A Review of Admission Pattern in Intensive Care Unit in a Tertiary Health Institution in Southeast Nigeria

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ABSTRACT

Background: Intensive monitoring and therapy are critical in the optimum care of very ill patients. Specialist intensive care unit (ICU) appears to be associated with improved care. With the dwindling supply of resources, prioritising the available resources in the ICU based on the local needs driven by available data is imperative. Unfortunately, these data are scarce for the hospital. **Objectives:** We present the pattern of admission and outcome of patients' management in a general open ICU in this public tertiary health institution in Southeastern Nigeria. **Materials and method:** The intensive care unit records of the patients admitted into Nnamdi Azikiwe University Teaching Hospital between January 2016 and 2020 were retrieved. Demographic data, diagnosis, duration of stay in ICU, managing units, and outcome were collected and analysed. The outcome was based on transfer to the ward or morgue. The data was analysed with descriptive statistics**. Results:** A total of 523 patients were included in this study. The male female ratio was 1.5:1. The mean age was 43.3years. Trauma related cases accounted for 39.4% (206/523) of the total admission. Neurosurgery unit had the highest number of admissions 46.1% (241/523), with neurotrauma accounting for 78.4% (189/241) of neurosurgical ICU admissions. Average length of stay was 7 days. Among the patients whose outcome were stated (500), the overall mortality rate was 39.4% (197/500). Among the Neurosurgery cases, mortality was 45.2% (109/241). **Conclusion:** Trauma related cases are the major reasons for the ICU admission. Neurosurgery unit has the highest cases admitted into the ICU.

Keyword: Admission**,** ICU**,** Nigeria**,** Southeastern**.**

INTRODUCTION

Intensive monitoring and therapy form the fulcrum of critical care for very ill patients. Optimum staff to patient ratio and use of qualified and skilled workers are part of the elements of this sector which are geared towards enhancing the quality of care. Generally, an Intensive Care Unit (ICU) may be closed or open. In a 'closed system' model, the admission, care and discharge of patients in ICU rests primarily on the general intensivist who in turn relies on inputs from the specialists. The unit in this case has a single team of clinicians that does multidisciplinary rounds daily. Conversely, the open system model, the

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primary care is by the neurosurgeon or neurologist who in turn depends on inputs from the subspecialist.[1] Furthermore, an ICU may be general/mixed or specialty based. General ICU provides critical care for wide range of diagnoses. The general ICU are useful in resource poor setting because it accommodates all classes of critically ill patients thereby reducing the burden of running different specialty units. The staff are usually trained to provide the needed supports for patients with multiorgan failure. Specific nuances necessary for the survival of critically ill patients, in this setting, are occasionally under-recognised.[1] Neurosurgery patients have better outcome in neuro-ICU (specialty ICU) when compared with General ICU.[2,3] This setting is however, a tall order in developing economies like Nigeria. Dedicated neuro-ICU appears to be a common practice in North America compared to the other regions of the world, especially resource poor countries.[4] Shortage of manpower and other ICU resources have been noted in Africa despite the overwhelming number of patients needing the service.[5 ,6,7,8] Differences in resource allocation and manpower availability has also been observed worldwide. For example, dedicated Advanced Practice Providers are most common in North America.[4] The pattern of admission and outcome in a mixed setting or general ICU are dynamic and have regional differences.[9,10,11,12,13,14,15,16] In the face of dwindling resources available to the hospitals and increasing competing needs, there is the burden of imperativeness on policy makers to prioritise the available resource in the ICU based on the local needs driven by available data.

Unfortunately, the data on the experience in Nnamdi Azikiwe University Teaching Hospital, (NAUTH) Nnewi, Nigeria is scarce. This institution has 450 beds and five bedded ICU during the period under review (2016 to 2020). The institution is one of the two public tertiary health institutions in Anambra state, Nigeria. We therefore present the pattern of admission and outcome of patients' management in a general open ICU in this public tertiary health institution in Southeastern Nigeria

MATERIALS AND METHODS

Study design/area/population

It is a retrospective study in which the intensive care unit records of the patients admitted into Nnamdi Azikiwe University Teaching Hospital between January 2016 and 2020 were retrieved. Demographic data like age and sex were collected. Other data like diagnosis, duration of stay in ICU, managing units, and outcome were collected using a data extraction template.

Outcome measure

The outcome was based on transfer to the ward or morgue.

Statistical analysis

These data were analysed with simple descriptive statistical tools like mean, median, standard deviation as well as charts and tables. Ethical clearance was obtained for the study.

RESULTS

A total of 523 consecutive admission of patient into the facility was made in the study period. The male female ratio was 1.5:1. The mean age was 43.3 +/- 16 years, while the age range was from 6month to 77 years (figure 1)

Neurosurgery accounted for most of the admission into the facility (figure 2) Trauma related cases accounted for about 39.4% of the total admission. Among the Neurosurgery cases, head injury was the most common reason for ICU admission. (figure 3). The average duration of ICU admission was 7 days with a range of 2hours to 90days, however, Neurosurgery patients stayed one day longer than the overall average length of stay. About 29.3% of patients were admitted for 24 to 48hours, while 32% stayed between 3 and 7days. Overall mortality rate was about 39.4% (197/500) with neurosurgery accounting for over half of total mortality (20.8%, 109/523). Thirteen patients were referred to another centre while 21 patients were managed and discharged home directly from the ICU. Two patients were discharged against medical advice.

Table 1: Comparing the patterns in different centres

Authors	Onyekwulu et al[20]	Bolaji et al[21]	Ilori et al[17]	Uche et al[23]	Isamade et al[16]	Current study
City of study	Enugu	Ilorin	Calabar	Umuahia	Jos	Nnewi
Year of study	2008-2012	1991-2001	2009-2010	2009-2011	1994-2002	2016-2020
Aetiology	TBI/Head injury Intracranial Tumours Spinal cord injury Heart block CVA	Exploratory laparotomy TBI/Head injury Thoracotomy Status asthmaticus Respiratory failure	Trauma Abdominal surgeries	Abdominal surgeries TBI/head injury	Post operatives cases Polytrauma Medical reasons Burns	TBI/Head injury Exploratory laparotomy Burns Airway obstruction Severe sepsis
Total hospital bed	700	445	410	240	500	450
Total ICU bed	5	2	3	4	2	5
Average annual ICU admission	153	29.5	85	87	82	105
Age (mean)	38+/-18.17	35.9	38.5 (2-80)	41+/-2.34	28.8+/-19.8	43.3 (0.5-77)
Sex {male in %}	65.4	62.7	55	67.8	54.6	53.5
Length of stay	4.9+/-3.2	48+/-11.22		3.63+/-0.34	4.5+/-5.1	7 (0.16-90)
Mortality	34.6	37.3	32.9	32.2	42.8	39.4

• *TBI : traumatic brain injury,* • *The aetiologies vary with localities. The mortality rates are comparable across the federation*

Table 2: Outcome of Neurosurgery patients admitted into the ICU N=241

	Frequency	Percentage
Ward	126	52.3
Morgue	109	45.2
Referred	4	2.0
Discharged home directly	1	0.4
Discharged against medical advice	1	0.4
Total	241	100

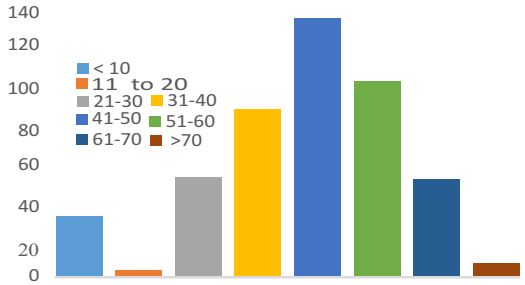

Figure 1: Age distribution of the participants (years)

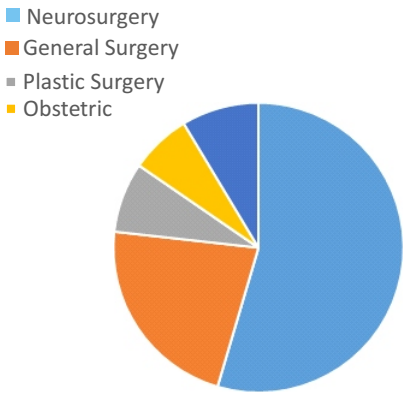

Figure 2: Top five admitting units

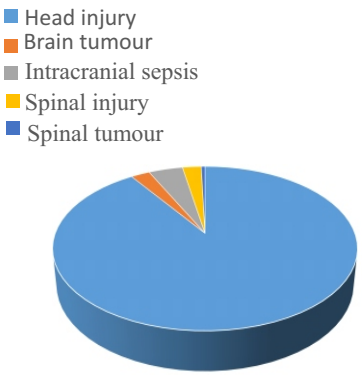

Figure 3: Distribution of Neurosurgery admissions based on aetiologies

DISCUSSION

The availability of data on pattern of ICU admission in resource constrained settings like our institution will go a long way in enhancing planning and efficiency in the care of patients. The average number of patients that had a stint in the ICU {105/year) gives the picture of the busy schedule of the centre. It is understandable since this ICU service is one of the few public institutions in the state and the environ. It is a major referral centre, besides the cost of taking care of a relative is believed to be cheaper than the very few private options available. This heavy load is comparable with tertiary hospitals within and outside the region. [11,17,18,19] The male preponderance in this study is similar to the observation done in Enugu, Ilorin and other centres.[14, 20,21,23] This pattern may be related to the indication for admission. Though, Quedraogo et al. and Prin et.al, found no sex difference in their respective series.[18,22] The age range for admission shows that patients of all age group were accommodated. This is because the institution does not have peadiatric ICU. The mean age of admission was higher than seen in some other centres in the country.[20,21] However, this is comparable to results seen in Tanzania and Democratic Republic of Congo.[14] The most admitted age group were people in the fifth decade of life (see figure 1) In this series, trauma related causes accounted for about half of the total admission. Similar trauma picture was seen in Enugu.[20] This however in converse to the observation in other climes where postoperative cases are predominant. [17,21,23]

The differences in postoperative protocols may be responsible for this. Besides, it is arguable that neurotrauma services were infantile in some of the later centres. Oji noted in his review of first one hundred cases in a developing country that the pattern of admission depends to some extent on the available specialists and by extension range of services available in the institution.[24] Neurosurgery unit was responsible for the highest number of admissions in this study. This may be related to the volume of head injury managed in our institution. [25,26] This is important for effective allocation of resources based on local need for efficient patient critical care. It is not a surprise that head injuries account for the highest number of ICU admission since it forms a substantial part of neurosurgical practice in Nigeria. [20,21,26,27,28,29] The general average length of stay may be a reflection of the predominant aetiological reasons for admission. This however appears longer than many similar studies across the country. [16,20,21,23] Neurosurgical cases stay longer than other cases on the average. This may be partly due to the fact that our institution has no working High Dependency Unit (HDU) where the care of patients who are more stable could be stepped down to. This may also explain why the general average length of stay is comparatively high. Besides, there appears to be the absence of well-defined protocols for admitting and stepping down patients managed in the ICU as evidenced by the 21 patients who were admitted, managed and discharged home directly from the ICU. Furthermore the standard of nursing care in the ward is a limitation.[24] Bearing in mind the cost of stay in the ICU, this longer stay period obviously leads to use of more resources by the care givers who mostly depend on out-of-pocket spending in our setting since our health insurance scheme still has poor coverage nationwide. On the side of the hospital, this definitely means more resources will be used. This could be an overwhelming challenge in sub-Sahara Africa where available resources are poor as noted by Okafor.[30] The proper management and allotment of the available resources must be efficient and tailored to the local need for the maximum benefit of the patients. This ideally, should be backed by empirical data.

The overall mortality rate was comparable with other centres in the country. {see table 1} The relatively higher mortality rate (table 2) among the neurosurgery patients may be explained by the possible aetiologies. Unfortunately, most head injury patients admitted into ICU are usually severely injured patients. Hence, there is need for this to reflect in the resource made available in this ICU. This a retrospective study. Unfortunately, some of the parameters were not fully available for all patients in

the ICU records. Besides, the recent upgrade in the ICU facility may have changed some of the current parameters shown in the study. Hence, a prospective study will give a clearer picture of the current status. Despite these, we believe this study gives an insight on the trend in ICU and will help in proper planning.

CONCLUSION

The ICU has a relatively high patients flow, top admitting units are Neurosurgery, Plastic, obstetrics, ENT and General surgery units. Most of the admission are trauma related. Head injury patients are responsible for the highest admission. The average length of stay is relatively high than other ICU in the region and across the nation.

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Authors' contributions
This is to certify that the authors contributed to the conception, data collection, analysis and intellectual contents of this article.

Data availability
The data used to support the findings of this study are available from the site publicly.

Declaration of conflicting interests
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval
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