

A 5-year analysis of admissions, seasonal variation, and patient outcomes in rural Nigeria: A retrospective observational study

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Abstract

Introduction: In low- and middle-income countries like Nigeria, there is an observed paucity of data on the admission pattern and patient outcomes in health facilities. Few related studies were conducted in the urban centers, but none from the rural areas where the majority of the populace resides. This study is to ascertain the demographic profile, seasonal variations, yearly distribution, admission pattern, and treatment outcomes at the accident and emergency department (AED).

Materials and Methods: A retrospective survey was used to review the data of patients admitted to the AED of the institution between January 2015 and December 2019. The data obtained were analyzed using SPSS Version 20.0. The results were presented in descriptive and tabular formats.

Results: Five thousand nine hundred and forty-four patients were studied with a mean age of 49.8 ± 19 years. There were 53.9% males and 46.1% females. Many (60.1%) were admitted from April to October. There were 58.9% medical and 41.1% surgical cases. Among the medical cases were 18.6% noncommunicable and 18.5% communicable diseases. Out of 5944 patients, 9435 disease patterns were diagnosed with infectious diseases 15.5%, and orthopedic 14.4% being the most frequently diagnosed medical and surgical cases, respectively. The treatment outcome revealed that the mortality rate was 3.7%.

Conclusions: The number of admissions increased over 5 years. Although most patients were treated and discharged successfully, the number discharged against medical advice was high. Therefore, appropriate hospital and community interventions should be implemented to improve admission outcomes.

The following core competencies are addressed in this article: Patient care and procedural skills, Medical knowledge, and Systems-based practice.

Keywords: Admissions, patient outcomes, rural Nigeria, seasonal variation

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INTRODUCTION

The accident and emergency department (AED) offers initial management of patients with various degrees of illnesses and injuries.^[1] Mortality resulting from such diseases and injuries constitutes a high proportion of deaths in developing countries, and this necessitates attention to look into what goes on in the AED.^[1,2] In Nigeria, the primary route of admission into the medical and surgical wards is through the AED, with medical cases accounting for 22-40%.^[3,4] Considering the magnitude of deaths prevailing in the AED and the reports of increasing admissions due to emergencies in rural settings, there is a need for stakeholders in the health sector to have information on the burden of admissions and seasonal variation due to emergencies. Such information will enhance the health system's preparedness toward meeting patient expectations, leading to improved health-care delivery and outcomes.^[5] Apart from this, periodic review of clinical practice is an important exercise every health-care facility should undertake to evaluate the existing services to improve patient care and outcome.^[6] One way of doing this is by looking at the records of patients admitted to the health facilities. However, to the best of our knowledge, there is a paucity of data on the pattern of admissions, seasonal variations, and treatment outcomes of local community emergency problems for which patients visit AED in Nigeria. Few related studies were conducted in health facilities located in the urban centers, but none in the rural areas where most of the populace resides. Therefore, the objectives of the study were to ascertain the sociodemographic characteristics, seasonal variations, yearly distribution, and causes and the outcomes of admissions of patients over 5 years in rural Southwestern Nigeria.

MATERIALS AND METHODS

Study design and settings

Ethical approval for conducting the research was obtained from the Federal Teaching Hospital, Ido-Ekiti Research and Ethics Committee (ERC/2020/08/25/402A). A retrospective review of patients admitted at AED between January 1, 2015, and December 31, 2019, was conducted at the institution's study center. The study center is located in a rural community, which is about 15 km from the State capital. The community as at the last population census of 2006 has a total land area of 332 km² and a total population of 159,114 with an annual growth rate of 3.2%.^[7] The people are mainly farmers and traders in the informal

sector, with a relatively small portion of the working population and retirees in the formal sector.^[7] The hospital is accredited for postgraduate residency training in various medical and surgical specialties and serves as a referral center for patients from private and government-owned hospitals in the state. The AED has 24 beds spread across male and female wards. Following initial triage and resuscitation of the patients by the medical team, other medical and surgical specialties as the case may be are invited to review and take over the management of the patients in accordance with the hospital treatment protocol.

Study population

This comprised all patients registered and admitted to bed at AED during the period under review. Patients 15 years and above, and who were admitted and registered at AED were included in the study. Patients with missing data, incomplete data, or with no clinical and diagnostic criteria were excluded from the study.

Data collection instrument and procedure

A data form and a predetermined questionnaire that the researchers developed were the main instruments used for data collection. The face and content validity of the questionnaire was established by the consultant family physicians working at the adult AED of the hospital. Using Cronbach's alpha, a consultant trauma surgeon established the construct validity and reliability coefficient ($\alpha = 0.83$). The reliability coefficient of 0.83 was obtained and was within the acceptable range. The data form and the questionnaire were used to obtain information from the case record of each patient and admissions and discharge from the nursing report books. Information retrieved included the demographic characteristics, date and year of admission, and definitive diagnosis based on the final assessment of each supervising consultant. The diagnosis was based on the use of the standard clinical and laboratory criteria. Seasonal variation was determined by retrieving the date, month, and year of admission. The outcomes of each patient as retrieved were to show if the patient was treated and discharged, dead, discharged against medical advice (DAMA), or referred to other health facilities. All medical diagnoses were categorized using the ICD-10 coding system. Data were collected by three trained casualty officers and were cross-checked by the principal investigator.

Data analysis

Data were checked for completeness and entered into EPI info version 7, and then it was exported

into SPSS Version 20.0 (Inc., Chicago, IL, USA) for analysis. Continuous variables were expressed as mean ± standard deviation while categorical variables as frequency and percentages. A comparison of categorical data was performed using Pearson's Chi-square test, and a $P < 0.05$ was considered statistically significant.

RESULTS

Sociodemographic profiles of the studied patients

From January 1, 2015, to December 31, 2019, a total of 6320 admissions were recorded. Of these admissions, 94.1% of patients had their data completed and were analyzed in this study. The mean age of the patients was 49.8 ± 19 years, and 41.6% were in the middle age group. In the present study, 53.9% were males, 54.5% were married, 30.5% were farmers, and 52.4% were educated above the primary school level. The majority were Yorubas (96.6%), and 54.7% were rural dwellers, Table 1.

Yearly distribution of admissions in the studied patients

The highest attendance 22.3% of patients were documented in 2019, whereas the least attendance (18.4%) was documented in 2016 [Figure 1].

Seasonal variation of admissions in the studied patients

The seasonal variation of admissions showed that the majority (60.1%) were admitted during the rainy seasons (April–October). There was no statistically significant difference in the seasonal variations of patients' admissions between the rainy and dry seasons ($P = 0.591$) [Table 2].

Pattern of admissions in the studied patients

Out of the 5944 patients, there were 58.9% medical cases, 41.1% surgical cases, 18.6% noncommunicable diseases (NCDs), and 18.5% communicable diseases (CDs) [Table 3].

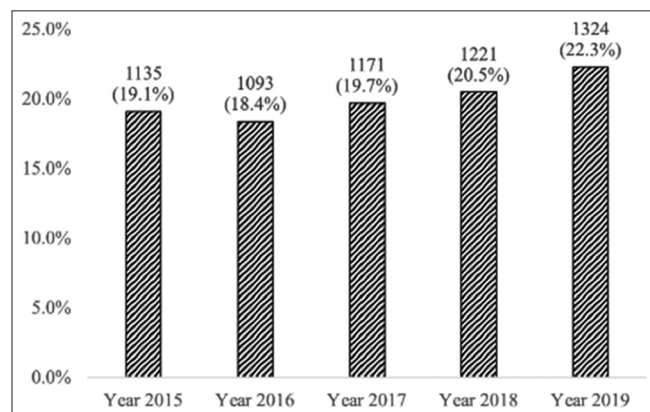


Figure 1: Yearly distribution of admission

Causes of admissions in the studied patients

Out of the 5944 patients, 9435 definitive diagnoses were made. Cardiovascular disorders (9.1%) and infectious diseases (15.5%) were the most frequently diagnosed NCDs and CDs, respectively. Similarly, orthopedic cases (14.4%) were the most frequently diagnosed surgical cases during the 5 years [Table 4].

Table 1: Sociodemographic characteristics (n=5944)

Variables	Frequency (%)
Age group (years)	
<40	2080 (35.0)
40-64	2474 (41.6)
65 and above	1390 (23.4)
Mean±SD	49.8±19
Sex	
Male	3205 (53.9)
Female	2739 (46.1)
Marital status	
Single	1218 (20.5)
Married	3241 (54.1)
Separated	208 (3.5)
Widow	1277 (21.5)
Occupation	
Civil servants	1509 (25.4)
Farmers	1813 (30.5)
Self-employed	1599 (26.9)
Retirees	785 (13.2)
Dependent	238 (4.0)
Education	
None	666 (11.2)
Primary	2223 (37.4)
Secondary	1736 (29.2)
Tertiary	1319 (22.2)
Ethnicity	
Yoruba	5742 (96.6)
Ibo	119 (2.0)
Hausa	83 (1.4)
Domicile	
Rural	3251 (54.7)
Urban	2693 (45.3)

SD=Standard deviation

Table 2: Seasons of admission (2015-2019)

Variable	Seasons of admission		Total, n (%)	χ^2	P
	November-March, n (%)	April-October, n (%)			
Year					
2015	452 (39.8)	683 (60.2)	1135 (100.0)	2.806	0.591
2016	460 (42.1)	633 (57.9)	1093 (100.0)		
2017	466 (39.8)	705 (60.2)	1171 (100.0)		
2018	477 (39.1)	744 (60.9)	1221 (100.0)		
2019	519 (39.2)	805 (60.8)	1324 (100.0)		
Total	2374 (39.9)	3570 (60.1)	5944 (100.0)		

Table 3: Five-year pattern of admission based on case type

Disease pattern	Year (n)					Total (n)
	2015	2016	2017	2018	2019	
Medical cases	658	628	687	731	797	3501
NCDs	315	310	345	380	407	1757
CDs	343	318	342	351	390	1744
Surgical cases	475	466	485	498	519	2443
Total	1133	1094	1172	1229	1316	5944

CDs=Communicable diseases, NCDs=Non-CDs

Treatment outcome of admissions in the studied patients

The treatment outcomes documented deaths (3.7%), DAMA (7.3%), referred to other facilities (1.1%), discharged (33.6%), and transferred to the wards (54.3%). However, there was no statistically significant difference in patient outcomes ($P = 0.057$) [Table 5].

DISCUSSION

The mean age of the patients in this study was 49.8 ± 19 years and implied a higher burden of diseases in the economically productive age group. This finding is consistent with previous studies conducted in sub-Saharan Africans,^[8,9] but higher than the findings of other studies.^[6,10] The relatively reduced life expectancy in developing countries may be the reason for the decreased number of elderly patients documented in this study.^[9]

In this study, the pattern of admissions revealed an upward number of patients admitted over 5 years. This finding was in agreement with previous studies where they all reported a consistent increase in the admission rate for a defined population over the past decade.^[8,11]

Table 4: Five-year pattern of admission based on diagnostic criteria

Diagnosis	Frequency, n (%)
Cardiovascular	856 (9.1)
Endocrinology (Diabetic Ketoacidosis)	653 (6.9)
Respiratory	594 (6.3)
Infectious	1462 (15.5)
Gastrointestinal Tract	519 (5.5)
Hematology	538 (5.7)
Nephrology	330 (3.5)
Neurology	434 (4.6)
Toxin and poisons	189 (2.0)
Orthopedic	1359 (14.4)
Neurosurgery	359 (3.8)
General surgery	783 (8.3)
Plastic surgery	821 (8.7)
Urology	292 (3.1)
Ophthalmology	123 (1.3)
Ear, nose, and throat	123 (1.3)
Total	9435 (100.0)

The implication of this finding may reflect the actual burden of diseases in the immediate environment and may help the health facilities to have a plan.^[8] However, a reduction in the number of admitted patients was documented in 2016 when compared with 2015 and 2017. The reason for this could be due to 2 months of industrial unrest embarked upon by all categories of health workers as a result of leadership crisis that rocked the hospital.

In this study, the admission rate was found to be higher in April–October. This is consistent with the previous study,^[7] but opposite to other studies.^[1,8,12] The increased number of admissions from April to October may be due to the peak of rainfall and malaria incidence in Southwestern Nigeria.^[5,11] The relative low admission rate recorded from November to March is attributed to harvest and planting activities during that period, given the fact that the majority of the patients in this study were rural dwellers, and farming was a common occupation in the study area.

The present study documented a total of 9435 disease patterns from the 5944 patients indicating that some patients visited the hospital with more than one primary ailment. Furthermore, medical cases accounted for 58.9% of all admissions and are in agreement with a study in Nigeria, where it was reported that medical cases contributed to the larger percentages of admissions in AED.^[4] However, our finding was higher than 45.4% documented in a study by Woyessa *et al.* in Ethiopia,^[8] and this could be due to the difference in the setting and the sociodemographic characteristics of the study population. Besides, the present study showed that CDs and NCDs are closely related in the proportion of their admissions. This finding is consistent with recent studies in urban and suburban centers of developing countries.^[3,4] The observation of increasing transition toward NCDs may be due to widespread awareness and improved administration of vaccines and supplements against the CDs, which

Table 5: Treatment outcome of admission between January 2015 and December 2019

Variable	Year					Total, n (%)	χ^2	P
	2015, n (%)	2016, n (%)	2017, n (%)	2018, n (%)	2019, n (%)			
Treatment outcomes								
Death	33 (2.9)	47 (4.3)	43 (3.7)	39 (3.2)	59 (4.5)	221 (3.7)	20.552	0.057
DAMA	83 (7.3)	80 (7.3)	88 (7.5)	80 (6.6)	105 (7.9)	436 (7.3)		
Referred to other facilities	140 (1.2)	11 (1.0)	12 (1.0)	11 (0.9)	15 (1.1)	63 (1.1)		
Discharged	367 (32.3)	332 (30.4)	359 (30.7)	461 (37.8)	478 (36.1)	1997 (33.6)		
Transferred to other wards	638 (56.2)	623 (57.0)	669 (57.1)	630 (51.6)	667 (50.4)	3227 (54.3)		
Total	1135 (100.0)	1093 (100.0)	1171 (100.0)	1221 (100.0)	1324 (100.0)	5944 (100.0)		

DAMA=Discharged against medical advice

have been identified in the past as being responsible for most morbidity and mortality in developing countries.^[9,13] Other previous studies have also attributed this observation to the increasing adoption of a westernized lifestyle in addition to improved personal and environmental hygiene in some parts of developing countries including Nigeria.^[11,14]

The most common diagnosed NCD was cardiovascular disease (CVD). This finding has also been previously documented in urban centers.^[4,15] This supports the recent WHO reports that CVD is a leading contributor to the global disease burden.^[10,15] The increased number of patients with cardiovascular disease in this study may be due to poor awareness of cardiovascular risk factors and poor access to health care as documented in similar studies in rural Nigeria.^[6,9] Similarly, the most frequently diagnosed CDs in this study was an infectious disease which is consistent with the finding by Umar *et al.* in Nigeria.^[4] Lack of potable water, poor personal hygiene, and poor environmental sanitation have been linked to the occurrence of high incidence of CDs in developing countries.^[4]

In this study, surgical cases accounted for 41.1% of all admissions with orthopedic being the most frequently diagnosed. This finding is similar to 36.8% found by Karim *et al.* in Bangladesh,^[16] but higher than 27.2% found by Onyemaechi in Nigeria.^[16] This variation may be affected by the difference in geographical, sociodemographic, and environmental factors.^[15,17]

The treatment outcomes in this study varied with the patient's demographic and clinical characteristics. The admission outcomes appeared to be good concerning the number of patients that were successfully treated and discharged, including the proportion of those that were referred to other facilities for the continuation of care. The mortality rate of 3.7% recorded in this study was <11.4% reported in the study conducted in South-East Nigeria,^[17] and 11.6% reported in the study conducted in North-East Nigeria.^[4] The lower mortality rate in our study compared to the other studies may be because the other studies were conducted in urban centers. These locations have been linked to higher fatalities from RTAs, gunshots, burns, and other crimes, which are less frequent in rural areas like the study center.^[6,18] In the same vein, the proportion of patients that were lost to DAMA (7.3%) was a source of concern. Some DAMA patients lacked

the funds to pay for the services required. Some patients lose all hope, especially when recovery is slow, and prefer to die at home or obtain treatment elsewhere. Some with fractures or limb gangrene fear limb amputation and seek treatment from alternative medical practitioners.^[19] Therefore, effective, sustained health education and communication strategies may be needed to improve treatment outcomes. Continuing enrollment of citizens on the National Health Insurance Scheme (NHIS) should be intensified to reduce the incidence of DAMAs due to financial constraints in our hospitals.^[20]

Limitations

The study was a retrospective, single-center, hospital-based. Hence, it may be subjected to referral bias and might not reflect the actual pattern of admissions and outcomes in Nigeria. Therefore, a multi-centered study is recommended for future research.

CONCLUSION

The forgoing results showed that the number of admissions increased over 5 years and peaked between April and October. Medical cases were the most frequent cause of admission. Infectious diseases and orthopedic cases were the frequently diagnosed cases of admissions. The mortality rate was 3.7%, and the proportion of DAMA patients was a source of concern. Our findings provide an impetus for prospective research on these outcomes.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Research quality and ethical statement

Appropriate approval was obtained from the study center's institutional ethics committee with reference number ERC/2020/08/25/402A. Clinical trial registration was not done as it was an observational study. The authors declare that they followed the applicable EQUATOR network (<https://www.equator.network.org>) research reporting guidelines.

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