DETERMINANTS OF OUTCOMES FOR MEDICAL CASES ADMITTED AT MUHIMBILI NATIONAL HOSPITAL INTENSIVE CARE UNIT

BY

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CERTIFICATION

The undersigned certify that they have read and here by recommend for acceptance by the University of Dar es Salaam a dissertation entitled, "*Determinants of outcomes for Medical cases admitted at Muhimbili National Hospital Intensive Care Unit,*" in partial fulfillment of the requirements for the award of the degree of master of medicine in Anaesthesiology

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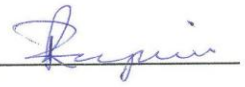
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LIST OF ABBREVIATIONS

ICU	-	Intensive care Unit
MNH	-	Muhimbili National Hospital
APACHE	-	Acute Physiology and Chronic Health Evaluation
MUCHS	-	Muhimbili University college of Health Sciences

ABSTRACT

A six months descriptive prospective study was done to determine the factors, Which influence the outcomes of medical cases admitted in Muhimbili National Hospital ICU, from 1st March 2002 to 31st August 2002. In the study the following data were collected. Patient's age, sex, diagnosis, length of ICU stay, number of physicians visits and the patient outcome. 43 medical cases were admitted during this period 26 patients (60.5%) were males and 17 (39.5%) were females. The overall mortality was 58.1%. Medical admissions during this period by descending order was, tetanus (44.2%), stroke (14.0%), dilated cardiomyopathy (9.3%), chronic renal failure (7.0%), status epilepticus, status asthmaticus, pneumonia each (4.7%). The rest were constrictive pericarditis, diabetic mellitus, AIDS, meningitis and cerebral malaria each accounted for 2.3% of cases. Tetanus, stroke and chronic renal failure patients were found to be associated with poor ICU outcomes. Age, sex, length of ICU stay and numbe of physicians visit were not seen to be associated with the patients outcome.

TABLE OF CONTENTS

	Page
Introduction	1
Problem statement	9
Objective of the study	10
Literature review	11
Methodology	22
Results	25
Discussion	32
Conclusion	39
Recommendations	40
References	41
Appendix 1(Questionnaire)	52

INTRODUCTION

An Intensive Therapy Unit was opened in Copenhagen in 1953 by Bjorn Ibsen, the first to be run by anaesthetist [1].

Intensive therapy consist of care of patients who are deemed to be recoverable, but who need continuous supervision and who need, or are likely to need specialized techniques by experienced skilled personnel [2]. Intensive therapy unit provide for the management of the critically ill patients who require facilities greater than those available in the traditional wards. They provide additional space, staff and equipments. The vital function of the body can be continuously observed and when necessary supported promptly and efficiently. Admission criteria should be worked out, certain broad groups may be defined [2,3].

(1) Patient requiring the use of an artificial machine to support a vital system until the primary disease of the system is cured (e.g. ventilator, renal dialysis).

(2) Patients requiring continuous monitoring

(3) Those who require heavy or specialized nursing (e.g. comatose patients)

(4) Certain patients with severe metabolic or electrolyte disorders.

(5) A place of safety for patients at risk of lethal complications.

All Intensive Care Units should have a clearly defined policies for admission, management, discharge and referral of patients. Policies generally indicate the

acceptance of patient suffering severe but reversible illness if there is a reasonable expectation of survival. The availability of beds and assessment of relative needs for other ICU patients are also taken into account in decision making about admission and discharge. Patients who require specialized technical intervention are given priority over patient requiring nursing care and with poor prognosis. There is the importance of experienced and qualified medical staff, making decision about the need for ICU care [4].

These critically ill patients require multidisciplinary care with [4]:

1. Intensive skilled nursing care (patient/nurse ratio 1:1)
2. Regular physiotherapy.
3. Careful management of pain and distress with analgesics and sedation as necessary.
4. Constant reassurance and support.
5. Nutritional support. Parenteral nutrition should always be used if possible.
6. Care of mouth, prevention of constipation and of pressure sore.

For many critically ill patients, intensive care is undoubtedly life-saving and resumption of a normal life style is to be expected [3].

Inappropriate use of intensive care facilities has other implications. The patient may experience unnecessary suffering and loss of dignity, while relatives may

also have to endure considerable emotional pressures. In some cases treatment may simply prolong the process of dying, or sustain life of dubious quality and in others the risk of interventions may out weigh the potential benefits [3].

Both for a human approach to the management of critically ill patient and to ensure that limited resources are used appropriately, it is therefore important to avoid admitting patients who cannot benefit from intensive care and to limit further aggressive therapy when the prognosis is clearly hopeless [3].

Little information is available on the efficiency of ICUs. Although individual units may maintain records of admissions, brief details of therapeutic maneuvers and patient outcome, these figures are seldom published . In addition, because of differences in admission policies and treatment regimens, and the wide variation in the type of illness precipitating admission to a general ICU, results from a small number of units cannot be extrapolated to provide figures respresenting the country as a whole [72].

Scoring systems have been used for some years for patient with certain type of illness e.g. Glasgow coma score for patients with severe head injury, injury severity score and trauma score for patients with severe trauma. These have proved useful in defining treatment and outcome [72].

A number of scoring systems have been designed in order to attempt to quantify the illness of critically ill patients. These have been based upon different criteria. One of the earliest systems, the therapeutic intervention scoring system (TISS) scored patients on the basis of their therapeutic requirement. The mortality prediction model (MPM) the acute physiology and chronic health evaluation system (APACHE), the simplified acute physiology score (SAPS) and the scoring of organ system failure, all attempt to quantify physiological disturbance [72].

The APACHE scoring system was published in 1981 [72]. This system was based on allocation of a score for abnormalities of 34 physiological variables. Ranges of values above and below the normal range were defined for each variable, and the ranges were assigned weight on an integer scale of 0 to 4 the higher the value, the greater the deviation from normal. The acute physiology score was calculated by summing the weights for the most abnormal value of each variable in the first 24 hours of the intensive care admission. In 1985, a revised system was published (APACHE II Score)[6].The new system scored 12 variable rather than 34, facilitating data gathering, and gave increased weight to the Glasgow coma score (GCS) and to acute renal failure. Points for age and chronic Health status were incorporated directly into the score. Variable's used in APACHE II score are:-

are rectal temperature, mean arterial pressure, heart rate, respiratory rate, arterial partial pressure of oxygen ($Pa0_2$), arterial PH, serum Na^+, k^+, blood creatinine, haematocrit, while cell count, and the Glasgow come score [2,6].

APACHE II[6]

THE APACHE II SEVERITY OF DISEASE CLASSIFICATION SYSTEM

Physiologic Variable	**HIGH ABNORMAL RANGE**				**LOW ABNORMAL RANGE**				
	4	3	2	1	0	1	2	3	4
Temperature Rectal(^{0}C)	≥ 41^{0}C	39-40.9		38.5^0-38.9^0	36-38.4^0	34-35.9^0	32-33.9^0	30-31.9^0	≤ 29.9^0
Mean arterial Pressure(mmHg)	≥ 160	130-159	110-129		70-109		50-69		≤ 49
Heart Rate (Ventricular response)	≥ 180	140-179	110-139		70-109		55-69	40-54	≤ 39
Respiratory rate (non-ventilated or ventilated)	≥ 50	35-49		25-34	12-24	10-11	6-9		≤ 5
Oxygenation P_a0_2 kpa					>9.3	8.1-9.3		7.3-8.0	<7.3
Arterial pH	≥ 7.7	7.6-7.69		7.5-7.59	7.3-7.49		7.25-7.32	7.15-7.24	< 7.15
Serum sodium(mmol/L)	≥ 180	160-179	155-159	150-154	130-149		120-129	111-119	≤110
Serum Potassium(mmol/l)	≥ 7	6-6.9		5.5-5.9	3.5-5.4	3-3.4	2.5-2.9		<2.5
Serum creatinine(micro.mol/L)	≥ 307	166-306	130-165		53-129		≤ 52		
Heamatocrit (%)	≥ 60		50-59.9	46-49.9	30-45.9		20-29.9		< 20
White Blood count (1 x 10^9/L)	≥ 40		20-39.9	15-19.9	3 – 14.9		1-2.9		< 1
Glasgow Coma Score (GCS) Score= 15 minus Actual GCS									

Age	Points
Age (years)	
<44	0
45 – 54	2
55 – 64	3
65 – 74	5
> 75	6

Chronic Health Points

If the patient has a history of severe organ system insufficiency or is immuno-compromised assign points as follows:

a. for non-operative or emergency post-operative patients: 5 points.

b. for elective postoperative patients: 2 points.

Definitions

Organ insufficiency or immuno-compromised state have been evident prior to this hospital admission and conform the following criteria:

LIVER: Biopsy proven cirrhosis and documented portal hypertension, episodes of past upper gastrointestinal bleeding attributed to portal hypertension; or prior episodes of hepatic failure/encephalopathy/coma.

Cardiovascular: New York Heart Association class IV (i.e. symptomatic at rest).

Respiratory: Chronic restrictive, obstructive or vascular disease resulting in severe exercise restriction i.e. unable to climb stairs or perform house hold duties, or documented chronic hypoxia, hypercapnia, severe pulmonary hypertension (>40mmHg), or respiratory dependency.

Renal: Receiving chronic dialysis.

Immunocompromised: The patient has received therapy that suppresses resistance to infection, e.g. immunosuppression, chemotherapy, radiation, long term or recent high dose steroids, or has a disease that is sufficiently advanced to suppress resistance to infection, e.g. Leukaemia, lymphoma, AIDS.

Total APACHE II score is the sum of Acute Physiology score, Age and chronic Health points.

A total score of 10 relates to a mortality of about 10%.

A total score of 20 relates to a mortality of about 20%.

A total score of 30 relates to a mortality of about 40%.

A total score of 35 relates to a mortality of about 75%.

A total score of 40 relates to a mortality of about 90%.

A further revision of the APACHE system is in (APACHE III)[72]. This system, which will become available as a commercial product, is intended to improve on the predictive power of the APACHE II system. It has been suggested that it will be sufficiently accurate to allow decisions regarding institution or termination of

treatment to be made in individual patients on the basis of the APACHE III score [72].

Anaesthetist has a major role to play in the management of the patient in the unit because of his/her special knowledge of ventilator and resuscitation problems, wide knowledge of medical and surgical conditions, commitment to continuous communications with colleagues, nurses, patients and relatives. Therefore the functions of anaesthesiologist in the ICU are management of the unit, resuscitation and respiratory care [7].

A unit of 6 – 8 beds is an economic size. Wall mounted monitoring boxes are useful. The plan should be as flexible as possible to allow for future changes. About 18 to 28m^2 floor space should be allowed for each bed. Piped oxygen, suction, adequate light, a wash-basin, fresh air inlet pipe, exhaust pipe, sealable waste – disposal facilities and 8-electric sockets per bed should be provided. The danger of cross infection is a particular hazard. Division into cubicles and the wearing of gowns and masks by the staff help to reduce this. Adequate storage space for equipment must be provided, and a small laboratory is advantageous. A high staff/patient ratio is important [2].

Selection of patients should be based upon the apparent reversibility of disease processes and likely hood of producing worthwhile relief of suffering. The

hospital costs for treating critically ill patients are approximately three times those for treating the average patients [63].

Problem – statement

Medical patients suffer a high mortality after critical illness, however the causes of mortality after intensive care management are unclear.

So there was a need to carry out a study in our institution to explore what factors affects outcome and to identify medical patients at particularly high risk of mortality.

From the results to recommend the means of improving the patients outcomes and hence reducing the mortality in our ICU.

Objectives of the Study

Broad – Objective

To evaluate the determinants of outcomes for Medical cases admitted in Muhimbili National Hospital Intensive Care Unit.

Specific Objectives

1. To determine the common medical cases admission at MNH – ICU.
2. To determine the influence of age on the patients outcome.
3. To determine the influence of sex on patients outcome.
4. To determine the influence of physicians visit on patients outcome.
5. To determine the influence of type of Diagnosis on the patients outcome.
6. To determine the influence of ICU length of stay on patients outcome.

LITERATURE – REVIEW

The working practices and outcomes from UK Intensive Care Units are poorly documented to date. In 1993 they reviewed 2000 consecutive admissions to one intensive care unit in a tertially referral center with eight beds. A high overall mortality in the intensive care unit (23%) proportional to APACHE II scoring on admission was demonstrated [59]. This reflects the referral of many patients who have, or who develop multiple organ failure.

A prospective survey studying 162 consecutive patients admitted to Medical ICU was conducted over a four months period, September to December 1990 in the Singapore General Hospital. Male admission (n=98) outnumbered female (n=64) by a ratio of 3:2. Sepsis comprised 25.3% of admission during this period of which chest infection made up 63% [60].

A study on mortality rate and patterns in a 6 bedded ICU in a busy general hospital was done in 1992 in Singapore. They found a high mortality rate (26%) in ICU. Mortality rate was strongly associated with cardiac arrest, respiratory support, immunocompromised state, lack of formal patient selection and entry criteria and critical care specialists may be contributing factors [61].

In the year 1998 the catalogues of Medical admissions to ICU at Canberra Hospital were, chest infections, stroke, renal failure requiring dialysis, over doses and multiple organ failure. The Canberra Hospital ICU provide central venous line insertion plus tracheostomy tube change services [7].

Outcome data from Hadassah University Hospital Medical Intensive Care Unit in the year 2000, the average annual ICU mortality was 17%, the patient admission disease profile were, respiratory 46%, Cardiac 22%, renal 17%, infections 13%, gastrointestinal 4%, poisoning 2% [8].

A study on patterns of medical admission into the Intensive Care Unit of the Lagos University Teaching Hospital over a 8 years period from Sept. 1990 to August 1998, revealed that, Medical admissions constituted 15% of ICU admissions. Patients with neurological diseases recorded the highest number of admission most of them being tetanus. The commonest indication for admission was respiratory insufficiency 33%. All patients admitted for stroke, hepatitis, meningitis and motor neurone diseases died. The least Mortality was found amongst patients admitted for tetanus, who constituted about 44% of the total number of medical admissions. The overall mortality was 69% and it was

observed that age of the patients didn't appear to affect the outcomes except in patients who were admitted for myocardial infarction and cardiogenic shock [9].

A six months survey from July 1978 to December 1978 was done at Tan-Tock Surg Hospital Medical Intensive Care Unit, which is a 10 bed unit. 611 patients were admitted during this period. 451 (73.4%) had cardiovascular problem and 160 (26.6%) had other acute medical problems. Of the patients with cardiovascular problems, 232 had acute myocardial infarction. The duration of stay in the unit was less than 3 days in 80% of the patients. The mortality rate was 15.7% [10].

The differences in out come of ICU care by diagnosis have been demonstrated in all studies that have looked at the issue.

Despite the experience of the 1970's which demonstrated that stroke intensive care units did not reduce morbidity and mortality[14,15], most patient in the USA who suffer a severe cerebrovascular accident are admitted to an ICU. Admission to and aggressive management in an ICU may only serve to prolong the dying process of a patient who has suffered a catastrophic neurological event [66]. Although the majority of patients with acute stroke do not require intensive care, it is important to recognize when admission to an intensive care unit is

warranted. Patients undergoing thrombolytic therapy, those with brainstem infarcts, and those with fluctuating neurological examinations should be admitted to the ICU for monitoring and treatment [62]. The management of patients following a cerebrovascular accident largely involves good nursing care and a well multidisciplinary rehabilitation program [67]. Acute Medical interventions have not been established to improve outcome. The emergent reduction of blood pressure in a hypertensive patient may be hazardous and increase the size of the stroke [68].

A study on stroke patients in Australian teaching hospital ICU was done between January 1994 and December 1999. The objective was to determine the mortality rate and the functional outcome of stroke patients admitted to the ICU. Stroke was found to be associated with high mortality rate and a high likelihood of dependant life style after hospital discharge [12].

A study to examine the impact of treatment in an intensive care unit on the outcome of patients who have suffered a stroke was done in department of critical care Medicine, St. Vincent Hospital and University of Massachusetts. The conclusion was, for the vast majority of patients suffering a stroke, admission to

an ICU doesn't affect outcome [13]. Other studies also have shown that stroke patients in ICU are associated with poor outcomes [14, 15, 16].

A 5 years study of 1308 patients was done on outcomes from intensive care from 1979 to 1983 at Herlev Hospital Denmark. Male to female ratio was 1:1, respiratory diseases (43%) and cardiovascular diseases (16%) were the most primary indication for ICU admission. Increasing age was associated with more frequent cardiovascular diseases [22].

Other studies have shown that chronic diseases and the number of failing organs, particularly failure of cardiovascular, pulmonary, renal and neurological systems are major determinants of ICU mortality [24,25,26].

Ideally, tetanus is treated is treated in an intensive care unit. Managing patients with tetanus in the ICU has significantly reduced the rate of mortality from this disease [19]. The most important early aspects of treatment, after airway protection is passive immunotherapy with human tetanus immunoglobulin to eliminate as much of the toxin burden as possible. The source of toxin should be eradicated by debridement. Although the disease is caused by the toxin and not active infection, the use of antibiotics may be of help, penicillin are the most

frequently used antibiotics although metronidazole may be useful [69]. A ten year retrospective study on tetanus was done at Sarawak General Hospital in Malaysia, in a period from Jan. 1990 to Sept. 1999. 22 cases of tetanus were attended. 15 (68.2%) patients were males and 7 (31.8%) patients were females. 21 (95.5%) patients were admitted to ICU, with an average length of stay of 21 days, 19 (86.4%) patients required mechanical ventilation for a varying period of time in the ICU. All patients (100%) had tracheostomy performed and intravenous diazepam as part of their management. There were four deaths, accounting for mortality of 18.2%. The conclusion was, in general tetanus remains in Sarawak an important disease with substantial mortality and morbidity despite being managed in well equipped ICU [17].

Other studies also have shown that tetanus patients in ICU are associated with poor outcomes [18, 20,64].

Chronic Renal failure patients requiring ICU admission, are in the end stage renal disease requiring dialysis but their outcome is poor. Despite advances in intensive care unit (ICU) and dialysis technology over the past four decades, death rates due to renal failure remain distressingly high [21].

Heart failure is a serious condition, and is a common reason for hospitalization. Patients presenting with an acute deterioration of cardiac function are often admitted to the ICU [70]. These patients are likely to benefit from treatment in an ICU. However, patients with "end-stage" cardiac failure whose condition has progressed slowly despite maximal medical therapy are poor candidates for admission to the ICU, unless they are candidates for cardiac transplantation or have suffered from an acute complication [71].

A number of investigators have looked at the association of age and mortality in ICU's. Most have found a direct relationship between increasing age especially above 65 years and high ICU mortality, longer ICU length of stay and high post ICU mortality rates [27,28,29]. Also elderly patients are more likely to receive a major life supports interventions such as mechanical ventilation but less likely to survive [30].

A study to examine utilization and outcome of ICU use for the elderly in the United States concluded that, the likelihood of ICU use among elderly decreased with age, especially among those 85 years or older. The great majority of the elderly, including those 85 years and older and those receiving the most expensive ICU care, survived at least 90 days [31].

Other studies, however, have found either a small or no association between age and ICU mortality. Prognosis is determined by the admission severity score and the number of concomitant chronic diseases [32,33,34,35,36].

Severity of illness is another factor which mainly influence the outcome of the patients in the ICU. Researchers have been using the scoring systems, like APACHE II (Acute physiology and chronic Health evaluation) score to evaluate this) [2,6]. APACHE II score is widely used, it is based on general health, age and the worst value of 12 physiological measurements during the first 24 hours after admission [6]. Studies have demonstrated that, the higher the APACHE II score of the patient the higher mortality while those patients with low score are associated with good ICU outcomes [37,38,39,40,41].

A study to determine the influence of gender on patient outcomes and the delivery of medical care during mechanical ventilation for acute respiratory failure, was done at Medical intensive care unit of a university – affiliated urban teaching hospital, Barnes – Jewish Hospital. There were 321 patients with acute respiratory failure requiring mechanical ventilation. The results were not

statistically significant in mortality rates as observed between male and female patients. The duration for mechanical ventilation, intensive care unit length of stay, and hospital length of stay were also similar between men and women with acute respiratory failure [42].

Other studies to show whether sex influences outcomes of patients from intensive care units haven't shown any difference between males and females [43,44]. Other studies are required to see if sex influences outcomes of patients from ICU.

Management of the patients in the ICU influences the outcome. This depends on the number and quality of ICU – staff, and daily physician care of the patients during the ICU-stay. High mortality may be explained by excess ICU workload [43]. High intensity ICU physician staffing is associated with reduced ICU mortality and reduced ICU length of stay [44].

In 1995 a group of university trained Medical intensivist were recruited at Lehigh Valley Hospital to develop an organized multidisplinary Intensivist led Medical ICU programme. The goal was delivering high quality clinical care and improving ICU efficiency. It involved daily rounds with medical residents, bedside nurses, a pharmacist, respiratory therapist, nutritionist and discharge

planner. The overall ICU mortality decreased. Also total hospital length of stay decreased [45,46]. Daily round by an ICU – physician were associated with a 3 fold reduction in hospital mortality, not having daily rounds by an ICU physician was associated with increased risk of cardiac arrest, acute renal failure, septicaemia [47,48]. A decreased nurse to patient ratio was associated with increased ICU length of stay. Attempts to control costs by decreasing nursing staff actually may increase the patients related costs [49].

Studies have shown that, the "closed" model ICU, in which the ICU team assumes responsibility for all patients is associated with good outcomes compared to the " open" model ICU, in which the attending physician write all orders and retain responsibility while a team of critical care physicians is available for consultations [50,51,52,65].

ICU units accounts for a large portion of hospital costs. A review of recent literature and a study of one ICU suggest that these costs could be reduced by more careful patient assignments to units suited to meet their needs [53]. Because of the high cost of Intensive care, reduction in ICU stay may become a target for future cost-cutting effort [54].

Observational cohort study in 23 Scottish ICU over a 3 years period was done, objective was to assess the numbers, characteristics and outcome for patients requiring long term intensive care. They found that these patients had a relatively high hospital survival, so resources should not be withheld from them on the basis of prolonged ICU stay alone, even in countries with limited ICU provision [55].

A retrospective analysis of prospectively collected data to analyze the impact of long term patients on ICU bed utilization was done in two university hospital Medical ICU in Jerusalem. Their conclusion was, long term patients can have a major impact on ICU bed utilization, the availability or beds for short stay patients is reduced [56].

Patients with prolonged ICU – stay form a small proportion of ICU patients, yet they consume a significant share of ICU resources [57].

Identification of patients with prolonged ICU length of stay who would ultimately die in the ICU may lead to earlier withdrawal of therapy in these patients, resulting in a substantial reduction in suffering and cost savings [58].

METHODOLOGY

Study – type

Descriptive prospective study

Study area.

This 6 months survey was done at Muhimbili National Hospital ICU. It is a 7 bedded ICU. The nurse to patient ratio per-shift is almost 1:2. There are four anaesthesiologists, two residents and nurse-anaesthetist and clinical officers anaesthetists. Daily, there is one anaesthetist on call in ICU and one anaesthesiologist. Muhimbili National Hospital ICU is capable of doing the non-invansive monitoring for the patients. There are monitors for electrocardiogram, Blood pressure, pulse – rate, respiratory rate and Blood oxygen saturation. The unit has 2-ventilators, piped oxygen and suctions. The unit doesn't have an adjacent laboratory for the rapid determination of blood gases and simple biochemical data .

The following things are done to every patients on arrival in ICU.

- Airway is made clear by nasopharyngeal or oropharyngeal suction if he/she has secretions.
- Intubation is done to those with poor respiratory function
- A good intravenous line is established
- A nasogastric tube inserted

- Urethral catheter for monitoring urinary output.

Nursing Care:

The following procedures are strictly adhered to, in all patients.

- Strict 1 hourly monitoring of vital signs i.e. pulse, blood pressure, respiration, temperature and blood oxygen saturation.
- 2 hourly change of position
- Strict input and output chart
- Suctioning when necessary depending upon patient's rate of formation of secretions
- 3 hourly, nasogastric tube feeding
- Regular physiotherapy

Sampling.

All medical cases admitted in Muhimbili National Hospital ICU within a 6 months period were included. From 1st March 2002 to 31st Aug. 2002.

Data Collection technique

On admission in the ICU patient's age, sex, type of diagnosis, length of ICU stay and the patient's outcome (either discharged from ICU or death) were noted. The number of physicians visits and care during the patients ICU-stay was noted. Admissions were stratified by ICU length of stay into four groups 1 to 5 days, 6 to 10 days, 11 to 15 days and > 15 days. Number of Number of

Physicians visits were also stratified into four groups 1 to 3 times, 4 to 6 times, 7 to 9 times and > 10 times.

Data analysis

Data analysis was done with the help of the epi-info-6 statistical package.

Ethical consideration

Participation in the study was completely voluntary. Real names were not used during data collection or during the presentation of the results and instead code numbers were utilized to ensure confidentiality. The proposal was submitted for ethical clearance to the MUCHS ethical committee.

Study – Limitation

Other variables influencing patients outcome were not evaluated. Examples of such variables include, the effect of nosocomial infections, severity of illness on ICU admission by e.g. APACHE-II score. This is because we couldn't obtain some of the variables needed in the scoring system.

Also patients who died within 24 hours of ICU admission were excluded from the study.

RESULTS

Table 1

Medical cases admitted at the ICU during the study period

	Males No (%)	Females No (%)	Total No (%)
All patients	26 (60.5%)	17 (39.5%)	43 (100%)

Males (60.5%) out numbered female patients (39.5%).

Table 2.

Shows the diagnosis of patients at admission to ICU

Diagnosis at admission

Patient's Diagnosis	Males	Females	Total	Percent
Dilated Cardiomyopathy	2	2	4	9.3%
Tetanus	16	3	19	44.2%
Status epilepticus	0	2	2	4.7%
Constrictive Pericarditis	1	0	1	2.3%
Stroke	3	3	6	14.0%
Pneumonia	1	1	2	4.7%
Diabetic Mellitus	1	0	1	2.3%
AIDS	0	1	1	2.3%
Meningitis	0	1	1	2.3%
Chronic Renal Failure	2	1	3	7.0%
Status Asthmaticus	0	2	2	4.7%
Cerebral Malaria	0	1	1	2.3%
TOTAL	26	17	43	100%

T-statistic=9.195, df =42, p-value = 0.0000

Medical admissions, to the ICU at Muhimbili National Hospital, during this study period by descending order was, Tetanus (44.2%), stroke (14.0%), dilated cardiomyopathy (9.3%), chronic renal failure (7.0%), status epilepticus, status asthmaticus, pneumonia each (4.7%). The rest were constrictive pericarditis, Diabetic Mellitus, AIDS, meningitis and cerebral malaria each accounted for 2.3% of cases.

The association of age of the patients, and the patients outcomes during the study period are shown in table 3.

Table 3

Age and the Patients Outcome

Age groups (yrs)	Discharged	%	Died	%	Total
1 – 10 yrs	4	66.7	2	33.3	6
11 – 20 yrs	1	33.3	2	66.7	3
21 – 30 yrs	6	50	6	50	12
31 – 40 yrs	1	50	1	50	2
41 – 50 yrs	3	33.3	6	66.7	9
51-60 yrs	2	22.2	7	77.8	9
61 – 70 yrs	1	50	1	50	2
TOTAL	18	41.9	25	58.1	43

$X2=3.74$, df=6, $p=0.712$

No statistically significant association was found between age and the patients outcome ($p=0.712$).

The association of sex of the patients and the patients outcomes during the study period are shown in Table 4.

Table 4. Sex and the patients outcome

Sex	**Discharged**	**%**	**Died**	**%**	**Total**
Male	8	30.8	18	69.2	26
Female	10	58.8	7	41.2	17
TOTAL	18	41.9	25	58.1	43

$X^2=3.32$ P-values=0.06

No statistically significant association was found between sex and the patients outcome (p=0.06).

The high mortality seen in male patients can be explained by high number of male patients admission than female patients.

The association of type of Diagnosis and the patients outcome during the study period are shown in table 5.

Table 5. Type of Diagnosis and Patients Outcome

Type of Diagnosis	**Discharge**	**%**	**Died**	**%**	**Total**
Dilated Cardiomyopathy	2	50	2	50	4
Tetanus	8	42.1	11	51.9	19
Status epitepticus	2	100	0	0	2
Constrictive Pericarditis	1	100	0	0	1
Stroke	1	16.7	5	83.3	6
Pneumonia	2	100	0	0	2
Diabetic Mellitus	0	0	1	100	1
AIDS	0	0	1	100	1
Menginitis	0	0	1	100	1
Chronic Renal Failure	0	0	3	100	3
Status Asthmaticus	2	100	0	0	2
Cerebral Malaria	1	100	0	0	1
TOTAL	18	41.9	25	58.1	43

X2=15.74, df=11, p.value=0.15

No statistically significant association was found between type of diagnosis and the patients outcome (p=0.15). Because the total number of admissions varied among individual diagnosis.

The association of physicians visit of the patients in ICU and the patients outcome during the study period are shown in table 6.

Table 6. Physician visit and Patients outcome

Number of Visit	**No. Patient Discharge**	**%**	**No. Patient Died**	**%**	**Total**
Not seen at all	1	50	1	50	2
1 to 3 times	6	33.3	12	66.7	18
4 to 6 times	7	58.3	5	41.7	12
7 t0 9 times	2	25	6	75	8
> 10 time	2	66.7	1	33.3	3
Total	18	41.9	25	58.1	43

X2=3.62, df=4, p-value=0.459

No statistically significant association was found between the number of physicians visit and the patients outcome (p=0.459).

The association of ICU length of stay and the patients outcomes during the study period are shown in table 7.

Table 7. ICU length of stay and the patients outcome.

ICU length of Stay	Discharge	%	Died	%	Total
1 to 5 days	7	38.9	11	61.1	18
6 to 10 days	5	38.5	8	61.5	13
11 to 15 days	1	25	3	75	4
> 15 days	5	62.5	3	37.5	8
TOTAL	18	41.9	25	58.1	43

X2=1.99, df=3, p-value=0.57

No statistically significant association was found between the length of ICU stay and the patients outcome (p=0.57).

DISCUSSION

In this 6 months study, there were 43 medical cases admitted to the ICU at Muhimbili National Hospital. They covered 23% of all ICU admissions during the 6 months period of the study. 26 patients (60.5%) were males and 17 patients (39.5%) were females (Table. 1). 25 patients (58.1%) died and 18 patients (41.8%) were discharged.

In a four months period study done at Singapore General Hospital Medical ICU in 1990[60], male admissions outnumbered female admissions by a ratio of 3:2. Findings similar to the findings of this study.

A 5 year study from 1979 to 1983 on outcome from Medical intensive care at Herlev Hospital Denmark, they found male to female ratio of 1:1 [22].

A three years review (July 1987 to June 1990) of the activity of a 10 bedded ICU in an Irish district general hospital, they found male admissions (57%) outnumbered female admissions (43%). The mortality rate was 11% [67]. The mortality rate at Tan Tock Seng Hospital Medical Intensive Care Unit in a six months period (July 1978 to Dec. 1978) was 15.7% [23].

The mortality rate from Hadassah University Hospital Medical Intensive care unit in the year 2000 was 17% [8]. So the mortality rate observed in this study (58.1%) is higher compared to the mortality rates reported from other studies.

In this study period medical admission by descending order was Tetanus (44.2%), stroke (14.0%), dilated cardiomyopathy (9.3%), chronic renal failure (7.0%), status epilepticus, status asthamaticus, pneumonia each (4.7%). The rest constrictive pericarditis, Diabetic Mellitus, AIDS, Meningitis and cerebral malaria each accounted for 2.3% of cases (Table 2). This admission patterns do not differ with ICU Medical admissions patterns reported elsewhere. At Lagos University Teaching Hospital over a 8 years period from September 1990 to August 1998, revealed that Medical admissions constituted 15% of ICU admissions. The leading admission was tetanus, constituted about 44% of the total number of Medical admissions [9].

In the year 1998 the catalogue of medical admissions to ICU at Canberra Hospital were chest infections, stroke, renal failure, overdoses and multiple organ failure [7].

Outcome data from Hadassah University Hospital Medical Intensive Care Unit in the year 2000, the admission disease profile were respiratory 46%, cardiac 22%, renal 17%, infectious 13%, gastrointestinal 4%, poisoning 2% [8]. So, the results in this study are similar with other studies [7,9,8,10].

No significant association was found between age of the patients and the patients outcome in this study (p=0.712) Table 3. Number of admissions and mortality were different with each age group. However the least mortality was found in young age group (1 to 10 years) 33.3% and the highest mortality in old age group (51 years to 60 years) 77.8%. Most studies have found a direct relationship between increasing age and high ICU Mortality [27,28,29]. Other studies, however, have found either a small or no association between age and ICU – Mortality. Prognosis is determined by the admission severity score and the number of concomitant chronic diseases [32,33,34,35,36].

A study in patterns of Medical admissions into the ICU in Lagos, they found that age of the patient didn't appear to affect the outcomes of the patients as reported in our study [9].

In this study no statistically significant association was found between sex and the patients outcome (p=0.06) Table 4. The high Mortality seen in male patients can be explained by high number of male patients admission than female

patients. The lack of association of sex and patients outcome have also been reported in other studies [43,44].

A study to determine the influence of gender on patients outcome during Mechanical ventilation for acute respiratory failure at Barnes Jewish Hospital Medical ICU, results were not statistically significant in mortality rates as observed between male and female patients [43]. So, the results in this study are similar with other studies.

There was no direct association between the type of diagnosis and the patients outcome in this study (p=0.15) Table 5. Number of admissions varied among individual diagnosis, with tetanus leading (44.2%). From table 5, we can see of 19 patients admitted because of tetanus 11 patients died, 6 patients for stroke 5 patients died and 3 patients with chronic renal failure all died. Hence tetanus, stroke and chronic renal failure are associated with poor ICU outcomes.

A ten year retrospective study on tetanus done at Sarawak General Hospital in Malaysia, in a period from Jan. 1990 to Sept. 1999, concluded that, tetanus remains in Sarawak an important disease with substantial Mortality and Morbidity despite being managed in well equipped ICU [17]. Other studies also

have shown that tetanus patients in ICU are associated with poor outcomes [18,19,20,64]. So, the results in this study are similar with other studies.

During the study period, tetanus was followed by stroke in ICU admission (Table2) which accounted for 14.0% of all medical admissions (6 stroke patients). Out of those 6 stroke patients 5 patients died, which is a poor outcome. Stroke is the third most common cause of death in the United States after heart disease and cancer. However, unlike acute myocardial infarction, no therapeutic intervention has been demonstrated to be of any value in restoring the damaged cerebral tissue or its function after a stroke has fully evolved [13].
A study on stroke patients in Australian teaching hospital ICU done between Jan. 1994 and Dec. 1999, found stroke to be associated with high Mortality rate and a high likelihood of dependent life style after hospital discharge [12]. Other studies also have shown that stroke patients in ICU are associated with poor outcomes [14,15,16,66]. So, the results in this study are similar with other studies.

In this study period chronic renal failure patients accounted for 7.0% of all medical admissions (Table 2), 3 chronic renal failure patients.

All 3 patients died (table 5), which is a worse outcome. The results of this study do not differ with the results elsewhere. Studies have shown that chronic renal failure patients requiring ICU admission, are in the end-stage renal disease requiring dialysis but their outcome is bad. Despite advances in intensive care unit and dialysis technology over the past four decades, death rate due to renal failure remain distressingly high [21].

No statistically significant association was found between the number of physicians visit and the patients outcome (p=0.459) table 6. What matters is the management of the patients in the ICU. Intensivist at Lehigh Valley Hospital in 1995 found that, having daily rounds with medical residents, bedside nurses, a pharmacist, respiratory therapist, nutritionist and discharge planner, decreased the overall ICU mortality [45,46]. Studies have shown that the closed model ICU, in which the ICU team assumes responsibility for all patients is associated with good outcomes compared to the open model ICU [50,51,52,65]. High intensity ICU physician staffing is associated with reduced ICU mortality and reduced ICU length of stay [44].

No statistically significant association was found between the length of ICU stay and the patients outcome in this study (p=0.57) Table 7. However from table 7, the least mortality is in those patients who stayed longer (> 15 days) in ICU, (37.5%)

A 3 years period cohort study in 23 Scottish ICU revealed that, patients requiring long term intensive care had a relatively high hospital survival, as observed in this study [55].

ICU length of stay is associated with increased hospital costs, and not the patients outcome. Because of the high costs of Intensive Care Unit, reduction in ICU length of stay may become a target for future cost cutting effort [54]. Also, long term patients can have a major impact on ICU bed utilization, the availability of beds for short stay patients is reduced [56]. Patients with prolonged ICU-stay form a small proportion of ICU patients, yet they consume a significant share of ICU resources [57]. All these studies have found no association between length of stay and ICU patients outcome, as reported in this study.

CONCLUSION

Medical cases admitted to the Muhimbili National Hospital ICU are associated with high mortality. Tetanus is the leading admission diagnosis. Tetanus, stroke and chronic renal failure patients are associated with poor ICU outcomes.

Sex, age of the patients, number of physicians visit and length of ICU stay do not influence the patients outcome.

RECOMMENDATIONS

1. Intensive care management of our patients should be improved especially those associated with poor outcomes i.e. Tetanus, Stroke, chronic renal failure. It includes improvement of infrastructure, equipments, and human resource.

2. It is necessary for our ICU to have a scoring system of the patients according to the severity of illness to estimate patients risk for mortality (APACHE II). Also, further studies should be carried out to determine the influence of APACHE II score on ICU patients outcome.

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