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Post-Operative Admissions to the Intensive Care Unit at Windhoek Central Hospital: A Prospective Study of Factors that Influence Indications and Outcome

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ABSTRACT

Background: Indications for postoperative admissions to the intensive care unit are multifactorial and could be due to patient preoperative status, surgical or anaesthetic adverse events. In addition, admission to the ICU could be planned or unplanned. The aim of the study was, therefore, to assess and determine indications and outcomes following postoperative admissions to ICU in Windhoek central hospital, Namibia.

Objectives: The study aimed to determine post-operative admissions to the intensive care unit, the factors that influenced indications and outcome of admissions to the unit, at Windhoek Central Hospital (WCH).

Methods: This quantitative prospective study was carried out over a six-month period at Windhoek Central Hospital ICU. Data collection sheets were used to collect relevant patient details from their hospital records. This was done only for postoperative patients that were admitted to WCH ICU, and that met the inclusion criteria of the study. The data obtained was then entered in a Microsoft Excel spreadsheet and analysed.

Results: A total of 53 patients met the inclusion criteria for the study. Most postoperative admissions to the ICU were planned (77%). A larger percentage of patients admitted to the ICU had an ASA score of IV and V (32% and 28%, respectively). Cardiothoracic and General surgery were the specialities that had the greatest need for ICU admissions. Intraoperative adverse events were mainly attributed to anaesthesia (28%); the majority were hypotensive episodes requiring ionotropic support. There was no relationship between the duration of surgery and length of ICU stay using Pearson correlation score (N=53), .045, .751. The study found that 52 (98%) of patients survived, and there was only 1 (2%) mortality following admission to ICU.

Conclusion: The study showed that most postoperative ICU admissions were planned. Anaesthetic adverse events led to a greater need for ICU admissions. Most of the patients admitted to ICU had higher ASA scores of IV and V.

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Introduction

Adverse events during a surgical procedure often occur unexpectedly and may lead to death, disability at discharge, admission to the intensive care unit (ICU), and prolonged hospital stay [1]. Indications for postoperative ICU admission include haemodynamic instability and increased risk of postoperative complications. Surgeries of longer durations and emergency procedures have high morbidity and mortality and require ICU admission for close monitoring and observations. Adverse effects of anaesthetics can also contribute to ICU admissions. In their study, Bui et al [2]. found that the most common reasons for planned ICU admissions were anticipated lengthy operations (42%) and anaesthetic risks (40%).

An essential component of postoperative admission to the ICU is the prevention, early recognition and timely management of life-threatening complications occurring in the immediate postoperative period. However, some obstacles prevent admissions to the ICU, including the high cost of ICU admissions, the unavailability of ICU beds and the need for more specialised staff. Therefore, adequate patient preoperative optimisation is necessary to reduce the need for postoperative admissions to ICU. There are some factors to be considered regarding patients' ICU admission and the outcomes of which are influenced by available resources,

staffing, and skills [3]. Meziane et al. did a study on unplanned ICU admissions following elective surgical procedures [1]. The study focused on intraoperative adverse events that contributed to unplanned admissions to the ICU. The authors defined unplanned postoperative admission as an ICU admission not anticipated preoperatively but due to an adverse event occurring within five days after elective surgery. The results showed that out of the 693 admissions to the ICU, surgical causes accounted for 58.7% of all unplanned ICU admission. In contrast, 32% were due to anaesthetic causes and 9.3% were related to postoperative adverse effects. The study, however, did not include emergency surgical cases and planned admissions as a variable for comparison in determining the causes of ICU admissions.

Another study by Bhat et al. considered several variables that contributed to postoperative ICU admissions [4]. Patients admitted to ICU were categorised into two groups: planned admissions, which included 128 (62.7%) ICU admissions, and unplanned admissions, which included 76 (37.3%). The authors observed that long-term outcomes were worse for unplanned ICU admissions than planned ICU admissions. This was associated with an increase in the length of both hospital and ICU stay and an increased mortality rate. In addition, factors associated with a high risk of ICU admission included males older than 60 years of age, American Society of Anaesthesiologists (ASA) physical status III, IV and V, abdominal surgery, general anaesthesia, and surgery undertaken on an emergency basis. Others were intra-operative persistent tachycardia, major blood loss and hypotension requiring inotropic support.

A retrospective study by Okafor and co-workers focused primarily on unplanned post-anaesthetic and postoperative surgical admissions to the ICU in Southeast Nigeria [5]. The authors analysed hospital records of consecutive unplanned anaesthetic/surgical admissions from the general operating theatre to the ICU over four years. The results showed that 6,581 surgical cases were carried out during the study period, with 497 ICU admissions. Twenty-six ICU admissions were unplanned: out of which six cases were due to anaesthetic causes and 20 admissions were due to surgical complications. In addition, 22 admissions were elective surgical cases, and four were emergencies. Unplanned anaesthetic indications were due to failed intubation, intra-operative endotracheal tube dislodgement, and respiratory distress following urological and oral surgeries. The most common surgical indications for ICU admission included neck surgeries which formed 75% of the cases.

In 2018, Patel et al. carried out a prospective observational study over a 15-month period at a tertiary care Government university hospital in Western India [6]. The authors identified the risk factors associated with postoperative ICU admissions and their outcomes. Patients with at least one overnight stay in the ICU after surgery and postoperative patients re-admitted within seven days of transfer from the surgical ICU were included in the study. They observed that planned and unplanned postoperative ICU admission rate was 4.45% and 0.09% of the 5284 patients operated on, respectively. Indications for planned admissions included preoperative medical illnesses, anticipated blood loss, and anticipated mechanical ventilation, while unpredicted intraoperative hypotension was the principal cause of unplanned admittance. The study concluded that there was an increased incidence of ICU admissions with males, the elderly, patients with poor risk stratification scores and those with pre-existing medical illnesses. The list of indications for ICU admission included major intra-operative haemorrhage, hypotension requiring inotrope support, perioperative respiratory problems, and patients who underwent abdominal, trauma and emergent surgeries.

Methods

Study Design

This was a quantitative prospective study of all postoperative admissions to the ICU at the Windhoek Central Hospital.

Study Area

This study was conducted at the Intensive Care Unit (ICU) of Windhoek Central Hospital (WCH.) Study population

Inclusion Criteria

All immediate postoperative ICU admissions within the study period. All patients who were already in ICU after a postoperative surgical procedure, elective and emergency surgical procedures and planned and unplanned ICU admissions.

Exclusion Criteria

All non-postoperative admissions to the ICU. Postoperative Admissions after initial ward admissions and patients in ICU due to nonsurgical procedure.

Data Collection Tools

Data collection sheets were used to collect the necessary data by independently reviewing patient medical records that form part of the inclusion criteria. The data sheets contained all the variables to be analysed during the study period.

Data Analysis Method

All the data collected were analysed using SPSS version 25. Frequencies were used to determine the incidence of planned and unplanned postoperative admissions to the ICU, the indication (anaesthetic/surgical complication) for postoperative, and the clinical outcome of postoperative ICU admissions. Correlation analysis was used to determine important patient variables associated with postoperative ICU admissions. Continuous variables were expressed as mean +/- standard deviation. These continuous parametric variables were analysed by analysis of variance.

Continuous nonparametric variables were analysed, and median values were reported. Categorical variables were expressed in absolute and relative frequencies using the X2 test. Results obtained from the study were expressed as odds ratio and 95% confidence interval. The P value was considered significant if it was ≤ 0.05.

Ethical Considerations

This study respected the ethical principles of autonomy and informed consent. The UNAM ethical committee and the Ministry of Health and Social Services approved this research study.

Results

During the duration of the study, there were 53 patients admitted to the ICU postoperatively, including 23 (43%) males and 30 (57%) females. See Figure 1. Patients between the ages of greater than 25 to 55 years made up 51% of the total ICU admission, and patients aged greater than 55 to > 65 years were 24% of the population. Patients aged <15 years contributed 16% of total ICU admission—table 1.

Figure 2 shows that most ICU admissions were planned, 41 (77%) patients. The remaining 12 (23%) patients were unplanned ICU admissions. There was an even distribution between elective and

emergency operations admitted to ICU, 26 (49%) and 27 (51%), respectively. Regarding the American Society of Anesthesiologists (ASA) score, patients with ASA scores of IV and V accounted for most of those admitted to the ICU, representing 32% and 28%, respectively. General surgery, cardiothoracic and ear, nose and throat surgical units accounted for most patients admitted to the ICU postoperatively, 40%, 27% and 20%, respectively. (Table 2) Regarding intraoperative adverse events, 17% of the cases had hypotensive episodes which required inotropic support. Aspiration of gastric contents contributed to 6% of the intraoperative adverse events. The others, including cardiac arrest, iatrogenic bowel injury and emergency tracheostomy secondary to airway oedema, all contributed to 2% of the intraoperative adverse events.

Most patients admitted postoperatively to the ICU stayed less than five days (88%).

There was a good outcome following postoperative admission of surgical patients to the ICU; only one patient died in the unit. About 98% of the patients were discharged to the ward from the ICU.

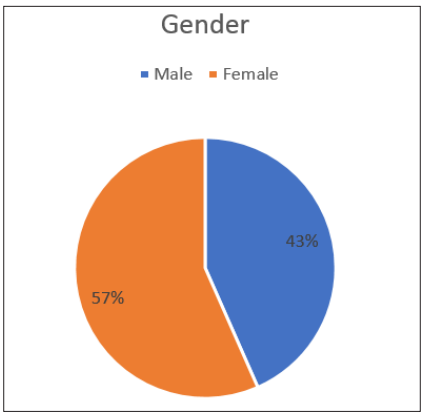


Figure 1: Gender

Table 1: Age Distribution

Age (years)	Frequency	Percentage (%)
<5-15	8	16
>15-25	6	11
>25-35	13	25
>35-45	8	15
>45-55	6	11
>55-65	5	10
>65	7	14

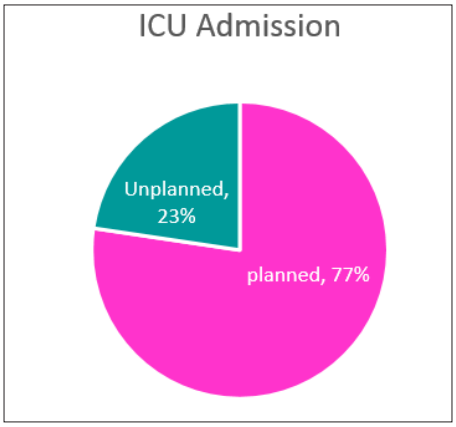


Figure 2: Planned vs. Unplanned ICU Admissions

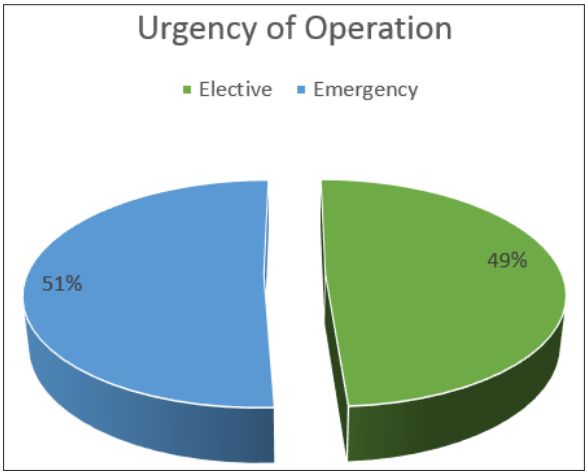


Figure 3: Urgency of Operation

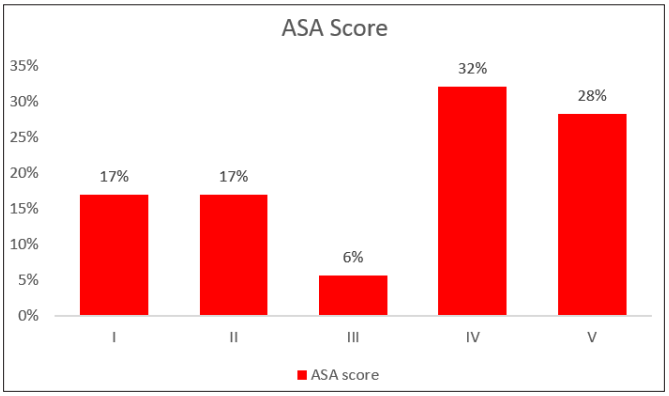


Figure 4: ASA Score

Table 2: Admission by Surgical Units

Surgical units	Percentage (%)
General surgery	40
Cardiothoracic	27
ENT	20
Maxillofacial	10
Others	03
Total	100
>65	7

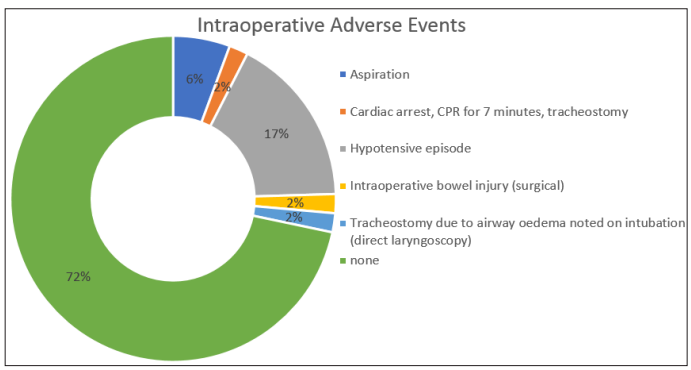
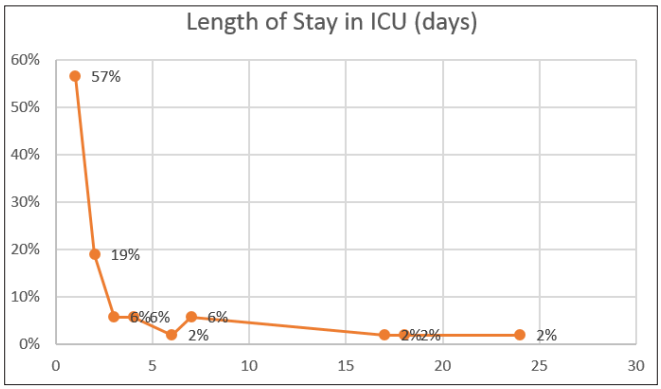


Figure 5: Intraoperative Adverse Events



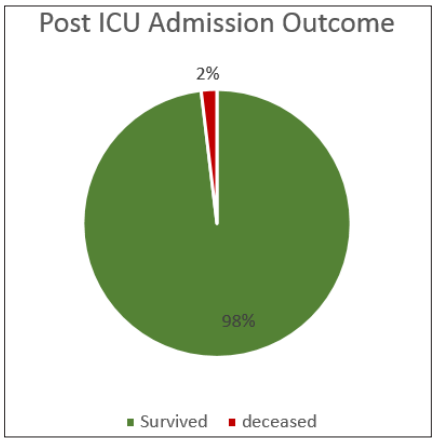


Figure 6: Post ICU Admission Outcome

Discussion

Fifty-three patients that met the inclusion criteria were enrolled for the study. The number of females, 30 (57%), was slightly higher than that of males, 23 (47%). A study by Todorov et al. who sought to determine the influence of gender and age on the probability of ICU admission, found that women were less likely to be admitted to the ICU [7]. However, their findings contrasted with this study's finding, where more women were admitted to the ICU postoperatively. Several factors may account for our findings, including the gender distribution in Namibia. In 2021, Namibia's female population amounted to approximately 1.31 million, while the male population amounted to approximately 1.22 million inhabitants [8]. The United Nations Department of Economic and Social Affairs: Population Division reported the male: female ratio in Namibia to be 50.3%: 49.7% although studies have indicated that older population groups tend to use health care services, this is not the case in this study [9]. Most patients admitted to the ICU postoperatively in this study were young people from the 25-35 age group. In addition to the fact that Namibia has a high young population ratio, the indications for surgery, such as trauma, are commoner in young populations. In another study, it was observed that the rates of ICU admission and mechanical ventilation were lowest for patients aged 20 years. Thes rates more than tripled by age 50 and peaked at age 80 years [10].

Planned ICU admission is defined as a surgical case in which the ICU reservation was made before surgery and anesthesia [11]. We found from this study that about 77% of postoperative ICU admissions were planned. It has been estimated previously that planned admission to the ICU is higher than unplanned admissions [12]. Planned admission to the ICU postoperatively is the standard of care and is associated with better patient outcomes. However, a study from Ethiopia reported a very high rate of unplanned ICU admission, more than 80% [13]. Some of the reasons for this finding were the higher ASA physical status of the patients and increased incidence of intraoperative events.

The commonest indication for ICU admission in this study was close monitoring postoperatively. This was followed by the need for airway management and mechanical ventilation. Postsurgical admission to ICU is indicated in patients who are likely to deteriorate after surgery and thus require close monitoring. Some of these patients could also have had some adverse events intraoperatively, such as aspiration and hypotension requiring ionotropic support. Because ICU provides a higher nurse-to-patient ratio, patients admitted to the unit are more closely monitored than in the general ward. It has been documented that a higher nurse-to-patient ratio increases the patient outcome [14].

The nature of the surgery performed also plays a role in postoperative admission to the ICU. In this study, general surgical and cardiothoracic patients accounted for 32% and 26% of patients admitted to the ICU postoperatively. This finding is due to the complex and delicate nature of the procedures performed. Onwochei and colleagues reported that high-risk and emergency surgery accounted for the commonest indications for postoperative ICU admission. Although elective and emergency surgeries were equally performed among patients admitted to the ICU in our study, high-risk surgeries such as neurosurgery were more [15].

The American Society of Anesthesiologists (ASA) physical status classification of our patients shows that most were ASA IV and V. In a case-control study by Huda and coworkers, ASA physical status and neurological deficits were the most significant factors influencing postoperative ICU admission [16]. The sicker a patient is before surgery will make planned admission to the ICU postoperatively the best option of care. This was the finding of this present study, as more than half of our patients were ASA IV and V.

About 98% of the patients admitted to the ICU postoperatively were discharged alive to the ward. This finding collaborates with the fact that planned ICU admission postoperatively is associated with better patient outcomes. On a different note, Cheng and colleagues, in their study on factors influencing ICU admission and associated outcome in patients undergoing radical cystectomy with enhanced recovery pathway, reported that planned ICU admissions did not improve outcomes compared to unplanned ICU admissions [17]. This finding could be because the authors adopted the Enhanced Recovery after Surgery (ERAS) protocol in their study, which has been found to reduce postoperative complications and thus reduce the need for planned ICU admission [18].

Conclusion

Different factors ranging from surgical and anaesthetic, contributed to the need for postoperative admission to the intensive care unit. Most of the admission to the ICU were planned, which resulted in improved outcomes. Patients undergoing general surgical and cardiothoracic procedures accounted for most of the admissions to the ICU.

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