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Prospective Study of clinical profile and outcome in Surgical ICU patients

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Abstract

Introduction: *Surgical patients admitted to intensive care units (ICUs) were generally older, with a preexistent chronic condition and a poor nutritional status that could be associated with diverse mortality causes***Error! Bookmark not defined.***[8]. Major postoperative complications were not common, occurring in less than 20% of patients, but these patients have a four-fold higher mortality rate than patients without complications.[1] Infection was prominent among the surgical complications.The mortality rate of infected patients was now known to be more than twice that of non-infected patients.[2] in ICU. The ICU mortality rate in patients with severe sepsis was reported to be 39.2%.[2] In a prospective cohort study including 75 ICUs in Brazil, the mortality rates of patients with severe sepsis and septic shock were 34.4 and 65.3%.*

Study Design: *Prospective Observational Study.*

Setting: *Tertiary care teaching hospital based study done in Department of General Surgery at MMIMSR, Mullana, Ambala, Haryana, India.*

Duration: *Two years (June 2015 to May 2017)*

Sample Size: *100 patients.*

Sample Size Calculation: *The sample size was estimated on the basis of a single proportion design. The target population from which we randomly selected our sample was considered 20,000. We assumed that the confidence interval of 9.8% and confidence level of 95%.*

Subjects & Selection Method: *The study population was drawn from patients who presented to Department of General Surgery at MMIMSR. There were 100 patients, who were diagnosed and admitted in the department of general medicine in surgical ICU including post-operative and admitted in SICU for some other surgical condition were included. The research procedure followed was in accordance with the approved ethical standards of MMIMSR, Mullana, Ambala, Punjab, India, Ethics Committee (Human).*

Result: *In the present study, population consisted of 57 (57%) males and 43 (43%) females with a mean age of 41.08±15.8 years.* The main cause of admission was perforation *peritonitis (29%), followed by post-operative cases of cholelithiasis (11%). Major attributing causes were malignancy (10%), intestinal obstruction (8%), necrotizing fasciitis and liver abscess (7% each). Pancreatitis patients were 6%, PVD and Hernia (5% each) and miscellaneous/unclassified (8%) of the total cases. Mortality rate was found to be 17% of this 52% was because of ARDS or ventilator assisted pneumonia leading to sepsis and MODS In our study, APACHE II (First day) score was13.5±5.1 for survivors and 19.7±6.7 for non survivors and second day score was 10.4±4.3 & 23.8±7.8 respectively was found to be significant and could be used to predict the. Duration of stay of stay for survivors and non survivors was 5.06±3.4 & 12.8±5.8 respectively. The difference in both the APACHE II scores for both days as also the duration of stay in ICU were statistically highly significant P<0.001.*

Conclusion: *It was concluded that prolonged ICU stay is more frequent in more severely ill patients at admission and it is associated with higher hospital mortality.*

Keywords: *SICU, Surgery, Scoring System, Mortality.*

Introduction

Worldwide, more than 230 million major surgical procedures are undertaken each year.[2] For most of the patients, though at the outset risks of surgery appear low and yet evidences increasingly suggest that complications after surgery were an important cause of death.[2,3,4,5] About 10% of patients undergoing surgery in the developed countries were at high risk of complications, accounting for 80% of postoperative deaths.[2,3,4] If this rate was applicable worldwide, up to 25 million patients undergo high-risk surgical procedures each year, of whom 3 million would not survive until hospital discharge. Patients who develop complications but survive to leave hospital often have reduced functional independence and long-term survival.[5,6,7] Surgical and medical patients were the two large groups of critically ill patients with differences in demographic characteristics, leading primary intensive care diagnoses upon admission, and mortality[2,3,4,5], suggesting that different treatment approaches might benefit both groups.

Outcome in intensive care have primarily been focused on hospital survival and resource utilization adjusted for severity of illness. Many outcome prediction systems for ICU patients were developed[ii,iii,iv] and were routinely used in many ICU all over the world measuring severity of illness as mortality prediction models. They have been widely used and their performance well studied in large international data set[4,v] Predicted outcomes might be used both for clinical decision making in individual patients and for assessing quality of care. A number of scores aid in prediction of death specifically for patients admitted to the ICU. While not developed solely for surgical patients, all of these scores account for postsurgical patients and provide risk prediction. The most commonly used scores were the Acute Physiology and Chronic Health Evaluation (APACHE) score, the Simplified Acute Physiology Score (SAPS), and the Mortality Probability Model (MPM).[6]The Sequential Organ Failure Assessment (SOFA) and the Multiple Organ Dysfunction Score (MODS) were two other ICU scoring systems used to describe organ dysfunction over the course of the ICU stay.[7]

Cost analysis studies have revealed that the ICU cost per day per patient were remarkably consistent across most diagnoses[5] and therefore, ICU length of stay (LOS) had been also used as a measure of resource utilization in the ICU[8] Despite refinements in perioperative management, prolonged intensive care unit stay was still associated with poor patient outcome and increased costs[9,10] Risk factors, which predispose toward prolonged stay in ICU after surgery have been found and widely studied and were associated with poor patient outcome and increased costs[11-13]. Although LOS in ICU might be affected by discharge policies, variable practice patterns and bed management[14] prolonged ICU stay can adversely affect the health status by increasing the risk of infection, complications, and, possibly, mortality[15,] It also impacts bed availability and could result in cancellation of elective surgeries, leading to long waiting times and time spent on the ward before ICU admission. The likely LOS of a patient might also influence therapeutic decisions. Several recent studies have indicated that some therapeutic strategies that impact on patient outcome might only have an effect on patients with longer ICU stays[16,17,]The aim of the present study was to estimate the incidence and predictive factors for intra hospital outcome measured by mortality and LOS in patients admitted to a surgical ICU.

Patients and Methods Data collection: patients included

Study Design: Prospective Observational Study

Setting: This was a tertiary care teaching hospital based study done in Department of General Surgery at MMIMSR, Mullana, Ambala, and Haryana, India.

Study Duration: Two years (June 2015 to May 2017)

Sample Size: 100 patients.

Sample Size Calculation: The sample size was estimated on the basis of a single proportion design. The target population from which we randomly selected our sample was considered 20,000. We assumed that the confidence interval of 9.8% and confidence level of 95%.

Subjects & Selection Method: The study population was drawn from patients who presented to Department of General Surgery at MMIMSR. There were 100 patients, who were diagnosed and admitted in the department of general medicine in surgical ICU including post-operative and admitted in SICU for some other surgical condition were included. The research procedure followed was in accordance with the approved ethical standards of MMIMSR, Mullana, Ambala, Punjab, India, Ethics Committee (Human).

Inclusion Criteria

- All aged patients admitted in surgical ICU including post-operative patients
- All patients admitted in SICU for any surgery

Exclusion Criteria

- All the patients who were of Orthopaedics surgery or Department.
- All post-operative patients who were shifted from ICU within 24 hours of their admission.
- All patients admitted in burns ICU and respiratory intensive care unit.
- Not consenting to participate in the study

Study Tool

- Predesigned Performa for data collection

Method of Collection of Data

A written consent was taken from all potentially eligible subjects and excluded from the study if they were not matched with inclusion criteria of the study. Detailed physical examination was performed and patient's information was recorded on predesigned Performa from each patient. Patient's personal history, age, gender, patients clinical profile, acute physiology and chronic health evaluation (First day and second day), daily blood glucose levels, admitted ward information, ICU admission and discharge dates, ICU and hospital admission diagnoses, APACHE III diagnostic category, source of ICU admission [Operation theatres (OT) or wards], patient comorbid conditions, physiologic data in the first 24 hrs of ICU stay, duration of ICU stay, ICU outcome and discharge date, hospital outcome and discharge dates. To calculate the APACHE II scores, predicted mortality and ICU length of stay used the ICON Database CCMX version 1.1 software (ÓD. McWilliam and R. Herkes).[vi]

Clinical Data Collection: All clinical data were recorded drom vital sign monitors, ventilators and infusion pumps automatically (clinical information system (Copra System GmbH, Sasbachwalden Germany). The clinical information system provides staff with complete electronic documentation, order entry (eg, medications) and direct access to laboratory results. The primary outcomes analyzed were perioperative complications and hospital mortality. The secondary outcomes analyzed were duration of ICU stay, ventilator free days and ICU free days.

Gender wise Age group distribution of patients was recorded in the table below. The age group wise difference in age of the patients of the two sexes was statistically significant P value = 0.019

Table No.01: Gender wise Age group distribution of studied patients

Age group	Male (N=57)	Female (N=43)	Total (N=100)	Significance
≤ 20 year	6(5.3%)	3(14.0%)	9(9.0%)	Chi square = 15.13 P value = 0.019
21 to 30 year	9(15.8%)	10 (23.3%)	19 (19.0%)	
31 to 40 year	20(35.1%	6(14.0%)	26 (26.0%)	
41 to 50 year	9(15.8%)	15 (34.9%)	24(24.0%)	
51 to 60 year	8(14.0%)	2(4.7%)	10 (10.0%)	
61 to 70 year	5 (8.8%)	4(9.3%)	9(9.0%)	
>70 year	3(5.3%)	0(0.0%)	3 (3.0%)	

P value >0.05= non-significant; P value <0.05= significant; P value <0.001=highly significant

Figure No 1: Bar chart age group distribution of patients

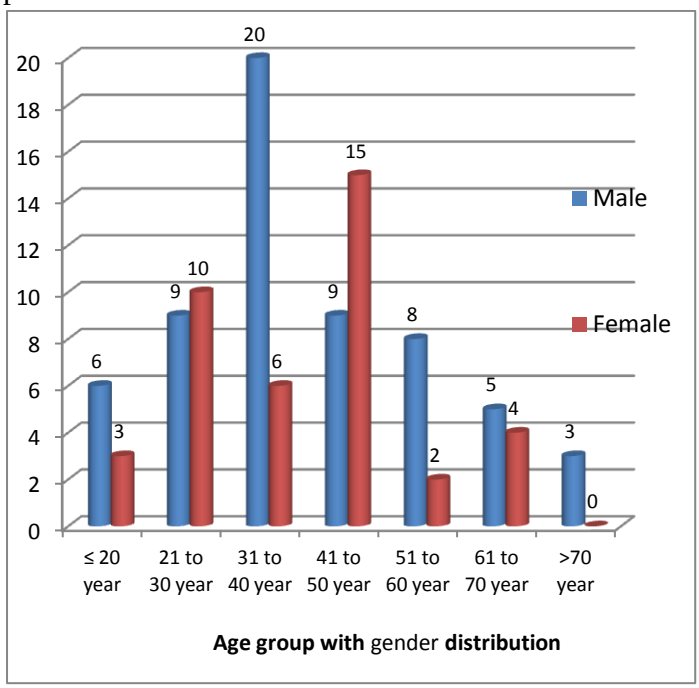

Table No.2: Distribution of patients score and outcome

Variable	Mean±SD (N=100)
APACHE II (First day)	15.21±7.9
APACHE II (Second day)	12.41±4.2
Survived	83 (83.0%)
Non survived	17 (17.0%)

Table No.03: Showing distribution of patients Admitted in SICU

Initial admissions	Number of patients (%) (N=100)
Transferred from OT	64 (64.0%)
Transferred from Emergency	31 (31.0%)
Admitted directly in S ICU	5 (5.0%)

Figure no 02: Pie chart showing distribution of patients admitted in SICU

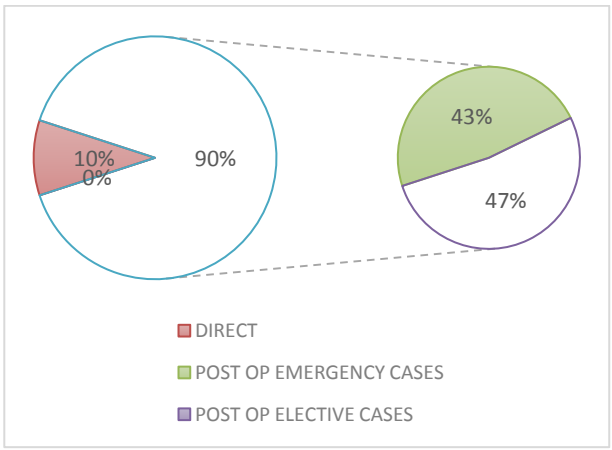

Table No.04: Showing distribution of patients admitted in ICU & their final outcome

Diagnosis	Survived	Non-Survived	Number of patients (%) (N=100)
Pancreatitis	6	0	6
Perforation peritonitis	20	9	29
Malignancy	8	2	10
PVD	5	0	5
Hernia	5	0	5
Intestinal Obstruction	7	1	8
Hydatid cyst & Liver abscess	7	0	7
Blunt injury (Chest/Abdomen)	2	2	4
Cholelithiasis	10	1	11
Necrotizing Fasciitis	5	2	7
Miscellaneous / Unclassified	8	0	8

Figure 3-A: Pie chart showing distribution of patients admitted in ICU

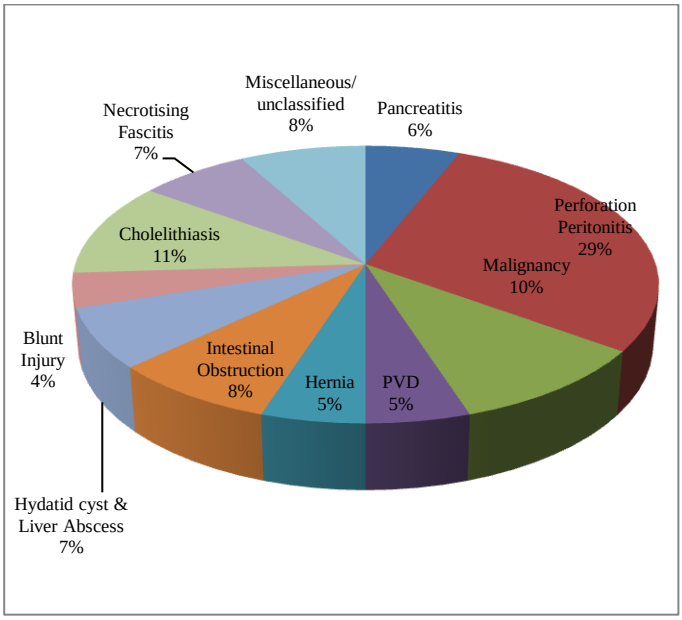

Figure 4 Bar chart showing distribution of patients admitted in ICU

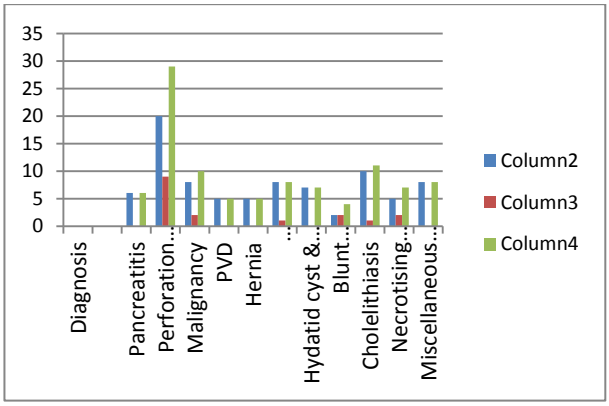

Table No.05: Duration of stay in ICU

Duration of stay	Number of Patients (%)
2 to 5 day	61 (61.0%)
6 to 10 day	32 (32.0%)
More than 10	7 (7.0%)
Total duration (Mean±SD)	6.08±5.2

Table No.06: Showing associations between outcome and clinical profile of studied patients

		Survived (N=83)	Non Survived (N=17)	P value
Gender	Male	46 (55.4%)	11 (64.7%)	0.481
	Female	37 (44.6%)	6 (35.3%)	
APACHE II (First day)		13.5±5.1	19.7±6.7	<0.001
APACHE II (Second day)		10.4±4.3	23.8±7.8	<0.001
Duration of stay		5.06±3.4	12.8±5.8	<0.001

P value >0.05= non-significant; P value <0.05= significant; P value <0.001=highly significant

Figure 5: Bar chart showing outcome and clinical profile of patients

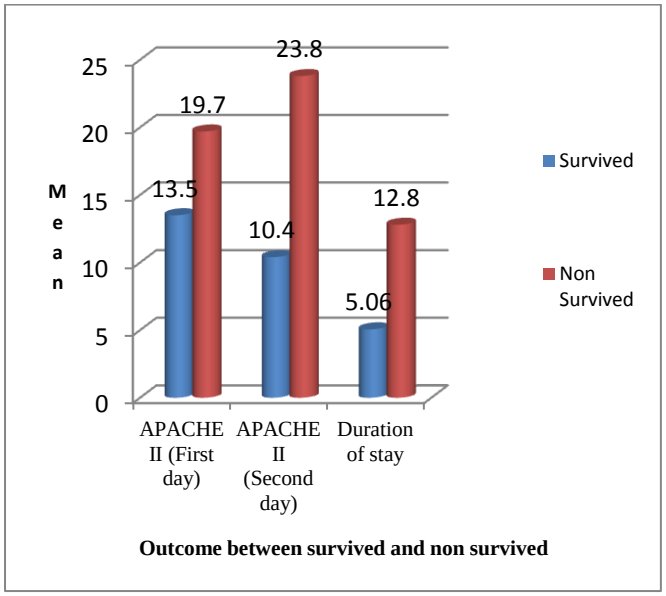

Table No.07: Showing associations between outcome and SOFA (Sepsis-related Organ Failure Assessment), Score Of patients suffering from sepsis

	TOTAL SOFA SCORE	SURVIVORS SOFA SCORE	NON-SURVIVORS SCORE
1ST DAY	8.173±5.436	4.588±1.258	15.588±2.03
3RD DAY	8.884±7.555	3.529±0.928	19.117±1.964

Image 1: Ventilator showing setting on CPAP mode

Image 2: Patient on Ventilator with vitals monitoring

Image 3: Image showing Central line in situ with date of insertion

Discussion

Critical care resources are limited and expensive and it costs about (16.9–38.4% of hospital costs and 5.2– 11.2% of national healthcare expenditures) in USA .In India we have limited

resources. Therefore appropriate utilization of ICU beds is essential and incumbent, but it is complex and a challenge to attain. What has been said for other events and places it holds true for SICU admissions i.e. "3R's: Right Person, Right Place at Right time". ICU is not the place for patients who fall in either of the groups which can be referred to as "too well to benefit" and "too sick to benefit" from critical care services. Defining the "too well to benefit" and "too sick to benefit" population may be difficult solely based on diagnosis [(21).] Nonetheless, it is observed that 70% of these low-risk patients were admitted to an ICU for observation worldwide.

As ours is a postgraduate teaching institute recognized by Medical Council of India(MCI) therefore all the Protocols and policies framed by or recommended by MCI are observed. We have 12 bedded Surgical ICU and another 12 bedded HDU manned by Postgraduates where all patients have bedside continuous monitoring of HR, BP, SPO2, temp and invasive procedures like CVP monitoring ,Intra arterial BP monitoring, bedside Chest tube insertion, tracheostomy etc are carried out routinely. Long term acute care of highest standards is provided with Bedside x-ray, USG, 2D-Echo availability with Own CT Scan and MRI facilities with adequately supported by Blood banks and Blood component therapy.

The optimum patient/Nurse ratio is maintained with 3/2 pt /Nurse ratio in ventilated patients and 3/1 pt /Nurse ratio for less seriously sick patients. Protocols related to prevention of infection are observed. Doctors, Nurses and other support staff is continuously updated in newer technologies and knowledge in critical Care .There is regular sharing of knowledge, mishaps, incidents, symposia and seminars etc related closely to the department and in association with other specialties .

As the present study, is regarding the clinical profile and morbidity and mortality of patients admitted to surgical ICU we will confine our discussion limited to that aspect of Surgical ICU care.

In the current study 100 patients who were included after following the guidelines of inclusion and exclusion criteria we found male57 (57%) patients were males and 43 (43%) females with a mean age of 41.08±15.8 years. The prospective observational study conducted by Kumar P et al[118] revealed predominantly male (58.4%) with a mean age of 50.5 ± 18 years. Other studies described by Lobo *et al*[119] and Abelha *et al*[28] had an elderly population (62.4 ± 17 years and 64.11 ± 14 years respectively). Kumar P et al[118] also found that an increasing age correlated with a higher mortality (survivors [49.3 ± 17.8] vs. nonsurvivors [64 ± 15]; $P = 0.000$).

Sarvepalli AK et al[22] did a prospective study on south Indian population and stated mean age 56.16±15 years with higher prevalence in male population 57.6% for ICU care. In contrast, Devabhaktuni P et al[29] were observed 26.34 ± 5.34 years mean age of these patients. Difference may be only due to the selection of patients, their study included only pregnant patients who were previously enrolled were only admitted to the ICU. In the present study we did not find any age-specific correlation with mortality.

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