

Audit of unplanned intensive care unit admissions in elective surgeries

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Abstract

Background: ICU admissions can be planned and unplanned. Unplanned ICU admissions are not anticipated, but intra-operative events determines need of post-operative ICU admission.

Aims and objectives: Study was aimed to audit factors for unplanned ICU admissions of elective surgeries and their ICU course.

Methods: This study was a prospective observational study conducted in a tertiary care hospital over a period of twenty six months. Patients posted for elective surgeries and who were unanticipated for post-operative ICU care were included. Pre-operative and intra-operative indications of admission, course of patients in ICU was monitored and noted.

Results: Total of 9861 elective patients were operated during the study period. 41(0.415%) were shifted to ICU and were unplanned ICU admissions. Mean age was 65±23 years. Majority of patients were in age group 61-70yrs(36.93%). 22 patients were males. 34(83%) patients were ASA II and above. 36.24% patients of unplanned ICU admissions had more than one comorbidity. 24(59%) patients were abdominal surgeries. Main indication of ICU admission was desaturation (31.7%) followed by hemodynamic instability (26.8%). 4.8% patients were shifted to ICU for monitoring. Length of ICU stay was less than 24 hours in 48.78% patients. Mortality was seen in 7 patients (17%). Main cause of mortality was blood loss. ICU infections was cause of mortality in 2 patients. 34 patients recovered during ICU stay.

Conclusion: Unplanned ICU admissions following elective surgery is difficult to predict. Major reason for ICU admission is intraoperative blood loss. Unplanned ICU admission leads to significant death and prolonged hospital stay, reemphasizing preparedness on the part of ICU for unpredictable intra-operative course.

Keywords: Elective surgeries, ICU, unplanned admission

Introduction

Intensive care unit (ICU) beds are limited and ICU course is expensive as well. Patients are admitted to ICU for organ system support and to limit further deterioration in clinical condition¹. 230 million major elective surgical procedures are conducted worldwide each year². Most of the surgeries are low risk and only about 10% surgeries are of high risk nature³. 3 million post-surgical patients die each year⁴. The goal of safe patient care is to predict, prevent, identify and correct a life threatening complication of a surgical procedure. Therefore patients who develop post-operative complications are admitted to ICU for stabilization and organ support³. Worldwide about 40% of ICU admissions are for post-surgical reasons. ICU admission is an important safety factor in post-operative patients⁵. Unplanned ICU admissions in elective surgeries may lead to higher morbidity and mortality and financial costs. Unplanned ICU admissions has not been studied much in our part of the world.

Aims and Objectives:

The present study was aimed to study factors for unplanned ICU admissions of elective surgeries and their ICU course.

Material and Methods:

This study is a prospective observational study conducted at a tertiary care center, over a period of twenty six months after approval from institutional ethical committee and written informed consent.

Inclusion criteria: This study included adult patients 18 years and above who had to undergo elective surgical procedures and were unanticipated for post-operative ICU admission in pre-operative anesthesia evaluation and were admitted to ICU in immediate postoperative period.

Exclusion criteria: Patients operated for cardiothoracic surgeries, neurosurgical reasons and pediatric surgeries, patients who were admitted to ICU before surgery and non-elective procedures like emergency surgeries were excluded. Patient characteristic like age, sex, ASA status were noted. Intra operative course of the patients was studied i.e. duration of surgery, type of anesthesia, blood loss and unanticipated event leading to unplanned ICU admission. Patients shifted to ICU were observed for mechanical ventilation, duration of ventilation. Duration of stay in ICU and clinical outcome was noted. Complications of ICU stay; ventilator-associated pneumonia, central line-associated bloodstream infection, catheter-associated urinary tract infection, surgical site infection, DVT and embolism were noted.

All data was compiled and analyzed statistically. All the categorical variables were shown in form of frequency and percentage. Continuous 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 twenty six months, 9861 elective surgical procedures were performed. Total of 41 patients (0.415%) were transferred to ICU in the immediate postoperative period. 282 admissions were planned ICU admissions. 41 ICU admissions were unanticipated and unplanned. Mean age of patients was 65 ± 23 years. Majority of patients belonged to 61-70 age group.

| Age Group in years | No. | Percentage |
|--------------------|-----------|------------|
| 1) 20 – 30 | 1 | 2.43% |
| 2) 31 – 40 | 3 | 7.31% |
| 3) 41 – 50 | 4 | 9.75% |
| 4) 51 – 60 | 10 | 25% |
| 5) 61 – 70 | 15 | 37% |
| 6) 71 – 80 | 6 | 15% |
| 7) 81 – 90 | 2 | 4.87% |
| Total | 41 | |

Table 1: Age group of unplanned ICU admissions

22(53.6%) patients were males, 19(46.3%) patients were females

34(83%) patients had ASA scoring of II and above

Majority of patients were operated for abdominal reasons followed by gynecological and urological surgeries Table 2

| Type of surgery | No. | Percentage |
|--------------------|-----------|------------|
| 1) Abdominal | 24 | 59% |
| 2) ENT | 2 | 4.8% |
| 3) Gynaecological | 6 | 14.6% |
| 4) Orthopedics | 3 | 7.3% |
| 5) Plastic Surgery | 1 | 2.4% |
| 6) Urological | 5 | 12.1% |
| Total | 41 | |

Table 2. Surgical procedures of study group

15 patients had multiple comorbidities

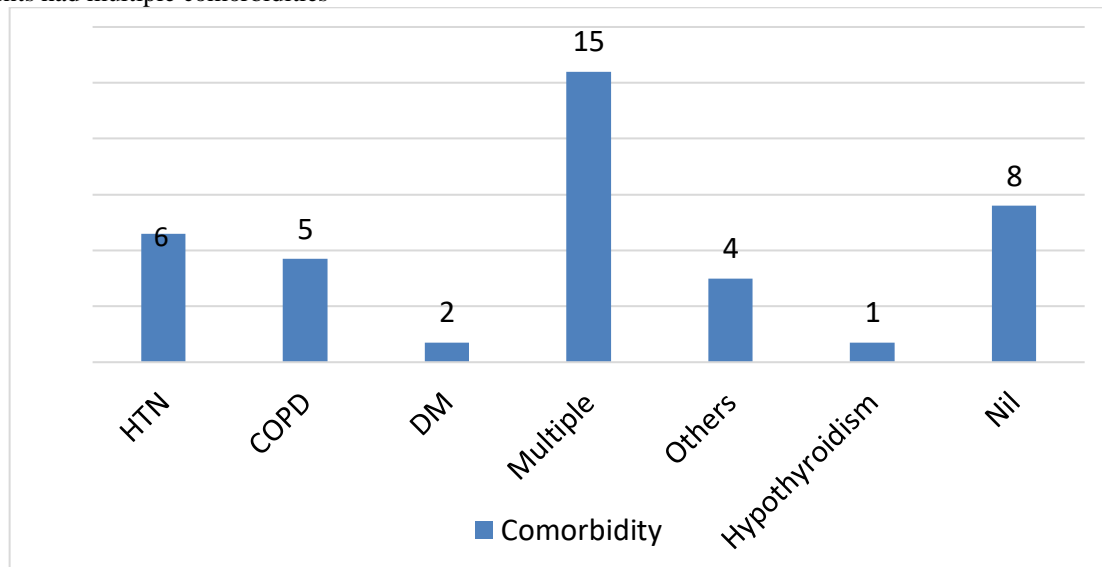


Figure 1. Comorbidity of Unplanned ICU admissions

Major indication of unplanned ICU admission was desaturation followed by hemodynamic instability. Table 3

| Indications of unplanned admissions | No. | Percentage |
|---|-----------|------------|
| 1) Desaturation | 13 | 31.7% |
| 2) Desaturation & hemodynamic instability | 4 | 9.7% |
| 3) Hemodynamic instability | 11 | 26.8% |
| 4) Hypersensitivity to drugs | 2 | 4.8% |
| 5) Acidosis | 3 | 7.3% |
| 6) Monitoring | 2 | 4.8% |
| 7) Prolonged surgery | 6 | 14.63% |
| Total | 41 | |

Table 3: Indications of ICU admission

Majority of patients had ICU stay of less than 24 hours, 6 patients had stay of more than 7 days. Table4

| Duration of ICU stay | No. | Percentage |
|----------------------|-----------|------------|
| 1) < 24 Hrs | 20 | 48.78% |
| 2) 24 - 48 Hrs | 8 | 19.51% |
| 3) 3- 7 Days | 7 | 17% |
| 4) > 7 Days | 6 | 14.63% |
| Total | 41 | |

Table4: Duration of ICU stay

Seven patients expired during ICU stay leading to mortality of 17%. 5 patients died of blood loss and 2 patients died of ICU acquired infections

Discussion:

Post-surgical complications occur worldwide and unplanned ICU admissions following elective surgeries are also known⁶. In developing countries, ICU beds are limited and costly, so admitting patients who have good outcomes should be the primary goal in resource limited settings. Intraoperative complications and managing them is a challenge for physicians. There is limited data available about unanticipated elective surgeries who need unplanned admission to ICU. Unanticipated ICU admission in elective surgeries are known to increase morbidity and mortality compared to elective procedures⁷. This study audited factors responsible for unplanned postoperative ICU admissions in elective surgeries. A total of 9861 elective surgeries were performed over a period of 26 months. Total of 41 patients were admitted in ICU as unplanned ICU admissions during the study period. Incidence of unplanned ICU admission for elective procedures varies

from 0.12-0.79%^{8,9}. Different studies have shown variable postoperative admission rate of elective patients. Admission rate in our patients was 0.415%

In this study 22(53.6%) patients were males, 19(46.3%) patients were females. Majority of patients aged more than 51 years with maximum 37% between age group of 61-70. Postoperative morbidity and mortality is seen more commonly in older age group¹⁰. 15 patients had multiple comorbidities, elderly patients suffer from chronic diseases which makes them inherently high risk for post-operative complications. 83% patients were ASA II and above.

During the study period 282 patients were planned post-operative ICU care. Most common reason of planned ICU admission was the type of surgery (33%) which included high risk surgeries, prolonged duration surgeries and surgeries expected to have major blood loss during peri-operative course. 59% of patients of unplanned postoperative ICU admission were major abdominal procedures. Peri-operative morbidity and mortality has been known with major surgical procedures mainly abdominal procedures¹¹. 36.58% patients had multiple comorbidities.

In majority of cases cause of unplanned ICU admission was intra operative desaturation followed by hemodynamic instability. Similar observations were made by Quinn⁵ et al who found that respiratory and cardiovascular events were main reason for unplanned ICU admission.

ICU stay of < 24 hours was seen in 48.78% patients and 14.63% patients had ICU stay greater than 7 days. Mortality of unplanned ICU admissions was 17%. Cause of death was massive blood loss leading to irreversible shock in 5 patients. 2 patients died of ICU acquired infections. Multiple studies have found unplanned ICU admissions of elective surgeries with adverse outcomes^{12,13}. In our study mortality of 17% in unplanned patients was less than most studies¹². However the limitation of our study compared to other studies was that number of unplanned admissions was less than these studies, which could have led to less mortality numbers in our study. Only two patients of planned ICU admission died and the cause of mortality in them was massive blood loss. Overall mortality of planned and unplanned ICU admissions was 2.93%. studies found mortality rate of 2.5% in postoperative ICU admissions¹⁴. In general mortality rate of elective surgical procedures has been found to be 0.5%¹⁵. The reason of higher mortality in unplanned postoperative ICU admissions have been found to be unanticipated intra operative course which lead to unpredictable and negative outcomes. 2(4.8%) patients were admitted for monitoring only and did not receive any specific ICU intervention. 6(14.63%) patients were shifted only because of prolonged duration of surgery. These patients could have been managed in HDU, thereby saving ICU resources. Incidence of post-operative admission for monitoring ranges from 20-40%¹⁶.

Conclusion

Unplanned postoperative ICU admission is rare but also challenging event. Unplanned ICU admissions are also indicators of quality of peri-operative care. Unplanned ICU admissions, although very less in number, were having more negative outcomes, reemphasizing preparedness on the part of peri operative team for unanticipated adverse events. Further studies will be useful to find perioperative care requiring improvement.

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