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Post operative intensive care unit admission in elective surgical procedures

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ABSTRACT

Background: Postoperatively patients are admitted to ICU for multiple reasons. ICU admissions for elective surgeries are planned pre-operatively. Some admissions are not anticipated pre-operatively, but intra-operative course determines changes in post-operative care.

Aims and objectives: The aim of study was to audit ICU admissions of elective surgeries, indications of admissions, ICU course and outcome of these admissions.

Methods: This study was a hospital based prospective observational study conducted over a period of two years. Adult patients undergoing elective surgeries and who were anticipated for post-operative ICU care were included. Patients not anticipated for ICU care but because of any event during intra-operative period were also included in the study. Pre-operative and intra-operative indications of admission, duration, complications and outcome of patients in ICU was monitored and noted.

Results: A total of 287 patients were studied. 252 patients were planned for post-operative ICU care, out of which only 175(69.4%) patients were shifted to ICU. 35 patients were unplanned ICU admissions. 104(36.23%) patients has multiple co-morbidities and 56 (19.51%) had no co-morbidity. 190(66.20%) patients were ASA II. Majority of surgeries were major abdominal procedures (58.19%), followed by urological and gynaecological surgeries. 26.60% patients were shifted to ICU for monitoring purpose. Major reason of unanticipated ICU admission was intra-operative desaturation. 140 (48.78%) patients had an ICU stay of less than 24 hours. Complications occurred in 8 patients. 6 patients died, out of which 5 were unanticipated admissions. Main cause of mortality was intra-operative blood loss.

Conclusion: A significant proportion of patients were planned for ICU care, mostly on the basis of nature of surgery, but either did not need post-operative ICU care or were admitted for monitoring only. However unplanned ICU admissions showed more mortality, reemphasizing the need of preparedness on the part of ICU for unpredictable intra-operative course.

Keywords: Elective surgeries, intensive care unit, planned and unplanned admission

INTRODUCTION

Worldwide critical care facilities are limited and expensive as well. Usual indications of intensive care unit (ICU) admission are for any illness which impairs one or multiple organ systems and for which patient is admitted to support and limit further deterioration in clinical condition[1]. About 230 million major surgical procedures are conducted worldwide each year[2]. Majority of procedures are low risk

surgeries and only about 10% surgeries are high risk[3]. Worldwide more than 3 million post surgical patients die each year[4]. The goal of ideal anesthetic practice is to predict, prevent, identify and correct a life threatening complication of a surgical procedure. Thus patients who are at risk for post-operative complications are admitted to critical care unit for monitoring, intervention and organ support[3]. About 40% of ICU admissions are for post-operative procedures. Planned and unplanned ICU admission is an important safety measure in post-operative patients[5]. The present study was conducted to study ICU admission rate of elective surgical procedures in our institution, pre-operative indications for post-operative ICU care and outcome of these patients after ICU admission.

Material and Methods

This study a hospital based prospective observational study was conducted at a tertiary care center in North India, over a period of two years after approval from institutional ethical committee and informed consent.

Inclusion criteria: This study included all adult patients who had to undergo elective surgical procedures and were anticipated for post-operative ICU admission in pre-operative anesthesia evaluation (planned admission). Patients who were not anticipated for ICU care in pre anesthetic workup but due to any event intra-operatively led to unplanned ICU admission in the post-operative period were also included in the study.

Exclusion criteria: Patients undergoing neurosurgical procedures, cardiothoracic surgeries, and pediatric surgeries, patients who were already admitted to ICU before surgery and emergency surgeries were excluded.

Demographic data and preoperative characteristic were assessed like Age, Sex.

ASA Physical Status

Pre-operative conditions that led to anesthesiologist decision of post-operative ICU care. Intra operative course of the patients was noted i.e. duration of surgery, type of anesthesia, blood loss, any other unanticipated event leading to unplanned intensive care unit admission. Data of patients who remained stable intraoperatively and were not shifted to ICU, was also noted.

All patients shifted to intensive care unit in post-operative period were observed for mechanical ventilation, duration of ventilation and other invasive intervention. Duration of stay in ICU and outcome was noted. Complications arising out of stay in ICU like ventilator-associated pneumonia, central line-associated bloodstream infection, catheter-associated urinary tract infection, surgical site infection, venous thrombo-embolism, deep venous thrombosis were monitored and noted.

All data was compiled and analyzed statistically. All the categorical variables were shown in form of frequency and percentage. Continous variables were analyzed by using independent t test. All variables were discussed at 5% level of significance ($p<0.05$). All the data was analyzed with the help of statistical software package SPSS-v-23.0.

Results:

During the study period of two years, 287 patients were studied. 252 patients were planned for post-operative ICU admission in the preanesthetic workup. 35 ICU admissions were unanticipated (unplanned). Out of 252 patients (anticipated patients) only 175 patients (69.4%) were shifted to ICU. A total of 210 patients were admitted to ICU [Table-1]. During this time period a total of 9576 elective surgeries were conducted leading to ICU admission rate of 2.19%.

Type of admission	**No.**	**Percentage**
1) Planned	175	83.33%
2) Un Planned	35	16.67%
Total	**210**	

Table-1: ICU admissions

Volume 3, Issue 6; November-December 2020; Page No 807-814

[Table-2] shows the age distribution

Age Group in years	No.	Percentage
1) 20 – 30	20	6.97%
2) 31 – 40	21	7.32%
3) 41 – 50	14	4.88%
4) 51 – 60	69	24.04%
5) 61 – 70	106	36.93%
6) 71 – 80	50	17.42%
7) 81 – 90	4	1.39%
8) > 90	3	1.05%
Total	**287**	**100.00%**

Table-2: Age Distribution

147 patients were females (51.22%) and 140 (48.78%) males.

ASA	No.	Percentage
1) I	42	14.63%
2) II	190	66.20%
3) III	55	19.16%
Total	**287**	**100.00%**

Table-3: ASA status

Majority of patient (66.20%) were ASA II. [Table-3]

[Table-4] shows type of surgical procedure done. Majority of procedures were abdominal surgeries followed by urological and gynaecological surgeries

Type of surgery	No.	Percentage
1) Abdominal	167	58.19%
2) ENT	12	4.18%
3) Gynaecological	34	11.85%
4) Orthopedics	2	0.70%
5) Plastic Surgery	22	7.67%
6) Urological	50	17.42%
Total	**287**	**100.00%**

Table-4: Type of surgeries

Volume 3, Issue 6; November-December 2020; Page No 807-814

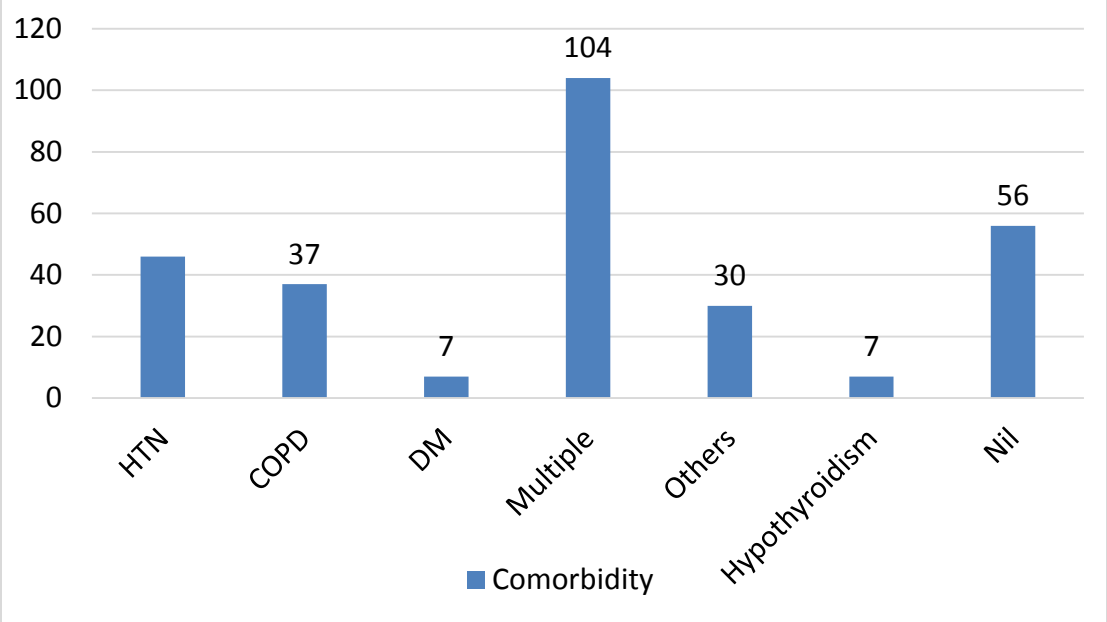

Figure-1: Comorbidity of Patients

Out of total 287 patients majority had more than one comorbidity on pre operative workup. 56 patients had no comorbidity, out of them 35 patients were those patients who had no comorbidity and were unanticipated admission to ICU due to events occurring during intra-operative period. [Figure-1]. 21 planned ICU admissions had no comorbidity but were anticipated for ICU care because of nature of operative procedure.

248 patients were administered general anesthesia and 24 cases were done under combined general and regional anesthesia. [Table-5]

Type of anesthesia	**No.**	**Percentage**
1) GA	248	86.41%
2) Regional	15	5.23%
3) Combined	24	8.36%
Total	**287**	**100.00%**

Table-5: Type of anesthesia

Out of 272 patients who were intubated 256 patients (94.11%) were extubated in operating room. 16 patients were sent intubated to ICU.

[Table-6] and [Table-7] shows indications of planned and unplanned ICU admission. Main indication of unplanned admission was desaturation followed by hemodynamic instability.

Indications of planned admissions	**No.**	**Percentage**
1) Atrial septal defect	2	1.14%
2) Multiple comorbidities	14	8.00%
3) COPD	34	19.43%
4) Dilated cardiomyopathy	6	3.43%
5) Hypertension	3	1.71%

Volume 3, Issue 6; November-December 2020; Page No 807-814

6) Bronchial asthma	2	1.14%
7) LBBB with CKD	3	1.71%
8) Nature of surgery	57	32.57%
9) Monitoring	54	30.85%
Total	**175**	**100.00%**

Table 6: Indications of planned/anticipated ICU admission

Indications of unplanned admissions	**No.**	**Percentage**
1) Desaturation	12	34.29%
2) Fall in SPO2 & hemodynamic instability	3	8.57%
3) Hemodynamic instability	10	28.57%
4) Hypersensitivity to atracurium	2	5.71%
5) Metabolic acidosis	2	5.71%
6) Monitoring	2	5.71%
7) Prolonged surgery	4	11.43%
Total	**35**	**100.00%**

Table 7: Indications of unplanned/ unanticipated ICU admissions

140 patients were shifted from ICU within 24 hours. Only 6 patients had stay of more than 7 days [Table-8]

Duration	**No.**	**Percentage**
1) < 24 Hrs	140	48.78%
2) 24 - 48 Hrs	56	19.51%
3) 3- 7 Days	8	2.79%
4) > 7 Days	6	2.09%
Total	**210**	**100.00%**

Table 8: Duration of ICU Stay

8 patients developed complications out of ICU stay [Table-9].

Complication	**No.**	**Percentage**
1) No complications	202	96.19%
2) Blood stream infections	2	0.95%
3) VAP	2	0.95%
4) More than one complication	4	1.90%
Total	**210**	**100.00%**

Volume 3, Issue 6; November-December 2020; Page No 807-814

Table 9: Complications during ICU stay

6 patients died during ICU stay. 4 patients had massive blood loss and 2 patients succumbed to ICU infections. 5 patients (83.3%) belonged to unanticipated ICU admissions.

Discussion:

Postoperative complications remain a major concern worldwide and ICU admissions following major surgical procedures are common in many health care systems[6]. ICU resources are limited and expensive and triaging patients who have better outcomes is of paramount importance. Preoperatively identifying patients at risk of complications following surgery and preventing them is a challenge for anesthetists. Also limited data is available about elective surgeries leading to unanticipated admission to ICU. These are known to be associated with poorer outcome compared to elective admissions[7]. This study included planned and unplanned postoperative elective ICU admissions. A total of 9576 elective surgeries were conducted over the study period leading to ICU admission rate of 2.19% over a period of two years. Different studies have shown variable postoperative admission rate of elective patients. Satyawan et al[8] reported ICU admission rate of 1.5%. Admission rate of 2.19% was similar to study by Keith Rose et al[9].

In this study females and males were almost in equal number (males 48.78% and females 51.22%). Admission rate was more common in patients aged more than 50 years with majority between age group of 61-70 (36.93%). Likewise it has been found that morbidity and mortality occur more commonly in elderly patients undergoing major surgical procedures[10]. A major proportion of elderly patients suffer from chronic medical illness which makes them inherently high risk for post-operative complications. Predictably 66.2% patients were ASA II and 18.12% were ASA III.

Total of 252 patients were planned pre-operatively for post-operative ICU care, however only 175 patients (69.4%) were shifted to ICU. The reason for lesser admissions compared to expected pre-operatively could be attributed to optimization of patients before surgery. In addition we had significant number of patients for cholecystectomy and these were operated laproscopically which results in less surgical time, improved post-operative respiratory functions and reduced post-operative pain. Moreover use of regional anesthetic technique (39 patients) could have led to lesser admissions. Also cautious approach of anesthetists in pre anesthetic workup for considering post-operative ICU admission could also have been the reason for only 69.4% patients ultimately requiring ICU admission.

Major reason of planned ICU admission was the nature of surgery (32.57%). These included high risk surgeries like complicated surgical procedures, surgeries expected to last for prolonged duration and procedures expected to have major fluid shifts during peri-operative course. Peri-operative morbidity and mortality has been associated with major surgical procedures like abdominal procedures[11]. COPD was indication for ICU admission in 19.30% of patients. This is in line with the fact that COPD and anesthesia are associated with adverse post-operative outcomes[12].

35 patients were shifted to ICU who were pre-operatively not anticipated for ICU care. The main indication for these patients was intra operative desaturation and hemodynamic instability. This is similar to observation made by Quinn[5] et al who found that respiratory and cardiovascular events were main reason for unplanned ICU admission.

A total of 210 patients were shifted to ICU. 16 patients had not been extubated in OR. Reason of not extubating was desaturation, hemodynamic instability, hypothermia and metabolic acidosis. Majority of patients n =140(66.6%) stayed in ICU only for 24 hours. 56(26.6%) patients stayed upto 48 hours.

Out of 210 patients, 204 (97.14%) patients improved and were shifted back to parent department. 6 patients died during ICU stay. Cause of death was massive blood loss leading to irreversible shock in 4 patients. 2 patients died of ICU infections. Out of 6 patients, 5 patients were unplanned ICU admissions. Mortality rate of unanticipated patients was 14.28%. Several studies have found unplanned ICU admissions of elective surgeries with adverse outcomes[13,14]. Mortality of 14.28% in unplanned

Volume 3, Issue 6; November-December 2020; Page No 807-814

patients was less than most studies[13]. Although the limitation of this study compared to these was that number of unplanned admissions was less than these studies, which could have led to less mortality numbers in this study. Only one patient of planned ICU admission died and the cause of mortality in this patient was massive blood loss. Overall mortality of planned and unplanned ICU admissions was 2.8%. Other studies also found high mortality rate of 2.5%[15]. In general mortality rate of elective surgical procedures is 0.5%[16]. The higher mortality rate in ICU is because more sicker patients are admitted to ICU.

56 (26.6%) patients were admitted for monitoring only and did not receive any specific ICU intervention. Although these patients could have been managed in high dependency unit, thereby saving ICU resources. Worldwide incidence of post-operative admission for monitoring varies from 20-40%[17].

To conclude, a significant proportion of patients were planned for ICU care, mostly on the basis of co-morbidities and nature of surgery, but either did not need post-operative ICU care or were admitted for monitoring purposes only. However, unplanned ICU admissions, although lesser in number, were having more mortality, reemphasizing the need for preparedness on the part of ICU for any unanticipated intra-operative complication and dynamic nature of peri-operative course of elective surgical procedures.

References:

1. Nates JL, Mark N, Kleinpell R, Blosser S, Goldner J, Birriel B, Fowler C. ICU admission. Discharge and triage guidelines: A framework to enhance clinical operations, development of institutional policies and further research. Critical Care Medicine 2016; 44(8):1553-1602.
2. Weiser TG, Regenbogen SE, Thompson KD. An estimation of the global volume of surgery: a modeling strategy based on available data. Lancet 2008; 372:139-44.
3. Pearse RM, Harrison DA, James P. Identification and characterization of the high risk surgical population in United Kingdom. Crit Care. 2006;10:81.
4. Pearse RM, Moreno RP, Bauer P, Pelosi P, Metnitz P, Spies C et al. Mortality after surgery in Europe: A seven day cohort study. Lancet 2012;380(9847):1059-65.
5. Quinn TD, Gabriel RA, Dutton RP, Urman RD. Analysis of unplanned postoperative admissions to the intensive care unit. Journal of Intensive Care Medicine. 2017;32(7):436-43.
6. Ghaffar, Sadia, Pearse, Rupert M, Gilles, Michael A. ICU admission after surgery who benefits. Curr Opin Crit Care. 2017;23(5):424-29.
7. Piercy M, Lau S, Loh E, Reid D, Santamaria J, Mackey P. Unplanned admission to ICU in postoperative patients- An indicator of quality of anesthetic care? Anaesth Intensive Care 2006;34:592-8.
8. Satyawan Ab, Shinde VS, Chaudhari LS. Audit of intensive care unit admissions from the operating room. Indian J. Anesth. 2006;50(3):193-200.
9. Rose K, Byrick RJ, Cohen MM. Planned and unplanned postoperative admissions to critical care for mechanical ventilation. Can J Anesth 1996; 43:333-40.
10. Muravchick S. Anesthesia for elderly. In : Miller RD, ed. Anesthesia. Philedelphia: Churchill Livingstone 2000; 2140-56.
11. Forrest J, Rehder K, Cahalan M. Multicenter study of general anesthesia. Predictors of severe peri-operative adverse outcomes. Anesthesiology 1992; 76: 3-15.
12. Lumb A, Biercamp C. Chronic obstructive pulmonary disease and anesthesia. Continuing education in anesthesia, critical care and pain. 2014; 14(1): 1-5.
13. Meziane M, Jaouhari SD, Bensglir M, Bab H, Ahtil R, Aboulaala K et al. unplanned ICU admission following elective surgical adverse events: incidence, patient characteristics, preventability and outcome. Indian J Crit Care Med 2017;21(3):127-30.
14. Kim J, Kim Y, Lee D, Kim KM, Lee WY, Lee S. Analysis of the characteristics of

Volume 3, Issue 6; November-December 2020; Page No 807-814

unplanned admissions to ICU after general surgery. Anesth Pain Med 2019;14(2):230-35

15. Zampieri FG. Elective ICU admission after major surgery: can too much support be futile. J Thorac Dis. 2018; 10: 1992-94.
16. The International surgical outcome study group. Global patient outcomes after elective surgery: prospective cohort study in 27 low, middle and high income countries. Br J Anaesth 2016;117:601-9.
17. Swann D, Houstin O, Goldberg J. Audit of ICU admissions from operating room. Can J Anesth 1993; 40:137-41.

Volume 3, Issue 6; November-December 2020; Page No 807-814