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Mortality Pattern Among Patients Admitted to the Intensive Care Unit in a Tertiary Health Institution in Abuja – Nigeria: 18-year Review

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Abstract: Background: It is globally known that, there is high mortality rate in the Intensive Care Unit. Therefore, this study seeks to know the pattern of mortality and the associated variables at the University of Abuja Teaching Hospital. Method: A descriptive cross-sectional retrospective study was conducted among patients admitted into the Intensive Care Unit, University of Abuja Teaching Hospital between May 2002 and April 2020. A total of 2078 patients admitted within the study period was analyzed. Data was collected from the ICU admission and discharge register using a proforma to include socio-demographic characteristics like gender, age, occupation, and religion. Data was analyzed using SPSS version 26.0. Variables were summarized and presented as frequencies and percentages, while quantitative variables were represented using means and standard deviations. The association between categorical variables was tested using Chi-square at a P-value of significance <0.05. And purposeful sampling was used to rule out bias. Result: The number of female patients were 1062 (51.1%) while 1016 (48.9%) were males. A total of 1362 (65.5%) of the patients were successfully managed and transferred to the general wards for further management, while 716 (34.5%) died in the ICU and were transferred to the Mortuary. Conclusion: This study represents the pattern and frequency of death rate of patients admitted into the Intensive Care Unit. Further study involving data analysis on the causes of death will be highly informative and beneficial.

Keywords: Intensive Care Unit, Mortality, Pattern

1. Introduction

An Intensive Care Unit is an organized system for the provision of care to the critically ill patients that needs intensive and specialized medical and nursing care. It is located in a defined geographic area of the hospital, its activities often extend beyond the walls of the physical space to include the emergency department, hospital wards, and follow-up clinics [1]. An Intensive Care Unit is usually a three-level unit and are described as thus: Level 1 ICU is capable of providing oxygen, noninvasive monitoring, and more intensive nursing care than on a ward, whereas a level 2 ICU can provide invasive monitoring and basic life support for a short period. And level 3 ICU provides a full spectrum

of monitoring and life support technologies, serves as a regional resource for the care of critically ill patients, and may play an active role in developing the specialty of intensive care through research and education. A formal definition and descriptive framework for ICU can inform health care decision-makers in planning, measuring capacity, provide clinicians and patients with a benchmark to evaluate the level of resources available for clinical care [1]. The 3 levels of Intensive Care Unit are represented in the University of Abuja Teaching Hospital, though not separated as hospital ward or cubicles.

Consequently, the study was conducted using the records of patients admitted into the Intensive Care Unit of UATH from May 2002 to April 2020. It is a specialized unit that provides expert care to patients with life-threatening illnesses and organ supports. It was established in January 1998 as a 4-bedded compact unit with 4-cardiac monitors, 5-ventilators, central piped-line oxygen, 3 functional suction machines and emergency medications for critical care at the highest level. It is located adjacent to the operating theatre complex. The ICU is staffed with 4 consultants, 10 resident doctors and 17 nurses, 6 cleaners and 6 janitors. These patients were co-managed by the Anesthetist Consultants, Resident Doctors, trained Intensive Care Nurses and the admitting Surgeon, Obstetrics/Gynecologist, Pediatricians and or Physician. The data were recorded on a proforma format sheet designed for the study and data analysis was done using Microsoft Excel 2010 and SPSS version 26.

A researcher, Blanch L further said, preference should be given to patients who are more likely to survive if admitted to the ICU but unlikely to survive or likely to have more significant morbidity if not admitted [2]. Hence, an intensive care unit is a specially staffed and equipped in a separated area in a hospital, dedicated to the management of patients with life-threatening illnesses [1]. Therefore, this study was focused on the mortality rate of patients admitted into the ICU conferring to these variables: age group, gender, and the distribution of diseases on admission.

2. Method

A descriptive retrospective study conducted on patients admitted into the Intensive Care Unit, University of Abuja Teaching Hospital, (UATH). All records of patients admitted to the Intensive Care Unit from May 2002 to April, 2020 were analyzed. Ethical approval was obtained from the University of Abuja Teaching Hospital, Health Research and Ethics Committee. The data were collated from the ICU admission/discharge register. This was entered on a spreadsheet designed for the study and data was analyzed using IBM SPSS version 26.0. All the patients considered for this study were within the age range of 1 – 89 years. A Purposeful Sampling technique was used where the total sample of all patients admitted to the ICU during the period under review was used. Information on socio-demographic characteristics like gender, age, occupation and religion were collected. Diagnosis on admission, the outcome was also

obtained for all the patients that were admitted. Categorical variables were described as frequencies and percentages. The association between categorical variables was tested using Chi-square test and level of significance was set at a p-value <0.05.

3. Results

Table 1. *Socio-demographic characteristics of the patients.*

Variable	Frequency	Percentage
Gender		
Female	1062	51.1
Male	1016	48.9
Total	2078	100
Age grouping		
Infants (1 - 11 months)	82	3.9
Under-five (12–59 months)	67	3.2
Children (5 – 17 years)	141	6.8
Adults (18 – 64 years)	1692	81.4
Elderly (65 and above)	96	4.6
Total	2078	100
Occupation		
Skilled	477	23
Unskilled	1340	64.5
Under – care	194	9.3
Retiree	67	3.2
Total	2078	100
Religion		
Christianity	1233	59.3
Islam	836	40.2
Others	9	0.4
Total	2078	100

Table 2. *Case distribution of the patients.*

Grouped Diagnoses	Frequency	Percentages
Medical	186	9
Obstetric and Gynaecologic	510	24.5
Paediatrics	110	5.3
Surgical	1272	61.2
Total	2078	100

Table 3. *Transferred Units of the Patients.*

Unit transferred		
A/E	16	0.7
ENT	7	0.3
HOME	20	1
LAMA	2	0.1
MEDICINE	50	2.4
MORTUARY	716	34.5
OBS/GYN	355	17.1
ORTHOPAEDICS	16	0.7
PAEDIATRICS	84	4
RENAL UNIT	1	0
SURGERY	811	39
Total	2078	100

OUTCOME OF PATIENTS IN THE ICU

The overall prevalence of mortality of ICU in the years under review was 34.6%. Mortality rate per year of 51.4% was highest in 2017 while 17.9% was the lowest in 2008. Thus, the result showed that prevalence varied from year to year.
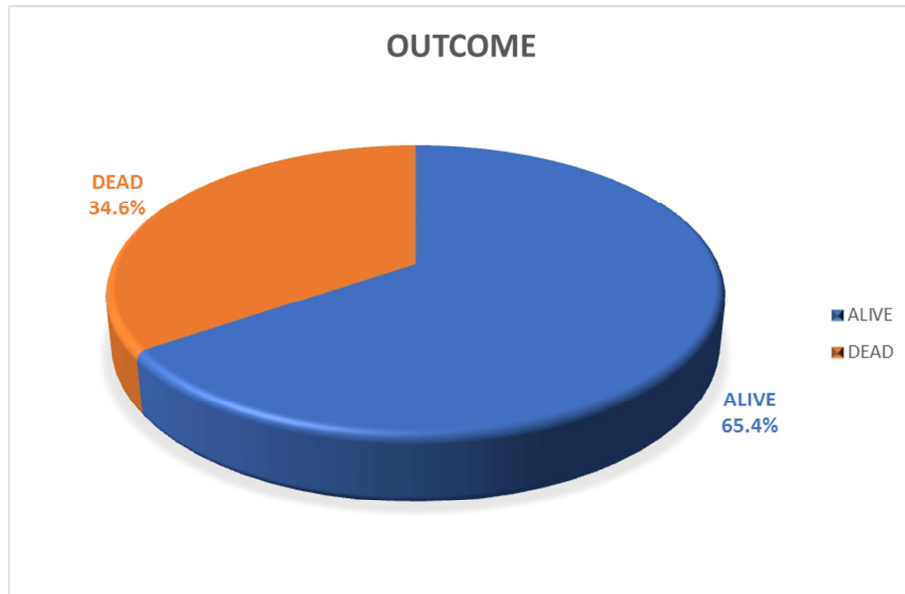
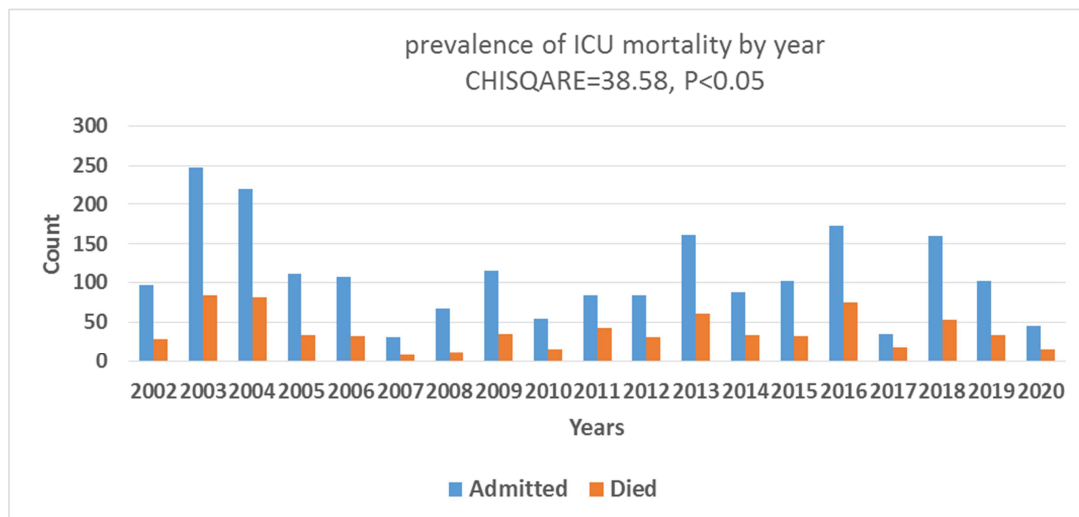**Figure 1.** *Prevalence of patients' mortality.*

Figure 2. *Prevalence of ICU mortality by year.*

Table 4 reveals patients' general characteristics and mortality and shows that, out of 1062 females, 322 (30.3%) died, while out of 1016 male patients, 396 (39%) died. The significant

Considering the association between the various socio-demographic variables and mortality, table 4 reveals that more males died than females, implying the statistical significant association between gender and mortality (P<0.01) among the admitted patients in the study period. In the same vein, there is a statistical significant association between religion and mortality (P<0.01). The same submission can be seen between diagnosis and mortality as there is a statistical significant association between diagnosis and mortality among the admitted patients in this study period.

Furthermore, 29.3% died among the infants, 31.3% out of patients who are children died, 34.7% died among adult patients, 44.8% of elderly patient admitted to ICU died. In terms of religion, 31.5% of Christian patients died, 38.3% of Muslim patients lost their lives. More patients with unknown faith lost their lives because they came into the unit as unknown named patients. Hence, the prevalence of mortality in ICU varies from religion to religion. 33.1% of skilled patients died, 35.8% of unskilled patients died, 37.3% of retiree patients lost their lives. For medical diagnosis, 69.9% of patients who were diagnosed of medical related aliment died, 26.3% died from obstetric and gynecologic related diagnosis, 1.8% of pediatric related aliments died, while 35.5% of surgical cases died. This result implies that mortality rate differs from diagnosis to diagnosis, more patient diagnosed with medical related diseases died.

***Table 4.** Factors associated with mortality among the patients.*

Gender	Outcome			Chi-square	*p-value*
	Alive	Died	Total		
Gender					
Female	740 (69.7)	322 (30.3)	1062 (100.0)	17.205	*<0.001**
Male	620 (61.0)	396 (39.0)	1016 (100.0)		
Age classification					
Infants	58 (70.7)	24 (29.3)	82 (100.0)	6.809	*0.146*
Under-five	46 (68.7)	21 (31.3)	67 (100.0)		
Children	98 (69.5)	43 (30.5)	141 (100.0)		
Adults	1105 (65.3)	587 (34.7)	1692 (100.0)		
Elderly	53 (55.2)	43 (44.8)	96 (100.0)		
Religion					
Christianity	844 (68.5)	389 (31.5)	1233 (100.0)	27.095	*<0.001**
Islam	516 (61.7)	320 (38.3)	836 (100.0)		
Unknown	0	9 (100.0)	9 (100.0)		
Occupation					
Skilled	319 (66.9)	158 (33.1)	477 (100.0)	4.910	*0.179*
Unskilled	860 (64.2)	480 (35.8)	1340 (100.0)		
Paediatrics	139 (71.6)	55 (28.4)	194 (100.0)		
Retiree	42 (62.7)	25 (37.3)	67 (100.0)		
Diagnosis					
Medical	56 (30.1)	130 (69.9)	186 (100.0)	170.844	*<0.001**
Obs/Gyn	376 (73.7)	134 (26.3)	510 (100.0)		
Paediatrics	108 (98.2)	2 (1.8)	110 (100.0)		
Surgical	820 (64.5)	452 (35.5)	1272 (100.0)		

4. Discussion

In this study, there was a higher number of females (51.1%) while 48.9% were males as compared to other studies which stated the opposite. In the research study by R. A. Fowler et al; 2007 who made an assertion that, the proportion of admissions due to specific diagnoses varied according to sex, greater numbers of men than of women were admitted to an ICU with a medical diagnosis or a non -obstetric surgical diagnosis, which was in consonant with the study done by Hendry R. Sawe et al; 2014, who also claimed that, male predominance in their study, may in some extent, reflect the prevalence of trauma, long shown to have a working age male predominance and other researchers studies also agreed with the male predominance. [3-6]. In contrast to the aforementioned studies, this study showed that females are higher than males on admission at the Intensive Care Unit in the University of Abuja. The reason for this deviation from our study may be associated with increased admission from Obstetrics and Gynecology department.

Furthermore, it is shown in this study that, there were more adults (18 - 64 years) with 81.4% of the population of N Valid (2078), with the age mean of 34.07, median of 33.0, minimum of less than a year and maximum of 85 years. Similarly, there was a research finding [6] with middle age group (20 - 59 years) and this accounted for 66.9% of admission, while another study [5] had more of elderly (37 - 97 years) with a median age of 70 years. The highest distribution is the surgical cases which were as a result of Road Traffic Accident (RTA), Severe Head Injury, Severe Burns with mortality rate of 35.5% which is similar to the findings by Poluti et al; 2016 [6].

Also, in this study, it was discovered that, the surgical cases being the highest in the distributions is probably associated with the proximity of the facility to the Federal Highway. Furthermore, it was discovered that Obstetrics and Gynecology was the second highest admissions in the Intensive Care Unit (ICU) due to the factor of non-proximity of the hospital to many rural areas, with most of these rural areas having poor health awareness and there exists gaps in the capacity of the primary health care facilities in rendering high-quality maternal and child health services, leading to clients resorting to traditional procedures and absence of regular Ante Natal Care (ANC) at the primary health care centers; consequently, the resultant effect of increased complications from pre/post-eclampsia, Postpartum Hemorrhage (PPH), Cesarean Section and poor intra-facility referral system.

In another multi-center observational study which also revealed that, the majority of patients admitted to ICU were female and younger productive age groups, 19–39 years old which are in line with other studies conducted in Sub-Saharan African countries [7-13]. This finding corroborated with this study. Contrarily, another study discovered a higher rate among male gender which was discovered in the age group among low-income countries might be due to engagement in violence, road traffic accident and relatively educated with high health-seeking behavior. While, the rate of admission to ICU in developed nations was among older patients that might be due to a sedentary lifestyle and high prevalence of a non-communicable disease among these patients [14-17].

This study also revealed that, the surgical cases being the highest in its distributions was ascertained to be due to the proximity of the facility, which is accessible to the Federal Highway. Furthermore, Obstetrics and Gynecology been the second highest admissions in the Intensive Care Unit (ICU) due

to the factor of proximity of the hospital to many rural areas, most of these rural areas have poor health awareness, hence they resorted to traditional procedures and absence of regular Ante Natal Care (ANC); consequently, the resultant effect of increased complications from pre/post-eclampsia, Postpartum Hemorrhage (PPH), Cesarean Section and poor referral system. Additionally, UATH being a referral Centre and most likely serves a large population that does not have ICU services.

According to the study done by Chukwuemeka O. Eze et al; 2020 [18] "mortality rate was 40.8%. It is very high as 2 out of every 5 ICU admissions died". Similarly, other studies in Africa also reported 34% - 43% [11, 19, 20] but higher than 8% - 18% reported in the USA and France [21, 22]. This high mortality rate is due to late presentation of patients, availability of limited number of trained staff and lack of adequate life support equipment in most developing countries.

In this study, the unskilled workers which are summed up to be population across all the grouped diagnosis with more attention to surgical being the highest population in the percentage of 860 (64.2%) were alive while 480 (35.8%) were dead and this is due to high incidence of trauma from road traffic accidents due to un-licensed and un-trained drivers and motor-cyclists, poor road maintenance and lack of willingness from the government in the implementation of road safety measures in developing countries. Furthermore, most patients from other grouped diagnosis i.e. medical, pediatrics and obstetrics/gynecology presented late to the hospital due to poor referral system from the primary health care level, inaccessibility of the hospitals, ignorance, poverty and with a resultant effect of poor prognosis which leads to life threatening agreed with the study done by Labinjo, M., and Akande, T. M 2009 [23, 24].

Overall, the facility is a referral Centre and most likely serves a large population that does not have ICU services. The outcome of this study showed the frequency (*f*) of patients who were alive at 1360 with percentage of 65.4% and the death frequency (*f*) of 718 which accounted for 34.6%, and this may be due to late presentation of patients to the facility, limited number of trained staff and lack of adequate life support equipment.

5. Limitations of the Study

This study has its scope of aims and objective, but there were some observed limitations. Firstly, this is a retrospective study using the Intensive Care Unit admission and discharged record, which was limited. The study was limited to the only teaching hospital in the Federal Capital Territory. Hence, this would limit generalization of the result. This study does not provide other outcome variables that can be used to assess quality of intensive care such as death rate within the first 24 hours, mean number of ICU days of stay per survivor and the financial implications of patients' period of stay in the unit. This is due to the limited domain from the records. There will be need to include information that would allow recording of this indices in the ICU records. The need for the institutionalization of Electronic Health Record at this point cannot be over-emphasized. This would ensure that all the records needed are imputed which can be easily accessed when required for studies like this.

6. Conclusion

The rate of patients' survival in the Intensive Care Unit is relatively low even with the availability of functional equipment such as suctioning machine, mechanical ventilator, Arterial Blood Gas Analyzer (ABG), bed-side cardiac monitor, regular supply of electricity and central piped oxygen. This may be due to the historical period of time the patients are brought, as the intensive care unit is seen as the last option for intensive care, therefore the patients' condition might have worsened with poor prognosis before bringing them into the unit. There is a need for training and re-training of Doctors and Nurses, including other health care workers, caring for these patients with particular attention to the use of various prognostic tools for assessing and predicting the severity of initial admission into the Intensive Care Unit which includes Acute Physiology and Chronic Health Evaluation (APACHE) II among others evidenced study done by Christie Omolola Adams et al; 2020 [25] which revealed that, there was no optimal knowledge and awareness of the utilization of this prognostic tools.

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