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**READMISSION OF PATIENTS TO SURGICAL INTENSIVE CARE UNIT,
INCIDENCE, ASSOCIATED FACTORS AND OUTCOME AT TIKUR
AMBESSA SPECIALIZED HOSPITAL FROM SEPTEMBER 2023 TO
FEBRUARY 2024**

A PROSPECTIVE OBSERVATIONAL STUDY, ADDIS ABABA, ETHIOPIA

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ADDIS ABABA, ETHIOPIA

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Abstract

Background

Globally, the survival of critically sick patients has improved significantly as a result of the remarkable strides made in critical care treatment. However, the lack of and high cost of intensive care facilities is a major concern, particularly in developing nations. ICU readmission occurs when a patient deteriorates during the same hospitalization and needs to return to the ICU for treatment. Although studies mostly done in developed countries show the association of ICU readmission with poor prognosis and increased cost, the knowledge of ICU readmission epidemiology, causes and outcome is uncertain in our country.

Objective: To determine the incidence, associated factors and outcomes of readmission to surgical ICU at TASH from September 2023 to February 2024.

Methodology; Institutional based prospective cross sectional study was conducted from September 1, 2023 – February 29, 2024. Data collected from patient chart will be filled into prepared checklist. Data was checked for completeness and then imported to SPSS version 27 software for analysis. Descriptive analysis was done for continuous variables. Bivariate logistic regression was done for each predictor variable and outcome variable. Multiple logistic regressions were done and a statistical significance p value less than 0.05 were taken as a determinant factor.

Results

A total of 155 patients that were transferred from ICU to ward were included in our study, among this 12(6.5%) required readmission. The mechanical ventilator need on admission (AOR= 7.057(CI 1.668-29.850) and oxygen requirement during transfer to ward (AOR =4.1(CI 1.004-17.093) were main factors associated with readmission. Only 41.7% of readmitted patients were recovered while 58.3% died.

Conclusion

In this study of surgical ICU patients, mechanical ventilation requirement on ICU admission and oxygen requirement during transfer to ward was found to be a major risk for readmission. The readmitted patient had poor outcome with a mortality of 58.3%. Further study is required to identify interventions that may improve outcome.

Key words; SICU, readmission, Ethiopia

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ABBREVIATIONS

AAU	Addis Ababa University
ICU	Intensive care unit
MICU	Medical ICU
PICU	Pediatrics intensive care unit
SICU	Surgical intensive care unit
SPSS	Statistical package for social sciences
TASH	Tikur Ambessa Specialized Hospital

1. INTRODUCTION

Background

Intensive care unit (ICU) is special unit where critically ill patients who require advanced organ support and monitoring are admitted. Globally, the survival of critically sick patients has improved significantly as a result of the remarkable strides made in this critical care treatment. However, the lack of and high cost of intensive care facilities is a major concern, particularly in developing nations. Patients and the healthcare system are further burdened by unanticipated bounce back to the intensive care unit.

Hospitals use quality metrics to address many aspects of patient care; one of those metrics is the ICU readmission¹. ICU readmission is defined as admission to intensive care unit of a patient previously admitted to the ICU during the same hospital encounter. The survival rate of critically sick patients around the world has significantly improved as a result of advances in critical care medicine. However, the paucity of intensive care facilities and cost constraints, especially in developing countries lead to early discharge of patients from intensive care units.

Early ICU discharge minimizes overuse and waste of costly medical facility while increasing the number of beds available for other seriously sick patients. But this exposes the patients to lower level of care at ward floors which may not only result in deterioration of clinical condition but may also lead to increased mortality. In this context optimization of available resources and the management of health care quality are essential factors for maintaining good health system functioning².

STATEMENT OF THE PROBLEM

Intensive care medicine has grown significantly and currently consumes a substantial part of the income of many countries worldwide. Its burden is significant particularly in low income countries. One of a vulnerable time in the delivery of healthcare occurs when patients are moved from intensive care unit to a hospital ward. The number of providers involved, the absence of standardized discharge procedures, the sickest patients in the hospital being moved from an environment with abundant resources to one with few resources, and the issues with verbal and written communication between providers and patients as well as among providers themselves

have all been blamed for this. ICU readmission occurs when a patient deteriorates during the same hospitalization and needs to return to the ICU for treatment. These readmitted patients are associated with poor prognosis and their increasing hospitalization costs would significantly burden patients' families and health care system.

Though one multicenter retrospective study done in Addis Ababa reported the association of ICU readmission with mortality there is no study done on ICU readmission causes and risk factors, knowledge of which would enable the ICU team to best plan both the discharge and the ongoing care outside the ICU³.

SIGNIFICANCE OF THE STUDY

The importance of this study is to know the incidence, risk factors and outcomes of patients readmitted to surgical intensive care unit in Tikur Ambessa Specialized Hospital. Though studies done mostly in developed countries show the association of readmission with increased adverse outcomes there is lack of studies in our country. Therefore knowing the incidence, causes and outcomes of readmission are very much important to know the magnitude of the problem, factors associated with readmission and to identify predictors of worse outcomes, also it can be an input for future researches.

3. LITERATURE REVIEW

There is a dearth of studies conducted on readmission of surgical patients in to intensive care unit in low resource settings. In addition published data in low resource settings did not thoroughly report predictors of readmission to surgical ICU and most of them are done in medical-surgical ICU set-up. A prospective observational study done in Iran by Mohammadi et al reported 10.3% (n = 25/242) readmission to ICU within 72hrs after their discharge. The major risk factor for readmission they reported are evening time discharge, neurological disorders (6.1% vs 93.9%), cardiovascular and respiratory disorders (11.3% vs 88.7%), renal disorders (29.4% vs 70.6%) and gastrointestinal disorders (13.3% vs 86.7%)⁴. Similarly the study done in Brazil reported readmission rate was 10% (n= 576/5,779). This retrospective single center study in private tertiary hospital in Saopaulo found that age, use of vasopressors, mechanical ventilation, presence of malignancy, renal replacement therapy, length of ICU stay, admission from ward, and night time ICU discharge as independent predictors of ICU readmission⁵

Single center prospective study of 3169 patients admitted to SICU done in German by Kaben et al reported that readmission to SICU was associated with a more than fivefold increase in mortality. They reported readmission rate of 13.4% and the independent association of older age, higher maximum sequential organ failure score and higher C-reactive protein on the day of transfer to ward with a higher risk of readmission to ICU⁶. Another prospective study done in Netherland by Timmers et al reported that readmission was independently associated with type of admission and need of mechanical ventilation⁷.

Similarly a retrospective longitudinal study done in Australia reported significant association of ICU readmission with in-hospital mortality (OR 5.4, 95% confidence interval (CI) 5.1 -5.7). In this study done by Renton et al and published in 2011, 247,103 patients were included and 5.5% readmission rate reported. Presence of comorbidities, evening discharges and initial admission source other than elective surgery were reported as risk factors for readmission⁸. In contrast prospective study published in 2017 found no association between ICU readmission and in-hospital mortality⁹. Rather older age, inotrope use and medical diagnosis were all independently associated with mortality in this study.

Systemic review of eight studies focusing on ICU readmission by Rosenberg and Watts published in 2000 reported a 7% mean readmission rate (range 4 to 14%). They reported that the most common reasons for ICU readmission are pulmonary complications and cardiac abnormalities followed by upper gastrointestinal bleeding and neurologic deficit. In this review it was also reported that ICU readmission is associated with dramatically higher hospital mortality¹⁰. Similarly a meta-analysis of 58 studies¹⁰ on ICU readmission and mortality among patients discharged alive from ICU between 1986 -and 2013 from North America, Europe and Australia reported that for every 100 patients discharged alive from ICU, between 4 and 6 patients will be readmitted to the ICU¹¹.

Heidi Mcneill et al. published in 2020, review of 11 articles on impact of ICU readmission on patient outcomes. They reported readmission rate of 1.5 % (n=378/25,717) to as high as 13.4 % (n=381/2852). Similarly due to different follow-up times ICU readmission rates vary very widely, ranging from 1.3% to 13.7% in a review by Elliot et al, 2014. The most common cause for ICU readmission was respiratory insufficiency or failure accounting for 18% to 59% of all readmitted patients and is followed by cardiovascular issues accounting for 15% to 30.2%. The mortality ranged from 10% to 27.5% and there is an increased length of stay (11 to 40 days)¹. Consistent with this retrospective cohort study done in 5 ICUs at teaching hospital in Taiwan found respiratory failure as the most common cause of ICU readmissions¹².

4. OBJECTIVES

GENERAL OBJECTIVES

- To assess the magnitude, associated factors and outcomes of readmission to surgical ICU at TASH from September 2023 to February 2024

SPECIFIC OBJECTIVES

- To determine the magnitude of readmission to SICU.
- To determine factors associated with ICU readmission.
- To assess the outcomes of patients readmitted to SICU.

5. Methods and material

Study area and period

The study was conducted from September 1, 2023 to February 29, 2024 at Tikur Ambessa Specialized Hospital in Addis Ababa, Ethiopia. TASH is the largest referral and teaching governmental hospital in Ethiopia with 700 beds, accommodating referred patients from across the nation and has most specialties and subspecialties. The hospital has one main ICU and one cardiac ICU. The main ICU has 16 beds of which 6 beds are dedicated for Surgical ICU and run by Anesthesiologist, 6 beds for Medical ICU run by pulmonologist and 4 beds for Pediatrics run by pediatric pulmonologist.

Study design

Institutional based prospective, observational study

Population

Source population

All adult patients admitted to TASH Surgical ICU and discharged alive during the study period.

Study Population

All adult patients who are readmitted to Surgical ICU within the study period and met the inclusion criteria.

Eligibility criteria

Inclusion criteria

All adult patients admitted to SICU and discharged alive from SICU.

Exclusion criteria

Scheduled readmission due to elective surgical procedure

Age < 18yrs

Patient directly discharged to home or referred to other hospital

Patient that went against medical advice

Sample size determination and procedure

Sample size determination

This is a single population proportion formula to determine the sample size. In a previous study done in Iran, the incidence of ICU readmission is 10.3%.

$N = (Z_{\alpha/2})^2 * p(1 - p) / d^2$ is used to estimate the sample size

$$N = (1.96)^2 * 0.103(0.897) / (0.05)^2 = 141$$

By adding 10% contingency, a total of 155 patients will be sampled.

Sampling procedure

Participants in the study were chosen using a total enumeration (purposive) sampling strategy.

Variables of the study

Dependent Variable

ICU readmission

ICU Outcome

Independent Variables

Sociodemographic

- Age
- sex
- BMI

Clinical Characteristic during initial admission

- admission diagnosis/reason
- type of surgery
- Respiratory status
- GCS
- mechanical ventilator use
- Inotrope requirement
- Oxygen requirement
- Comorbidities

Patient condition during transfer

- On tracheostomy
- Oxygen requirement
- GCS
- Transfer time

Operational Definition

ICU Readmission; admission to intensive care unit of a patient previously admitted to the ICU during the same hospital encounter

Co-morbidity: Diseases or disorders that exist together with an index disease or co-occurrence of two or more diseases or disorders in an individual.

Outcome: surgical ICU outcome

Data collection procedure

The data was collected using a structured questionnaire from patient chart by year 2 and year 3 anesthesiology residents who is on ICU rotation. The questionnaire seek information about socio-demographic data, Clinical characteristic during initial admission, patient condition during transfer, reason for readmission and ICU outcome. Data was collected from eligible patients using structured questionnaires with simultaneous crosschecking of data from patients' chart for consistency and reliability of clinical characteristics. The patients' unique identification number through medical record was strictly applied to avoid repetitions. The data was collected from September 1, 2023 to February 29, 2024. The questionnaires were checked for completeness, consistency, clarity and accuracy at the end of data collection day.

Data Processing and analysis

Data was checked for completeness and then imported to SPSS version 27 software for analysis. Descriptive statistics was used to describe the study variables. Association of each independent variable and dependent variable was assessed by bivariate followed by multivariate logistic regression after testing for fitness of the model using Hosmer and Lemisho goodness of fit model for this analysis. Multicollinearity was checked among independent variables and the effect of confounders was controlled during the analysis process using multivariable analysis. Those independent variables with P-value < 0.25 in the bivariate analysis was taken into multivariable logistic regression analysis model. Adjusted odds ratio with 95% CI was employed to control confounding effect. P value of < 0.05 was used to declare statistical significance for association of the dependent and the independent variables.

Ethical Consideration

Prior to data collection ethical clearance was obtained from the department of Anesthesiology, critical care and pain medicine. Verbal informed consent was obtained from the patient before data was collected. Information obtained from this data will only be used for the purpose of this research and confidentiality will be kept for all patients.

Dissemination plan

The result of the study will be submitted to AAU school of medicine, department of Anesthesiology and critical care, ICU directorate and other Hospital administrative staff.

6. RESULT

Sociodemographic data

A total of 155 patients were included in this study. Their age ranged from 18 to 82 with a mean age of 42.2 yrs (SD+-15). Majority of the patients were male accounting 53.5% while the rest 46.4% were female

Table 1 Frequency distribution of sociodemographic characteristic of patients transferred from SICU at TASH SICU from September 2023 – February 2024.

Variables		Frequency	Percent
Sex	Male	83	53.5
	Female	72	46.4
Age(yrs)	18-34	56	36
	35-49	46	29.7
	50-69	44	28.4
	>=70	9	5.8
Mean age	42.2+-15		
BMI	<18.5	8	5.1
	18.5-24.9	141	90.9
	25-29.9	5	3.2
	30-34.9	1	0.6

Majority of patients 141(90.9%) had normal BMI, 8(5.1%) were underweight, 5(3.2%) were overweight and 1(0.6%) patient were obese.

Clinical Characteristic of patient during initial ICU admission

In the primary admission to SICU, majority 144(92.9%) were from operating room, 5(3.2%) were direct admissions from the emergency, 5(3.2%) from ward and the rest 1(0.6%) patient were from other hospital. Of the total 155 patients, 112(72.3%) had an elective surgery, 37(23.8%) had an emergency surgery and 6(3.8%) had not undergone any surgical procedure. Majority 67(43.2%) of the patients had neurosurgical procedure, followed by Thoracic surgery 24(15.5%), General surgery 15(9.7%), Obstetric and Gynecologic surgery 14(9%), Vascular surgery 11(7.1%), orthopedic and ENT surgery 7(4.5%) each. Most of the patients (62.6%) had good respiratory status while 37.4% were in distress.

Table 2; characteristic of patients during initial ICU admission at TASH

Variables		Frequency	Percent
Source of admission	Emergency room	5	3.2
	Operating room	144	92.9
	Ward	5	3.2
	Other hospital	1	0.6
Type of surgery	Emergency	37	23.8
	Elective	112	72.3
Type of procedure	General surgery	15	9.7
	Neurologic Surgery	67	43.2
	Thoracic Surgery	24	15.5
	Obstetric and gynecologic	14	9
	Orthopedic Surgery	7	4.5
	Vascular Surgery	11	7.1
	ENT Surgery	7	4.5
	Urologic surgery	4	2.6
Respiratory status	Normal	97	62.6
	In distress	58	37.4
GCS	15	115	74.2
	13-14	7	4.5
	9-12	8	5.2
	<9	8	5.2
	Sedated	17	10.9
Need of MV support	Yes	39	25.2
	No	116	74.8
Inotrope requirement	Yes	15	9.7
	No	140	90.3

Out of the total 155 patients 39(25.2%) patients need mechanical ventilation support, while 116(74.8%) did not.

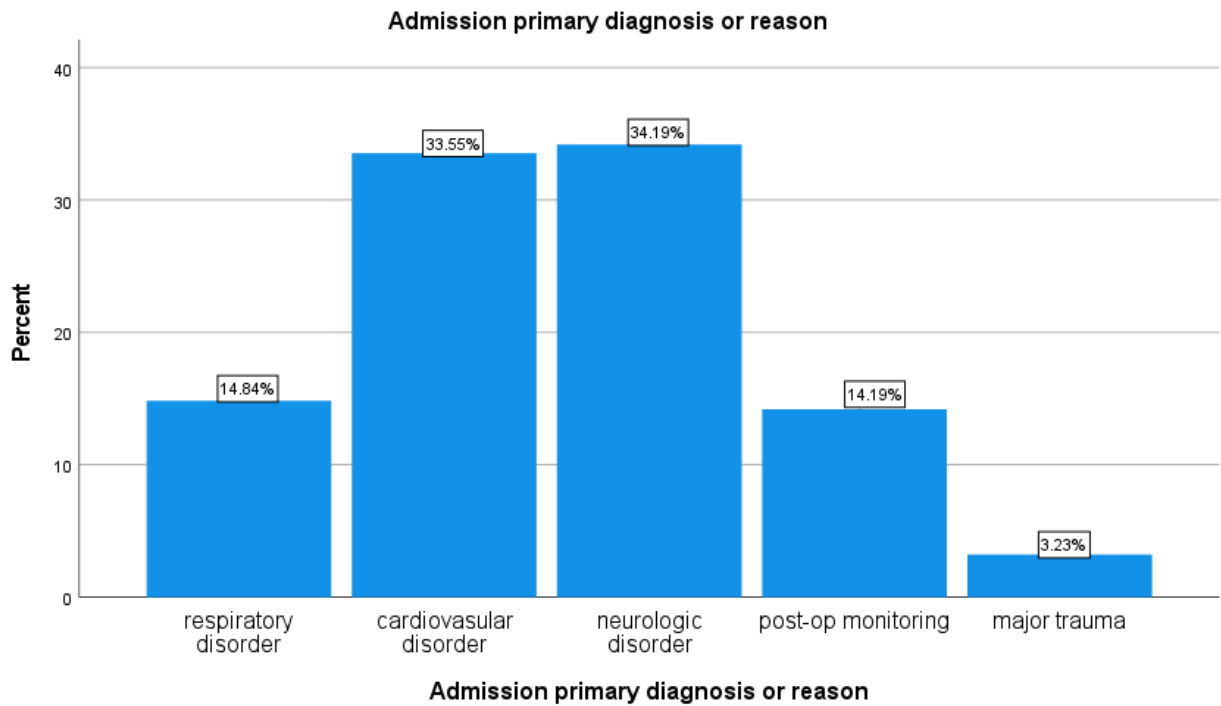
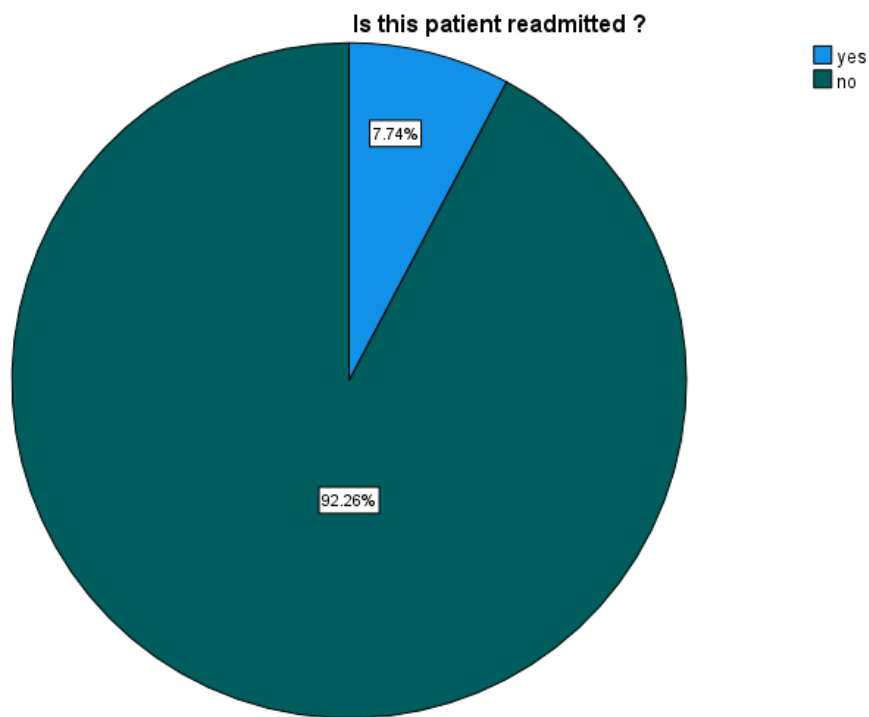


Figure 1- Admission primary diagnosis among study participants of SICU incidence, associated factor and outcome at TASH from September 2023 – February 2024(n=155)

Incidence of SICU Readmission

Among 155 patients that were transferred during the study period, 12(7.7%) were readmitted.

Figure 2; the incidence of SICU readmission at TASH among study participants from September 2023 – February 2024(n=155)



Factors associated with readmission

A total of 155 patients were included in this study, 12(7.7%) of them required readmission. To identify factors associated with readmission, first simple logistic regression was performed to select candidate variables that had crude association with static utilization at P-value <0.25%

Initially all independent variables were entered in the bi-variate logistic regression model in order to determine the factors associated with readmission. On the bi-variate logistic regression model, those variables with a p-value less than 0.25 were selected as a candidate variable.

Then the selected variables were subjected to multiple logistic regressions. Finally a step down method of multivariate logistic regression was carried out for the variables, source of admission, respiratory status during initial icu admission, Glasgow coma scale, need of mechanical ventilation support and oxygen support requirement during transfer to ward. A P value less than 0.05 was considered statistically significant and presented with 95% CI and AOR. Accordingly the need for mechanical ventilation during initial ICU admission and oxygen requirement during transfer from ICU to ward were found to have significant associations with ICU readmission. Age, sex, source of admission, admission primary diagnosis and inotrope requirement had no statistically significant associations with ICU readmission (table 3). Vital sign on discharge, presence of tracheostomy and GCS during transfer had also no statistically significant association with ICU readmission.

In this study, patients who need mechanical ventilation during initial ICU admission were seven times more likely to be readmitted compared to those who do not need mechanical ventilation (AOR: 7.057(CI 1.668-29.850, P=0.008)). Similarly patients who required oxygen support during transfer from ICU to ward were four times more likely to be readmitted to ICU as compared to those who didn't require oxygen support (AOR:4.1(CI 1.004-17.093), (P=0.049)).

VARIABLE		READMISSION TO SICU		NON READMISSION TO SICU		AOR:(95% CI)	P-VALUE
Total	155	number	Percent	number	percent		
		12	7.7	143	92.3		
Sex	Male	6	3.8	77	49.6		P=0.798
	Female	6	3.8	66	42.5		
Mean age+-SD	42.2 +-15	44+-16					
Source of admission	Emergency room	1	0.6	4	2.6		P=0.632
	Operating room	10	6.4	134	86.5		
	Ward	1	0.6	4	2.6		
	Other hospital			1	0.6		
admission primary diagnosis	Respiratory disorder	2	1.3	21	13.5		P=0.566
	Cardiovascular disorder	3	1.9	49	31.6		
	Neurologic disorder	5	3.2	48	31		
	Trauma	2	1.3	3	1.9		
	Postop monitoring			22	14.1		
Respiratory status	Normal	2	1.3	95	61.2	Ref	P=0.058
	In distress	10	6.4	48	30.9	5.007(CI 0.948-26.436)	
Need mechanical ventilation	Yes	9	5.8	30	19.3	7.057(CI 1.668-29.850)	P=0.008
	No	3	1.9	113	72.9	Ref	
Inotrope requirement	Yes	2	1.3	13	8.3		P =0.452
	No	10	6.4	130	83.8		
Glasgow coma scale	15	5	3.2	109	69.4		P=0.961
	13-14	1	0.6	6	3.8		
	9-12			8	5.1		
	<9	2	1.3	6	3.8		
	Sedated	4	2.5	14	9		
Oxygen requirement during transfer	Yes	7	4.5	12	7.7	4.1(CI 1.004-17.093)	P=0.049
	No	5	3.2	131	84.5	Ref	

Table 3: Bivariate and multivariate analysis to identify factors associated with ICU readmission at TASH.

SICU outcome of readmitted patients

Among 12 patients that were readmitted during the study period, 5(41.7%) patients recovered and 7(58.3%) died.

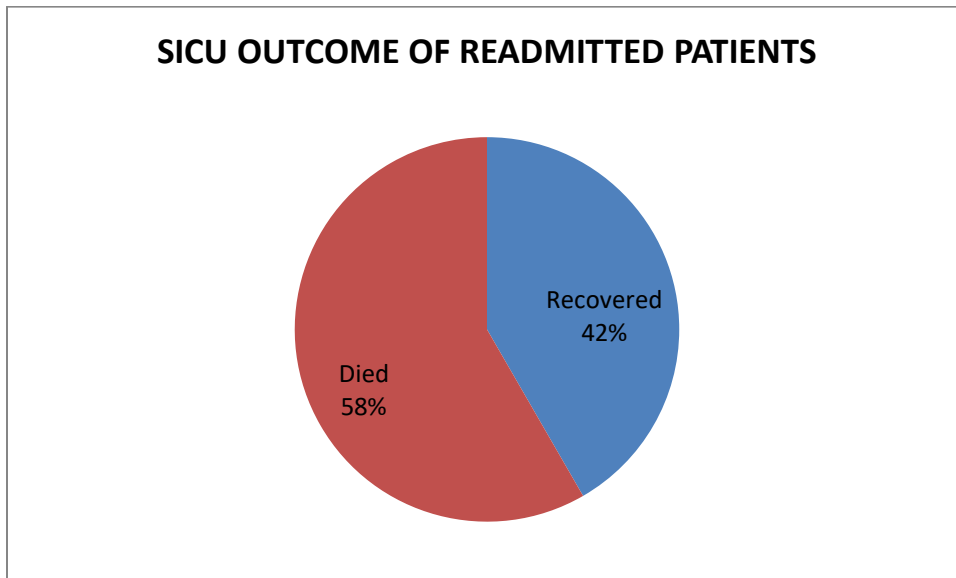


Figure 3; the outcome of patients readmitted at TASH from September 2023 – February 2024.

7. Discussion

In this prospective study of surgical ICU patients, 7.7% (n=12/155) of patients discharged from ICU required readmission during the same hospitalization. Though it is one of ICU quality metrics there is no local data available regarding the frequency of ICU readmission in our set up. So this is probably the first study regarding the SICU readmission conducted in Ethiopia.

The readmission rate in this study (7.7%) is lower than other studies done in resource limited setting. The study done in Brazil reported readmission rate was 10% (n= 576/5,779)⁵. Similarly Mohammed et al, reported readmission rate of 10.3% (n=25/242)⁴. This could be due to the difference of ICU admitted patient in this study which are mainly planned neurological and thoracic surgery patients which are relatively younger (41.6 Vs 61.6) and has less comorbidities. In addition these studies were done in medico-surgical ICU patients and over longer duration compared with this 6 month study.

This finding is also lower than the prospective study report by Kaben et al which reported SICU readmission rate of 13.4%⁶. However it is comparable with Rosenberg and Watts systemic review report of 7% readmission rate¹⁰.

In contrast to previous studies^(5,13,10) that reported multiple factors like; evening time discharge, comorbidity, neurological disorders, cardiovascular disorders, use of vasopressors and presence of malignancy as major risk factor for readmission this study found mechanical ventilation need on admission and oxygen requirement during transfer to ward as main risk factor for ICU readmission. This is in agreement with a finding by Lissauer et al which reported the need for mechanical ventilator as independent risk factor for readmission¹⁴.

Only 5 (41.7%) of readmitted patients were recovered while the rest 7 (58.3%) patients were died in this study. This is much higher than the 23.4% mortality rate reported by Lissauer et al and a review by Mcneill et al which reported 10% to 27.5% mortality among readmitted patients^{14,1}. It is also higher than mortality rate of 40.2% among surgical patients admitted to ICU at saint paul reported by kirubel et al¹⁵. A multicenter retrospective study done in Addis Ababa on survival status and predictors of mortality among patients admitted to SICU identified that readmission to SICU is one of the predictors of mortality in SICU³. This is in agreement with the high mortality (58.3%) of readmitted patient in this study. There is a need to further study on interventions that could improve the outcome readmitted patients.

Lastly, our findings might not hold true for patients in medical or combined medico-surgical intensive care units, or for ICUs with a diverse case mix. Further study is needed to see if these results are generalizable to other ICUs.

Strength and limitations of the study

Given the paucity of research in this topic in our nation, it may serve as a pilot study for other studies in the future. This can be taken as the strength of this study. However, this study has also certain shortcomings. First, due to the observational nature of the study we could not determine whether readmissions were appropriate or not. Second the relatively short study period, few sample size and the absence of studies done in Ethiopia affect strong discussion. Furthermore the lack blood gas tests and other lab results that may have influenced the result can be mentioned as limitation.

8. Conclusion

In conclusion, the incidence of surgical ICU readmission in this study is 6.5%. There is risk factor present on initial ICU admission and during transfer to ward that differentiate patients who may subsequently require readmission. The mechanical ventilator need on admission and oxygen requirement during transfer to ward was strongly associated with readmission. The readmission to ICU was also found to result in poor outcome with 58.3% mortality among readmitted patient. This data provide important insights into the incidence, risk factors for readmission and SICU outcome of readmitted patients.

9. Recommendation

In accordance to the findings in this study, we propose the following recommendations.

- Risk stratification of patients discharged from ICU.
- Step down unit should be prepared for high risk patients transferred from ICU.
- Further study shall be conducted to identify interventions that may improve outcomes.
- Further studies with a larger sample size shall be conducted.

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ANNEX I

Data collection checklist

1. Demographic variables

Age _

Sex Male Female

Weight

Height

BMI

2. Patient clinical characteristic during initial ICU admission

Source of admission

- a. Operating room
- b. Emergency room
- c. Ward
- d. Other hospital

Type of surgery

- a. Emergency
- b. Elective

Type of procedure

- a. Gastrointestinal
- b. Thoracic
- c. Neurologic
- d. Obstetrics and gynecology
- e. Urology
- f. other

Admission primary diagnosis

- a. Respiratory disorders

- b. Cardiovascular disorders
- c. Neurological disorders
- d. Gastrointestinal disorder
- e. Renal disorders
- f. Infectious disease
- g. Malignancies
- h. Post op monitoring
- i. Other

Respiratory status A. Normal B. In distress (tachypnea, increased work of breathing, desaturation)

Need of mechanical ventilation A. yes B. No

Inotrope use A. yes B. no

Comorbidities

- a. Diabetes
- b. Chronic heart failure
- c. Hypertension
- d. Malignancies
- e. Cirrhosis
- f. Chronic renal failure

3. Patient condition during discharge

Time of discharge

- a. Day time
- b. Evening
- c. Weekdays
- d. weekend

Vital signs

BP PR RR SPO2

Does the patient require o2 support

- a. yes
- b. no

Is the patient on tracheostomy tube

- a. yes
- b. no

if yes, do he/she requires suctioning

- a. yes
- b. no

Does the patient have adequate urine output

- a. yes
- b. no

Glasgow Coma Scale of the patient

- a. 15
- b. 13-14
- c. 9-13
- d. <9

4. Is this patient readmitted

Yes

no

If the patient is readmitted to ICU

5. Reason for readmission

- a. Respiratory disorders

- b. Cardiovascular disorders
- c. Neurological disorders
- d. Gastrointestinal disorder
- e. Renal disorders
- f. Infectious disease

6. Patient condition on readmission

Vital signs

BP PR RR PSO2

Glasgow coma scale

- A. 15
- B. 13 -14
- C. 9-13
- D. <9
- E. sedated

7. Does the patient require airway protection and/MV-support on readmission?

A .yes

B. No

8. Does the patient require vasopressor

A. Yes

B. No

9. Length of stay

10. Outcome of the patient

- a. Recovered
- b. Died

ASSURANCE OF THE PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical conduct of the research project and for provision of required progress reports as per terms and conditions of the research publications office in effect at the time of grant is forwarded as the result of this application.

Name of the student: Dr. Osman Aman (Anesthesiology, Critical care and Pain medicine specialty candidate)

Signature..... Date.....

APPROVAL FORMS OF ADVISORS

Name of the primary Advisor: Dr Yonathan Abebe (MD, Assistant professor of Anesthesiology and Critical care)

Signature..... Date.....

Name of secondary advisor: Dr Amria Shamil (MD, Assistant professor of Anesthesiology and critical care)

Signature..... Date.....

ADDIS ABABA UNIVERSITY

THESIS SUBMISSION FORM

Title of the study	Readmission of patients to surgical intensive care unit; Incidence, associated factor and outcome at TASH
Methodology	A prospective cross sectional study
Study area	Tikur Ambessa Specialized Hospital
Total cost of the study	37,741 Ethiopian Birr
Duration of Study	September 2023- February 2024
Source of funding	Addis Ababa University
Address of Investigator	Phone – 0921484378 Email – anesthman12@gmail.com
Name of Advisors	Dr Yonathan Abebe(MD, Assistant Prof of Anesthesiology and critical care Phone- 0921011371 Dr Amria Shamil(MD,Assistant Prof of Anesthesiology and critical care Phone - 0913414805