



Research Article

Mortality and its Determinants Among Surgical Critically Ill Patients Admitted at Muhimbili National Hospital, Dar es Salaam-Tanzania

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Abstract

Introduction: Critical sickness is a potentially fatal multisystem process that can result in significant morbidity or mortality, however, accurately identifying which patients are at high risk of death after major surgery and/or ICU care remains difficult. Simplified Acute Physiology Score II (SAPS II) was designed to measure the severity of disease for patients aged 15 or older, admitted to intensive care units. It gives a point score between 0 and 163, and a predicted mortality between 0% and 100%.

Material and Methods: A cross sectional analytical study was employed. The study was conducted at Muhimbili National Hospital in the surgical Intensive Care Units. A calculated adjusted minimum sample size of 206 was used, which was obtained by the formula for cross sectional studies with proportion and quantitative approach. Non probability sampling was employed. A validated and tested tool, the SAPS II was used to predict the intensive care unit mortality. Data were obtained by both a face to face interview with the patient/relative/care giver after signing informed consent form and from the patient medical records (patient file) using a questionnaire. Data was analyzed using SPSS version 20/22. Demographic information was cross tabulated. The association of categorical variables with the outcome was determined by using chi-square test. The p-value of ≤ 0.05 was considered statistically significant. Outcome indication was calculated using the total number of ICU admissions during the study period and the total mortality in ICU admitted patients in the same period. Results were reported as number (n) and frequency (%). Univariate and multivariate logistic regression were used to determine the association between independent variables and the outcome. Ethical clearance was sought from MUHAS ethical research committee (IRB). Permission to conduct the study was obtained from the Executive Director of Muhimbili National Hospital.

Results: A total of 240 surgical patients admitted to ICU were recruited in our study with mean age of 36.95 years (SD \pm 19.16). Most of the patients 197 (93.4%) admitted at ICU underwent major surgery. More than one third 89 (37.1%) of the patients died in the ICU while 151 (62.9%) of them were discharged during the study period. Increased SAPS II score, complication in the ICU and patients with ASA 4 classification were significantly independent variables associated with the ICU mortality. Patients who had SAPS II score of 29 points and below were 94.1% less likely to die in the ICU as compared to patients with SAPS score of 53 points and above (AOR=0.059, 95% CI, 0.019-0.183, p value <0.001). Patients who presented with complications in the ICU such as sepsis and acute kidney injuries among others were 1.9 times more likely to die in the ICU as compared to patients who didn't have any complications (AOR=1.94, 95% CI, 1.259-3.847, p value 0.006). ASA 4 patients were more likely to die in the ICU than those with a lower ASA classification (AOR=21.74, 95% CI, 1.259-3.847, p value 0.007).

Conclusion: Surgical patients admitted in ICU at MNH encounter significant mortality (37.1%). Independent factors associated with high mortality include: increased SAPS II score, occurrence of complications in ICU and ASA IV classification.

Keywords: Intensive care unit; Mortality; Risk factors

Introduction

Critical sickness is a potentially fatal multisystem process that can result in significant morbidity or mortality [1]. Critical care medicine specializes in caring for the most seriously ill patients treated in an ICU, which is staffed by experienced personnel. ICU care has been demonstrated to improve outcome in severely ill and/or unstable patient populations. The outcome in intensive care may be categorized as mortality or morbidity related [1,2]. The guidelines for ICU provide models which ICUs may use in formulating admission, discharge and triage criteria. A method for implementation, monitoring and performance evaluation of policies and procedures is also included. Scoring systems have been used to categorize patients according to severity based on different criteria, hence simplifying the means for treatment, assessing prognosis or patient outcome from the observed illness. Examples include: Glasgow Coma Scale (GCS) which assesses severity of patients with head injury, Mortality Predictive Model, Acute Physiology and Chronic Health Evaluation (APACHE) system and Simplified Acute Physiology Score (SAPS) system. SAPS II is a wide-ranging measure of severity of disease and is used commonly as a severity of illness score in the ICU for patients aged 15 or older. It is calculated from data collected over a 24-hour observation period and gives a point score between 0 and 163 corresponding to a predicted mortality between 0% and 100% [3,4] (Table 1).

| SAPS II score | Mortality (%) |
|---------------|---------------|
| 29 | 10 |
| 40 | 25 |
| 52 | 50 |
| 64 | 75 |
| 77 | 90 |

Table 1: Correlation of SAPS II scores with predicted mortality (%) [4].

Several studies describe surgical ICU complications as severe or minor. However the most common widely used method to classify these complications was referred to as Initial Clavien Classification System (1992); revised in 2004. The most common complications seen in surgical ICU patients leading to increased mortality, length of ICU stay, and increased need of the level of care at ICU discharge (decline in disposition) are postoperative

complications e.g. sepsis and acute kidney injury among others [5].

Materials And Methods

Study Design

A prospective cross-sectional analytical study was employed.

Study Area

The study was conducted at Muhimbili National Hospital (MNH) in the surgical ICU. MNH is a tertiary hospital serving the population of people in Dar es Salaam and associated referring hospitals. It also serves a center of referral from hospitals in nearby regions for expert medical care. It also serves as a teaching hospital for the Muhimbili University of Health and Allied Sciences (MUHAS). MNH has a total bed capacity of about 2000 beds with three ICU facilities. The first is referred to as ‘Ward 2’ ICU which has 18 beds, and admits more of the surgical cases. The second is referred to as ‘Ward 1’ with 18 beds, and admits more of the medical cases. The third is referred to as ‘Ward 35’ which has 5 beds and admits obstetric cases.

The surgical ICU is served by three anesthesiologists and residents in Anesthesiology department from MUHAS. There is also a nurse to at least every one or two patients admitted in the ICUs and some attendants supporting the daily activities in the units.

Study Population

Critically ill patients admitted at MNH surgical ICUs from August, 2017 to January, 2018. Surgical patients were defined as patients from departments of general surgery (adult and pediatric), OBGY, ENT, Dental and Ophthalmology. All surgical critically ill patients who were informed and consented to participate in the study were included. Patients who unexpectedly died within 24 hours of ICU admission were excluded from estimation of mortality by SAPS II.

Description of the Study Tools and Data Collection

Quantitative data was collected using a semi-structured questionnaire. A validated and tested tool (The Simplified Acute Physiology Score (SAPS)-II) was used to predict the ICU mortality. Validity of results obtained from the study was ensured since SAPS II scoring system is a standard and validated tool used to predict mortality for critical ill patients, which can be used in the similar study. Data were collected by a principal investigator (resident in anaesthesia and critical care) and two medical personnel (ICU nurses) trained in critical care. These assistants were instructed

on the tool used to collect data (questionnaire), aim of the study (objectives) and methodological procedures employed in the study. Also, patients/relatives involved in the study were adults who could well explain themselves making the data collected more meaningful. This is an initial study to obtain data in this setting; the reliability and the ability of the SAPS II to predict mortality in our setting will have to be looked at through further studies which compare the predicted mortality to the observed mortality.

Data Analysis and Processing

Data were analyzed by using SPSS version 20/22. Demographic information was cross tabulated. Association of categorical variables with the outcome was determined by using chi-square test. The p-value of ≤ 0.05 was considered statistically significant. Outcome indication was calculated using the total number of surgical ICU admissions during the study period and the total mortality in ICU admitted patients in the same period. Results were reported as number (n) and frequency (%). Univariate and multivariate logistic regression were used to determine the association between independent variables and the outcome.

Ethical Clearance and Consideration

Ethical clearance was sought from the MUHAS ethical

research committee (IRB). Permission to conduct the study was obtained from the Executive Director of MNH. The purpose of the study was explained to the patient or relative(s) if the patient was not able to communicate at the time of enrolment. Patient participation was on voluntary basis with the right to withdraw at any time during the study period without penalty or any loss of benefit to treatment. Written informed consent was obtained. Real names were not used during data collection or presentation of the results; so as a substitute, code numbers were employed to guarantee confidentiality. Data collected were not used for other purposes other than this study.

Results

A total of 240 surgical patients admitted at ICU were recruited to our study. Mean age was 36.95 years (SD \pm 19.16). More than half 129 (53.7%) were females. A high proportion 171 (71.3%) were married; most of the patients 186 (77.5%) had primary or secondary education level. More than half 130 (54.2%) of the respondents had normal BMI (18.5 - 24.9 kg/m²). Most of the patients were classified as either ASA 2 (45.0%) or ASA 3 (42.5%). Most of the patients 197 (93.4%) admitted at ICU underwent major surgery (Table 2).

| Patient characteristics | Frequency (n) | Percentage of total (%) |
|--------------------------|---------------|-------------------------|
| Age group (years) | | |
| <18 | 30 | 12.5 |
| 18 - 30 | 64 | 26.7 |
| 31 - 44 | 72 | 30 |
| > 44 | 74 | 30.8 |
| Sex | | |
| Male | 111 | 46.3 |
| Female | 129 | 53.7 |
| Marital status | | |
| Single | 65 | 27 |
| Married | 171 | 71.3 |
| Divorced | 4 | 1.7 |
| Educational level | | |
| No formal education | 16 | 6.7 |
| Primary education | 94 | 39.2 |
| Secondary education | 92 | 38.3 |
| College / university | 38 | 1.7 |

| | | |
|--|-----|------|
| BMI(kg/m²) | | |
| <18.5kg/m ² | 10 | 4.2 |
| 18.5 - 24.9 | 130 | 54.2 |
| 25 - 29.9 | 96 | 40 |
| ≥30 kg/m ² | 4 | 1.7 |
| ASA status | | |
| ASA 1 | 5 | 2.1 |
| ASA 2 | 108 | 45 |
| ASA 3 | 102 | 42.5 |
| ASA 4 | 25 | 10.4 |
| Cigarette smoking | | |
| Yes | 33 | 118 |
| No | 207 | 122 |
| Alcohol use | | |
| Yes | 118 | 49.2 |
| No | 122 | 50.8 |
| Type of surgical procedure | | |
| Emergency surgery | 123 | 51.3 |
| Elective surgery | 88 | 36.7 |
| Magnitude of surgical procedure | | |
| Minor surgery | 8 | 3.8 |
| Medium surgery | 6 | 2.8 |
| Major surgery | 197 | 93.4 |

Table 2: Baseline characteristics of the surgical patients admitted at ICU.

Hospital Mortality Among Surgical Patients Admitted at ICU and Associated Factors

More than one third 89 (37.1%) of the patients died in the ICU and 151 (62.9%) were discharged during the study period. Hospital mortality was significantly associated with co-morbidity, high ASA classification, high BMI, increased number of systems involved, and the need for inotropic support and/or ventilator support. A higher proportion of the patients with BMI below and

above normal died in the ICU (p value 0.016). Slightly more than half of patients who were classified as ASA3 or 4 died in ICU 64 (50.4) (p value 0.001). Higher number of the patients with co-morbidity died in the ICU (p value 0.048). A significantly larger number of patients with three or more system involved died in the ICU 76 (55.5%) p value 0.001. Most of the patients who required ventilator support died. A high proportion of patients who had complications in the ICU died (Table 3).

| Patients characteristics | Patients outcomes (N, %) | | Total | P value |
|---------------------------|--------------------------|------------|-------|---------|
| | Died in the ICU | Discharged | | |
| Age group | | | | |
| <30 years | 33(37.1) | 56(62.9) | 89 | 0.81 |
| ≥30 years | 56(37.1) | 95(62.9) | 151 | |
| Sex | | | | |
| Male | 47(42.3) | 64(57.7) | 111 | 0.141 |
| Female | 42(32.6) | 87(67.4) | 129 | |
| Marital status | | | | |
| Married | 65(38.0) | 106(62.0) | 171 | 0.661 |
| Unmarried | 24(34.8) | 45(65.2) | 69 | |
| Educational level | | | | |
| No formal education | 8(50.0) | 8(50.0) | 16 | |
| Primary education | 40(42.6) | 54(57.4) | 94 | 0.131 |
| Secondary and above | 41(31.5) | 89(68.5) | 130 | |
| BMI | | | | |
| Normal BMI | 39(30.0) | 91(70.0) | 130 | 0.016 |
| Below and above normal | 50(45.5) | 60(54.5) | 110 | |
| ASA classification | | | | |
| ASA 1 & 2 | 25(22.1) | 88(77.9) | 113 | < 0.001 |
| ASA 3 & 4 | 64(50.4) | 63(49.6) | 127 | |
| Co-morbidity | | | | |
| Yes | 50(43.5) | 65(56.5) | 115 | 0.048 |
| No | 39(31.2) | 86(68.8) | 125 | |
| System involved | | | | |
| <3 systems | 13(12.6) | 90(87.4) | 103 | < 0.001 |
| ≥3 systems | 76(55.5) | 61(44.5) | 137 | |
| Inotropic support | | | | |
| Yes | 48(90.6) | 5(9.4) | 53 | < 0.001 |
| No | 41(21.9) | 146(78.1) | 187 | |
| Length of ICU stay | | | | |
| <7 days | 66(37.7) | 109(62.3) | 175 | 0.74 |
| ≥7 days | 23(35.4) | 42(64.6) | 65 | |

| | | | | |
|---------------------------------------|----------|-----------|-----|-----------|
| Core temp. on admission (°C) | | | | |
| Low (≤ 35.5) | 5(50.0) | 5(50.0) | 10 | |
| Normal (35.6 - 37.5) | 30(25.2) | 89(74.8) | 119 | 0.01 |
| High (> 37.5) | 54(48.6) | 57(51.4) | 111 | |
| Type of surgical procedure | | | | |
| Elective surgery | 21(23.9) | 67(76.1) | 88 | 0.004 |
| Emergency surgery | 55(44.7) | 68(55.3) | 123 | |
| Ventilator support | | | | |
| Yes | 81(40.9) | 117(59.1) | 198 | 0.008 |
| No | 8(19.0) | 34(81.0) | 42 | |
| Complications in the ICU | | | | |
| Yes | 86(44.8) | 106(55.2) | 192 | < 0.001 |
| No | 3(6.2) | 45(93.8) | 48 | |
| SAPS II score | | | | |
| < 29 points | 6(10.0) | 54(90.0) | 60 | |
| 29-52 points | 28(28.9) | 69(71.1) | 97 | < 0.001 |
| ≥ 53 points | 42(76.4) | 13(23.6) | 55 | |
| Frequency of specialist review | | | | |
| 1-2 times | 35(46.1) | 41(53.9) | 76 | |
| 3- 4 times | 32(37.6) | 53(62.4) | 85 | 0.063 |
| ≥ 5 times | 22(27.8) | 57(72.2) | 79 | |

Table 3: Association of surgical ICU mortality with the patient characteristics.

In univariate logistic regression analysis of the factors associated with ICU mortality, a higher SAPS II score was significantly associated with hospital mortality. Patients who had SAPS score of 29 points and below were 96.6% less likely to die in the ICU as compared to patients with SAPS II score of 53 points

and above (COR 0.034, 95% CI 0.012-0.098, p value < 0.001). Patients who had co-morbidity were 1.7 times more likely to die in the ICU as compared to patients without co-morbidity (COR 1.7, 95% 1.0-2.8, p value 0.04). Patients who were scheduled for elective surgery were 60% less likely to die in the ICU (COR 0.4 95% CI 0.212 - 0.710, p value < 0.001) (Table 4).

| Variables | COR (95% CI) | p value |
|-------------------------------------|---------------------|---------|
| SAPS II score | | |
| >53 points | 1 | |
| 29-52 points | 0.13 (0.06 - 0.2) | < 0.001 |
| <29 points | 0.03 (0.01 - 0.1) | < 0.001 |
| BMI (kg/m²) | | |
| <18.5 | 1 | |
| 18.5 - 24.9 | 0.66 (0.14 - 3.07) | 0.596 |
| 25 - 29.9 | 0.96 (0.20 - 4.55) | 0.962 |
| ≥30 | 1.33 (0.11 - 15.70) | 0.819 |
| ASA status | | |
| ASA 1 | 1 | |
| ASA 2 | 0.41 (0.06 - 2.58) | 0.339 |
| ASA 3 | 0.97 (0.16 - 2.58) | 0.972 |
| ASA 4 | 36 (2.46 - 527.06) | 0.009 |
| Co-morbidity | | |
| No | 1 | |
| Yes | 1.7 (1.00 - 2.88) | 0.04 |
| Cigarette smoking | | |
| No | 1 | |
| Yes | 1.12 (0.53 - 2.38) | 0.767 |
| Core temp. on admission (°C) | | |
| Higher (> 37.5) | 1 | |
| Normal (35.6 - 37.5) | 0.36 (0.20-0.62) | <0.001 |
| Low (≤35.5) | 1.06 (0.29-3.85) | |
| Type of surgical procedure | | |
| Elective surgery | 1 | |
| Emergency surgery | 0.39 (0.21 - 0.71) | 0.002 |
| Number of systems involved | | |
| One system | 1 | |
| Two systems | 0.73 (0.02 - 3.24) | 0.304 |
| More than two systems | 2.49 (0.22 - 28.13) | 0.46 |
| Complications in the ICU | | |
| No | 1 | |

| | | |
|-----|--------------------|--------|
| Yes | 3.14 (2.06 - 4.80) | <0.001 |
|-----|--------------------|--------|

Table 4: Univariate logistic regression showing association of variables with ICU mortality of surgical patients admitted in ICU at Muhimbili national hospital (n=240).

In the multivariate logistic regression it was shown that higher SAPS II score, complications in the ICU and patients with ASA 4 classification were independently associated with ICU mortality. Patients who had SAPS II score of 29 points and below were 94.1% less likely to die in the ICU as compared to patients with SAPS score of 53 points and above (AOR=0.059, 95% CI, 0.019-0.183, p value <0.001) . Patients who presented with complications in the ICU such as sepsis and acute kidney injuries, among other factors, were 1.9 times more likely to die in the ICU as compared to patients who didn't have any complications (AOR=1.94, 95% CI, 1.259-3.847, p value 0.006). ASA 4 patients were shown to have a higher likelihood of dying in the ICU than other ASA classifications (AOR=21.74, 95% CI, 1.259-3.847, p value 0.007) Table 5.

| Variables | AOR (95% CI) | p value |
|--------------------------------------|---------------------|---------|
| SAPS II score | | |
| >53 points | 1 | |
| 29-52 points | 0.152 (0.07 - 0.35) | < 0.001 |
| < 29 points | 0.06 (0.02 - 0.18) | < 0.001 |
| Co-morbidity | | |
| No | 1 | |
| Yes | 1.56 (0.31-1.34) | 0.236 |
| Type of surgical procedure | | |
| Elective surgery | 1 | |
| Emergency surgery | 1.31 (0.72- 2.4) | 0.374 |
| Complication in the ICU | | |
| No | 1 | |
| Yes | 1.94 (0.11 - 3.85) | 0.006 |
| ASA 4 | | |
| No | 1 | |
| Yes | 21.74 (1.26-3.85) | 0.014 |
| Core temperature on admission | | |
| Higher (> 37.5) | 1 | |
| Normal (35.6 - 37.5) | 0.7 (0.33-1.5) | 0.339 |
| Low(≤35.5) | 1.71 (0.26-11.11) | 0.572 |

Table 5: Multivariate logistic regression showing factors associated with hospital mortality among surgical patients admitted at ICU at MNH.

Discussion

In our study mortality was found to be more than one third (89 patients, 37.1%) (Table 3). Similar findings were recorded in a three month study done at Jamma university specialized hospital in Ethiopia (2011) whereby mortality of ICU surgical patients was as high as 37.7% [6]. This may be explained by the similarity of low resource settings between these two African countries. However, other studies conducted in much lower resource settings in India (2017) found that mortality was higher (45.3%) [7,8]. In studies done in highest resource settings mortality was found to be the lowest (23.8%) [9,10]. Therefore, high mortality in surgical ICU patients may be significantly affected by the socioeconomic status of a particular setting. We found that increased SAPS II score, complication in the ICU and patients with ASA 4 classification were significantly independent factors associated with the ICU mortality after adjusting all the confounders from other variables (Table 5). We pointed out that patients who had SAPS II score of 29 points and below were 94.1% less likely to die in the ICU as compared to patients with SAPS II score of 53 points and above (AOR=0.059, 95% CI, 0.019-0.183, p value <0.001) (Table 5). Several similar studies had shown similar findings [9-11], whereby patients who had higher SAPS II scores were associated with significantly high mortality. This similarity may be explained by the fact that patients who were likely to die in ICU may be presented with co-morbidities and/or complications that lead to significant deranged physiology hence higher SAPS II scoring.

Patients who presented with complications in the ICU such as sepsis or acute kidney injuries, among other factors, were 1.9 times more likely to die in the ICU as compared to patients who didn't have any complications (AOR=1.94, 95% CI, 1.259-3.847, p value 0.006) (Table 5). Similar findings were reported by a study conducted to assess postoperative complications e.g. sepsis, among others and implications on patient centered outcome [5]. Similarity of these findings may be due increased chances of deranged physiological status and deterioration of the patient's general condition when complications occur. Findings in our study indicated that ASA 4 patients were shown to have higher likelihood to die in the ICU than other ASA classification (AOR=21.74, 95% CI, 1.259-3.847, p value 0.007) Table 5. Similar study titled "Preventing Surgical Deaths" (2005) showed that about 50% of surgical deaths in ICU were in patients classified as ASA IV or V [11]. This slight difference can be explained by the fact that our settings have a much younger population in the ICU than most American or European hospitals.

Our study has findings which showed that higher number of the patients with co-morbidity died (p value 0.040); and that a significantly higher proportion of patients with three or more systems that were involved as complications died 76 (55.5%) (P

value <0.001) (Table 2). However after adjusting for confounders, all these were found not to be associated with increased surgical ICU mortality (Table 4). Similar studies have shown different results whereby patients with co-morbidity and complications involving more organ systems had higher mortality [9,10]. This may be due to the fact that ICU patients in our settings have a greater physiological reserve because they are younger compared to ICU patients from most developed countries. In our study we found that patients scheduled for emergency surgeries were not associated with increased ICU mortality (AOR 1.31; 95% CI 0.72- 2.4; p value 0.374) (Table 4). A similar study done in India did not find any link between emergency surgeries and mortality. However, recent studies (2017) demonstrated dissimilar findings whereby patients admitted in ICU following emergency surgeries were significantly associated with high mortality [12,13]. These differences may be explained by the fact that there is proper implementation of modern ICU treatment goals aimed at combating complications earlier in settings which showed better outcome for emergency surgeries.

Another similar study conducted over three years in India (2017) found dissimilar results whereby the most common reasons of admission into ICU were for mechanical ventilation and observation followed by prolonged surgeries, and hemodynamic instability, among others. Common procedures performed were gastrointestinal (laparotomy) which had the highest mortality, followed by interventional radiology and orthopaedics [8]. These differences may be explained by differences in terms of geographical patterns of diseases, socioeconomic status, and education level among others in these settings. Results in our study found that most of the patients 197 (93.4%) admitted to ICU underwent major surgery (Table 1). Dissimilar results of a study conducted to analyze 130 ICU surgical patients for perioperative fitness found that eighty-nine patients (68.5%) underwent major surgery [9]. This may be explained by the fact that most ICU patients in our setting present at later stage of disease where preventable interventions for major surgery are almost impossible to undertake due to poor diagnostic and treatment facilities (low resource settings). In our study we found that the mean age of surgical patients admitted to ICU was 36.95 years (SD±19.16) with male: female ratio of almost 1:1 (Table 1). A similar study conducted in Manitoba, Canada (2007) reported that mean age of surgical patients admitted in ICU was 64.5 ± 16.4 years. Male: female ratio was 1:2 [9]. This mean age and male: female ratio difference, compared to our study, may be explained by differences in socioeconomic status and exposures to high risk environments between the two settings. Also the proportion of population that is young and old between the two countries can be explained by the fact that Tanzania has a young population whereas Canada has much older one.

We found that the ratio between married and unmarried individuals was 2.5:1. These participants had also lower education level (primary and secondary) by 77.5% (Table 1). Dissimilar results of a ratio of almost 1:1 were recorded in the study conducted to assess effect of marital status on the presentation and outcomes of elderly male veterans (2002-2007) in surgical ICU; whereby 26,558 (54.6%) were married and 22,077 (45.4%) were unmarried. Most of these patients had also better educational level [14]. This can be explained by differences in socioeconomic status and environmental exposures between the two settings.

Our study showed that more than half 130 (54.2%) of the respondents had normal BMI (18.5 - 24.9 kg/m²) (Table 1). Similar findings were reported in a study of 605 ICU surgical patients conducted to assess effect of BMI on ICU outcome among African American patients, whereby most patients (65%) had normal BMI [15]. However we found that most of patients with extremes of BMI had increased mortality (Table 2); but this was not significantly associated with high ICU mortality (Table 3). Similar findings were seen in a study done in 2012 which revealed that higher BMI was not associated with increased odds of ICU mortality (OR=.58; 95% CI, .16-2.20) [15]. We also found that most patients who were on mechanical ventilator support as part of ICU management died (Table 2). However this was found not to be significantly associated with high ICU mortality after adjusting the confounders (Table 3). Dissimilar findings were seen in a three years study conducted in India (1998-2001) [8], whereby patients who were on mechanical ventilator support had a significantly higher ICU mortality.

Study limitations

The study was limited to a single health facility which provides care for surgical critically ill patients, excluding others especially those from private sectors. Mortality and its risk factors of surgical patients admitted to ICU at other health facilities may be different. Results of this study may encourage further studies in other centers.

Conclusion and Recommendations

Surgical patients admitted in ICUs at MNH encounter significant mortality. Independent factors associated with high mortality included the following: increased SAPS II score, occurrence of complications in ICU and ASA IV classification. A multicenter study should be carried out in Tanzania as this study had a small sample size of 240 patients in a single center, which in our opinion may not be sufficient to draw major conclusion. Application of scoring systems (e.g. SAPS II as used in our study) should be emphasized in ICUs for they give estimate mortality hence proper planning in terms of ideal and cautious medical care.

Further studies should be carried out to identify major common complications with their appropriate interventions that affect patient's outcome in our settings so as to have better outcome.

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