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A Ten-Year Review of the Management of Medical Patients in the Intensive Care Unit in a Resource-Poor Setting in Southern Nigeria

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Abstract

Purpose: The Intensive Care Unit (ICU) is a specialist ward within a hospital, with a concentration of expertise and resources for the management of critically ill patients. Some clinicians think of the ICU only in relation to surgical practice, maybe because many intensivists are anaesthesiologists and anaesthesia is closely linked to surgery. However, this notion may not be entirely true. This study aims to highlight the importance of the ICU to patients with medical challenges.

Methodology: This is a ten-year retrospective study conducted at the University of Port Harcourt Teaching Hospital. Ethical approval for the study was sought and gotten from the hospital's ethical committee. All patients who were admitted into the ICU with medical diagnosis were included in this study. The information gotten includes history, age, sex, diagnosis, length of admission, and outcome. The data collected was analyzed and presented in tables and charts.

Findings: The mean age was 51.41±20.12. The highest age was 95 years. The mean bill paid was 80,718.55 Naira and the largest bill paid was 605,500 Naira while the least bill paid was 2000. The mean duration of stay was 6.59 days and ranged from a day to 120 days. The males were 268 (51.8%) while the females were 249(48.2%). Two hundred and sixty-five patients (51.3%) died during the study period. Patients who were transferred out of the ICU spent the highest amount of money and spent the most time (10.19 days) in the ICU. The patient who died spent the least amount of time (4.56 days) in the ICU. A hundred and two patients were discharged from the ICU. Transferring them to a high dependency unit or ward will save cost. As the age increased, the comorbidities also increased with 309 out of 517 having comorbidities. Exacerbation of comorbidity led to admission in the ICU.

Recommendation: Medical patients admitted into the ICU tend to have a higher mean age and have a higher mortality rate. Older patients tend to have more comorbidity. Proper and effective management of the ICU will save cost. Proper management of comorbidities in older patients can lead to an improvement in health. Patients who are fit, could be transferred to other wards and discharged from there, this will free up beds in the ICU, increase effective use of the ICU and save cost.

Keywords: *Intensive Care Unit ICU, Mortality, Mean Age, Bill, Transferred Out, Discharged.*

1.0 INTRODUCTION

The Intensive Care Unit (ICU) is a specialist ward within a hospital, with a concentration of expertise and resources for the management of critically ill patients.[1] These resources include the provision of organ support, expertise, and knowledge in the management of the critically ill and close monitoring of physiological variables. The ICU requires properly trained staff and high staff-to-patient ratios.[1,2,3,4] A large amount of personnel and material is needed to fund and run the ICU,[5,6] so only patients who meet the criteria for ICU admission should be admitted.[7] In Africa, running an ICU has been largely difficult because of a lack of funds and manpower.[8,9,10]

Patients managed in the ICU are transferred out of the ICU when they get better, some are discharged from the ICU directly, and some Sign against Medical Advice (SAMA) and leave the ICU, while others succumb to their illness. Mortality in the ICU can be high.[11-14]

In medical practice, some clinicians think of the ICU only in relation to surgical practice, maybe because many intensivists are anaesthesiologists and anaesthesia is closely linked to surgery. However, this notion may not be entirely true.

Numerous studies have been conducted and published in Nigeria and even Port Harcourt.[10-14] Many of the write up dwelt mainly on surgical patients in the ICU.[11-14] I am unaware of any research or published article about the management of medical patients in the ICU in Port Harcourt, Nigeria. We intend to concentrate more on Medical patients managed in the ICU.

2.0 METHODOLOGY

This study was carried out in Port Harcourt, Rivers State, Nigeria. Port Harcourt is an industrial city located in the Niger Delta region of Nigeria. All surgical patients admitted into the ICU of the University of Port Harcourt Teaching Hospital UPTH from January 2013 to December 2022 were evaluated. Hospital ethical committee approval was sought and obtained from the hospital ethical committee.

Data were obtained from the ICU ward register, theatre register, discharge records, and medical records. Information gathered include name, age, sex, bill, duration of admission, sub-specialty, number of survivors, number discharged home, and number transferred out. Patients with incomplete records were excluded from the study. The data from the folders were collected and entered using Microsoft Excel 2016 version and transferred into the statistical package for social sciences (SPSS) for Windows (version 25) (IBM SPSS Inc. Chicago, IL) for analysis. A ninety-five percent confidence interval and a p-value less than 0.05 was considered significant. Frequencies, percentages, mean, and standard deviation were used to summarize the data as appropriate. Categorical data were presented in the form of frequencies and percentages using tables. Continuous variables were presented in means and standard deviation. Results were presented in tables and charts.

3.0 FINDINGS

The patients who were admitted into the ICU with a medical diagnosis from January 2013 to December 2022 were evaluated. The results of our findings are presented below.

Table 1 shows the age, bills paid, and duration of stay in the ICU. The mean age was 51.41±20.12. The highest age was 95 years. The mean bill paid was 80,718.55 and the largest bill paid was

605,500 Naira while the least bill paid was 2000 Naira. The mean duration of stay was 6.59 days and ranged from a day to 120 days.

Table 1: Patients Admitted to the ICU with a Medical Diagnosis from January 2013 to December 2022

Statistics				
		Age (years)	**Bill**	**Duration (days)**
N	Valid	513	345	476
	Missing	4	172	41
Mean		51.41	80718.55	6.59
Median		54.00	57700.00	4.00
Mode		34.00	70000.00	2.00
Std. Deviation		20.12	83551.50812	8.74
Variance		405.12	6980854508.94	76.44
Range		94.99	603500.00	119.00
Minimum		.01	2000.00	1.00
Maximum		95.00	605500.00	120.00

Table 2 shows that the 50 to 59-year-old age group had the highest number of admissions into the ICU for medical reasons with 96 subjects being admitted during the study duration. The males were 268 (51.8%) while the females were 249(48.2%). Two hundred and sixty-five patients (51.3%) died during the study period.

Table 2: Frequency of Patients Admitted

	N(frequency)	**% (percentage)**
Age group		
0-9	16	3.1
10-19	18	3.5
20-29	46	8.9
30-39	68	13.2
40-49	74	14.3
50-59	96	18.6
60-69	87	16.8
70-79	74	14.3
80-89	32	6.2
>90	2	0.4
Not stated	4	0.8
Sex		
Female	249	48.2
Male	268	51.8
Outcome		
Died	265	51.3
Discharged	102	19.7
Referred out	5	1.0
SAMA	5	1.0
Transferred	140	27.0
Total	**517**	**100.0**

Table 3 shows that the females within the age group 30 to 39 years old were the most admitted with 52 (20.9%) subjects while amongst the males the 60 to 69 years age group had the highest frequency with 52 (19.4%) and this was statistically significant with a *p-value* less than 0.0001

Table 3: Number of Female Patients Admitted

	Sex				Chi-square	*p-value*
	Female		Male			
	N	(%)	N	(%)		
Age group						
0-9	7	(2.8)	9	(3.4)		
10-19	10	(4.0)	8	(3.0)		
20-29	31	(12.4)	15	(5.6)		
30-39	52	(20.9)	16	(6.0)		
40-49	27	(10.8)	47	(17.5)	44.15	<0.0001
50-59	45	(18.1)	51	(19.0)		
60-69	35	(14.1)	52	(19.4)		
70-79	24	(9.6)	50	(18.7)		
80-89	14	(5.6)	18	(6.7)		
>90	1	(.4)	1	(.4)		
Not stated	3	(1.2)	1	(.4)		
Outcome						
Died	130	(52.2)	135	(50.4)		
Discharged	48	(19.3)	54	(20.1)		
Referred out	0	(.0)	5	(1.9)	10.99	0.088
SAMA	0	(.0)	5	(1.9)		
Transferred	71	(28.5)	69	(25.7)		
Total	**249**	**(100.0)**	**268**	**(100.0)**		

Table 4 showed the relationship between age group and outcome. The 20 to 29-year age group had the highest mortality with 117 (21.5%) dying. The 30 to 39-year age group had the highest amount of discharge. The 40 to 49-year-old group had the highest referral. The 30 to 39-year-old age group had the number of patients transferred out of the ICU.

Table 4: The Relationship between Age Group and Outcome

	Outcome									
	Died		Discharged		Referred out		SAMA		Transferred	
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Age group										
0-9	13	(4.9)	0	(.0)	0	(.0)	0	(.0)	3	(2.1)
10-19	11	(4.2)	3	(2.9)	0	(.0)	0	(.0)	4	(2.9)
20-29	12	(4.5)	7	(6.9)	2	(40.0)	0	(.0)	25	(17.9)
30-39	34	(12.8)	15	(14.7)	1	(20.0)	0	(.0)	18	(12.9)
40-49	46	(17.4)	12	(11.8)	1	(20.0)	0	(.0)	15	(10.7)
50-59	51	(19.2)	11	(10.8)	0	(.0)	3	(60.0)	31	(22.1)
60-69	39	(14.7)	31	(30.4)	1	(20.0)	0	(.0)	16	(11.4)
70-79	44	(16.6)	12	(11.8)	0	(.0)	2	(40.0)	16	(11.4)
80-89	13	(4.9)	8	(7.8)	0	(.0)	0	(.0)	11	(7.9)
>90	1	(.4)	0	(.0)	0	(.0)	0	(.0)	1	(.7)
Not stated	1	(.4)	3	(2.9)	0	(.0)	0	(.0)	0	(.0)

Table 5 shows that patients who were transferred out of the ICU spent the highest amount of money and also spent the most time (10.19 days) in the ICU. The patient who died spent the least amount of time (4.56 days) in the ICU.

Table 5: Amount of Money and Time Spent by Patients

	Bill	Duration
	Mean	Mean
Outcome		
Died	73,974.72	4.56
Discharged	70,863.79	7.04
Referred out	82,500.00	9.00
SAMA	88,833.33	7.00
Transferred	97,782.35	10.19
Total	**80,718.55**	**6.59**

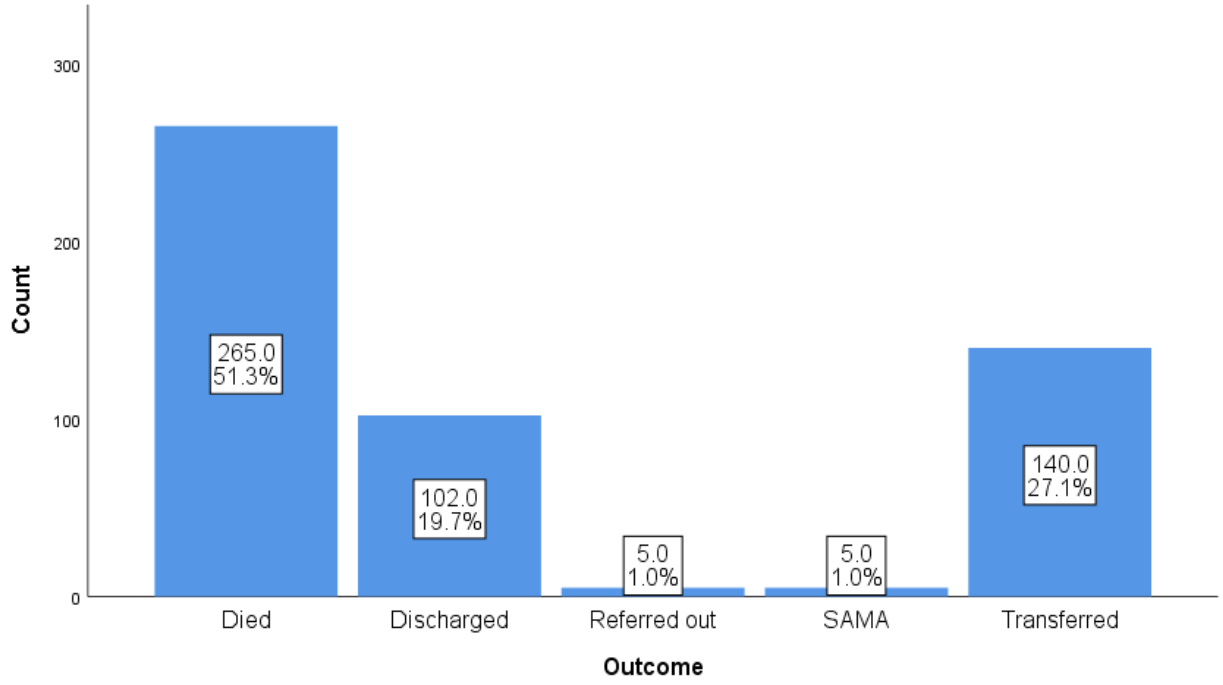

Figure 1: Outcome of Patients in the Medical ICU. Two Hundred and Sixty-Five (51.3%) Died While 102 (19.7%) Were Discharged

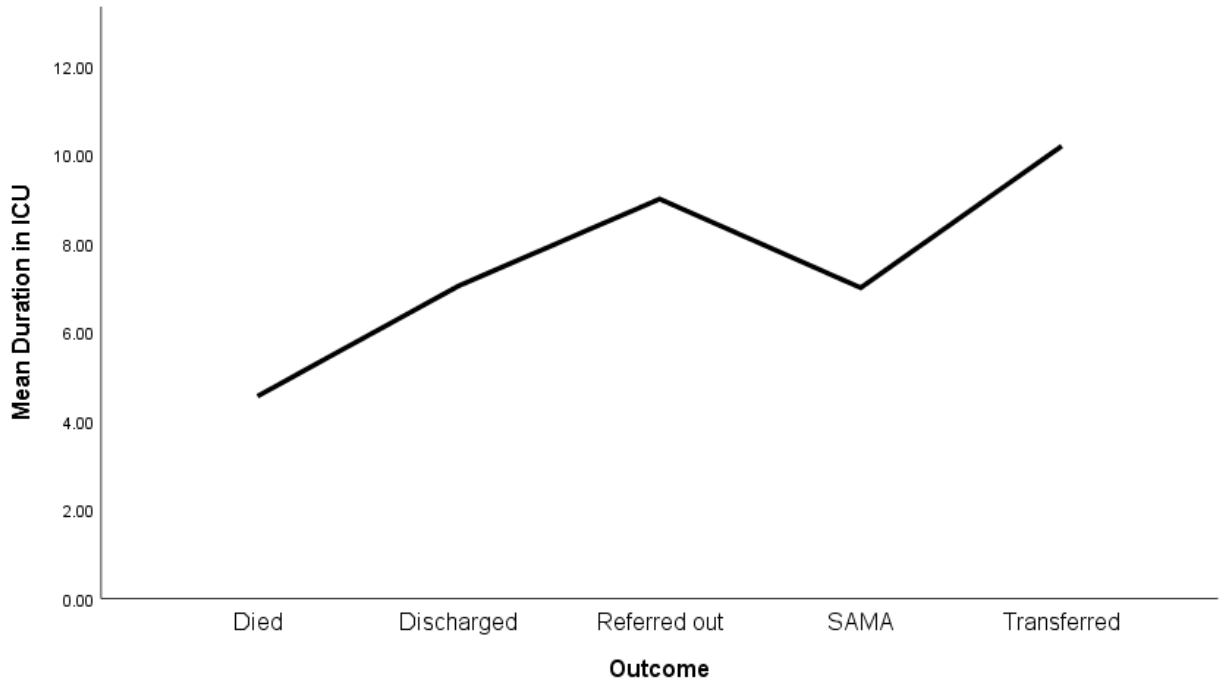

Figure 2: The Relationship between the Mean Duration of Stay and Outcome. Those Who Died Spent the Least Amount of Time in the ICU While Those Transferred Spent the Most Time in the ICU

Table 6 shows the age group of patients and their comorbidity, as age increases the percentage of comorbidity increases and vice versa. An increase in percentage comorbidity from 0 to 100percent is noted.

Table 6: The Age Group of Patients and Their Comorbidity

Age group	Frequency	Comorbidity	Percentage comorbidity (%)
0 to 9	16	0	0
10 to 19	18	0	0
20 to 29	46	2	4.3%
30 to 39	68	13	19.1
40 to 49	74	46	62.1
50 to 59	96	67	69.8
60 to 69	87	75	86.2
70 to 79	74	72	97.3
80 to 89	32	32	100
≥90	2	2	100
Not stated	4		
Total	**517**	**309**	

Discussion

The decision of intensive care unit (ICU) admission in patient management is often challenging, especially in developing countries with limited resources.[19] More nurses and physicians per patient

are required.[19] Increased number of staff required in the ICU is because the critically ill patient requires more care.[20]

Aging is associated with comorbidities such as diabetes and hypertension.[21,22] The mean age of patients in this study was 51.41±20.12 as shown in Table 1. The highest age was 95 years and the age range was 94.99 years. Patients with chronic medical conditions are usually older than patients with surgical pathology. Earlier studies carried out in Port Harcourt have consistently revealed a younger age of admission into the ICU.[10,15-18] The mean bill paid by patients was 80,718.55 Naira and the largest bill was above 600,000 Naira. This highlights the enormous resources needed to cater for a patient in the ICU.[19] In recent times, Nigeria has overtaken India as the poverty capital of the world with 46.5% living on less than 1.09$ daily. Having older Nigerians part with such amounts will be Herculean in a country with growing number of unemployment and underemployment. The mean duration of stay for these patients was 6.59 days and ranged from a day to 120 days. This can cause a significant disruption and mental burden in the everyday life of the relatives and caregivers.[24,25]

The total number of patients admitted during the study duration into the ICU with medical diagnoses was 517(268 (51.8%) males and 249(48.2%) females) as shown in Table 2. The 50 to 59-year-old age group had the highest number of admissions into the ICU for medical reasons with 96 subjects being admitted within this age group. This may simply reflect the fact that chronic medical illnesses are more in older people. The mortality in this study was above 50% for both males and females and this was also statistically significant.

Table 3 shows that the females within the age group 30 to 39 years old were the most admitted with 52 (20.9%) subjects while amongst the males the 60 to 69 years' age group had the highest frequency with 52 (19.4%) and this was statistically significant with a *p-value* less than 0.0001.

A previous study conducted in Port Harcourt noted a similar finding with a median age of 30 years but that study had more females than males.[10]

The outcome of patients in the ICU depends on a number of factors such as age, level of support, pre-morbid state, level of immunity, and so on. The 30 to 39-year-old age group had the highest number of favourable outcomes with 32 (41.0%) being discharged from the ICU and 244 (26.6%) being transferred out as shown in Table 4. This age group usually contains people who are physically active and able to fend for themselves. So, picking up their medical bills will be easier. As age increases the number discharged and transferred out reduced. This may be due to increasing comorbidities with age and reduced purchasing power.

Table 5 shows that patients who were transferred out of the ICU spent the highest amount of money (97,782.35 naira) and also spent the most time (10.19 days) in the ICU. This is understandable since all things being equal, the more time you spend in the ICU the more expensive your treatment eventually becomes. The patient who died spent the least amount of time (4.56 days) in the ICU followed by patients who signed against Medical Advice (SAMA) and then patients discharged from the ICU. Patients who were discharged from the ICU will pay less if they were transferred to ward or High Dependency Unit (HDU). Transferring fit patients out of the ICU will led to a more effective management of the ICU and less cost for the patients.[8,9,10]Several studies have shown that a lack of funds and resources have limited the proper functioning of the ICU.[10]

Figure 1 shows the outcome of patients in the medical ICU. Two hundred and sixty-five (51.3%) died while 102 (19.7%) were discharged. This high mortality has been noted in other studies.[10]

Rosenthal et al.[26] in a prospective study in Asia, Africa, Eastern Europe, Latin America, and the Middle East concluded that infections associated with catheters, ventilators and central lines are the causes of mortality. Ntuli et al.[27] in a study conducted in a tertiary hospital in Limpopo noted a mortality rate of 43% and that non-pregnancy-related infections even in women is an important cause of mortality.

In our current study, we noticed that patients who died spent the shortest time in the ICU and patients transferred out spent the longest time in the ICU as shown in Figure 2. Ntuli's study also noted that mortality was highest in the first 24 hours.[27] A prospective study conducted by Demoule et al.[28] discovered that mortality during the first 24 hours is associated with a reduced capacity of the diaphragm to produce inspiratory pressure which is associated with sepsis and disease severity. It is a poor prognostic factor.[28] Marty et al.[29] noted that severe sepsis is an early cause of death in patients in the ICU. They also found out that lactate clearance was the best parameter associated with 28-day mortality rate in septic patients.

Table 6 shows that as age increases patient's comorbidity also increases. Three hundred and nine out of the 517 patients in the study had comorbidity. Exacerbation of these comorbidities led to admission into the ICU. Proper management of comorbidities will lead to better health of these patients. The elderly is the continuation of life with reduced ability for adaptation.[30] Studies in Port Harcourt has shown that mortality in the ICU is higher in the elderly population.[30]

CONCLUSION AND RECOMMENDATIONS

Conclusion

Medical patients admitted into the ICU tend to a higher mean age and have a higher mortality rate. Older patients tend to have more comorbidities.

Recommendation

- Proper management of comorbidities in older patients can lead to an improvement in health.
- Patients who are fit, could be transferred to other wards and discharged from there, this will free up beds in the ICU, increase effective use of the ICU and save cost.

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Disclosure of Conflict of Interest

The authors declare no conflict of interest

Statement of Ethical Approval

Ethical approval was sought and obtained from the hospital's ethical committee.

Statement of Informed Consent

This was a retrospective study; no informed consent was obtained.

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