**39**	4	1	2 (450)	4	4	4	**19**	**58**	98.09%	61.75%	Expired

42	Rajimani	1719489	F	Duodenal perforation	Omental patch closure	4 (70)	2	1	1	2 (100/64)	2(98)	4 (10.1)	2 (14800)	4 (36)	4 (128)	2 (3.3)	1 (15)	**29**	4	1	2 (120)	4	1	4	**16**	**45**	85.45%	15.73%	Wound site infection
43	Usha	1716709	F	Ruptured ectopic pregnancy	Rt side salpingo-oophorectomy	1 (29)	1	1	1	8 (80/50)	4 (118)	8 (8.1)	1(7300)	4 (40)	2 (134)	1 (3.8)	1 (15)	**33**	4	1	4 (800)	4	2	4	**19**	**52**	95.17%	36.90%	No complaints
44	Manickraj	1713964	M	Internal Herniation	Resection with ostomy placement	1 (47)	1	1	1	4 (90/60)	4 (114)	4 (10.6)	2 (13100)	4 (36)	4 (126)	2 (3.3)	1 (15)	**29**	4	1	2 (350)	8	1	4	**20**	**49**	92.62%	25.77%	Expired
45	Neelavathy	1732123	F	Ovarian torsion	Oophorectomy	4 (73)	2	2	1	2 (100/70)	4 (118)	4 (10.1)	1(9100)	8 (52)	2 (134)	1 (3.8)	1 (15)	**32**	4	1	2 (400)	2	1	4	**14**	**46**	86.65%	18.53%	Urinary tract infection
46	Dhanush	1705383	M	Pelvic Abscess	Abscess drainage	1 (13)	1	1	1	4 (94/60)	8 (136)	2 (12.5)	4 (24300)	8 (56)	2 (132)	4 (3.0)	1 (15)	**37**	4	1	2 (120)	8	1	4	**20**	**57**	97.83%	57.33%	Paralytic ileus
47	Sundaramoorthy	1705026	M	Duodenal perforation	Omental patch closure	2 (65)	2	1	1	2 (100/70)	4 (112)	2 (11.7)	2 (16700)	4 (41)	2 (134)	2 (3.3)	1 (15)	**25**	4	1	1 (80)	4	1	4	**15**	**40**	71.91%	7.52%	Wound site infection
48	Ellamal	1709595	F	Gastric perforation	Omental patch closure	1 (40)	1	1	1	2 (100/64)	4 (110)	8 (8.3)	2 (13100)	8 (52)	2 (132)	2 (3.2)	1 (15)	**33**	4	1	2 (200)	4	1	4	**16**	**49**	91.76%	26.87%	Paralytic ileus
49	Sangeetha	1706493	F	Ovarian torsion	Oophorectomy	1 (25)	1	1	1	2 (100/70)	2(98)	4 (10.6)	2 (11200)	4 (38)	1 (137)	1 (3.8)	1 (15)	**21**	4	1	2 (250)	2	1	4	**14**	**35**	52.75%	3.42%	No complaints

URKUND

Urkund Analysis Result

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