Morbidity patterns among medical admissions at Niger Delta University Teaching Hospital, Bayelsa State, Nigeria

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Abstract

Hospital statistics on morbidity and mortality are essential in assessing disease burden, evaluation of health policies and health planning. The study aimed to determine the morbidity pattern and short-term outcome among medical admissions in the Niger Delta University Teaching Hospital (NDUTH), Bayelsa State, Nigeria. This retrospective 7-years disease audit was carried out in the medical wards of NDUTH, Bayelsa State, Nigeria. Information extracted included name and gender of patients, diagnoses and disease outcomes. One thousand, one hundred and twenty five (60.5%) females and seven hundred and thirty three (39.5%) males had complete records and were therefore used for the analysis. The mean age of the patients was 50.14±16.66 years with males being older (p<0.001). Non-Communicable Diseases (NCDs) accounted for a majority of cases (1270; 68.4%) while 588 (31.6%) were Communicable Diseases (CDs) NCDs were more prevalent among males and older individuals (p<0.03; p<0.001) and showed a rising trend over the years. CDs were however the leading cause of morbidities among females. The commonest diagnoses among males were retroviral disease, stroke, heart failure, pulmonary tuberculosis, diabetes and renal disease with women showing a similar trend except that heart failure replaced stroke as the second commonest morbidity while stroke came third, followed by diabetes, renal disease and hypertension. The all-cause mortality rates were 10.6% and 15.9% for females and males respectively. The major causes of mortality were infectious diseases and circulatory disorders for both genders. About 6.4% males and 3.8% females Left Against Medical Advice (LAMA). The pattern shows a rising prevalence of NCDs. Although CDs witnessed some decline, it however remained prevalent. The mortality rate was high while a good proportion LAMA. There is a need for strategic health programs to address this increasing tide of NCDs in our society, control CDs, and improve patient care while reducing mortality.

Introduction

Hospital based morbidity and mortality records are important because they give an idea of the health status and the diseases that are prevalent in a particular location or community. This is useful for policy makers, epidemiologists, public health specialists and other stakeholders in the health care industry in the planning, allocation and management of resources for health services, research training and development.[1] This is particularly important in developing countries like Nigeria where population based studies are rarely available and where the health system is plagued with inadequate allocation of resources in a context of poor health indices, continuous currency devaluation and poor socio-economic and infrastructural development.[2] A regular audit of cases will help to establish a trend for these diseases so that efforts and priority can be properly channeled. Medical cases have been shown to constitute 22% to 40% of all hospital admissions[3-5] and account for the most common causes of death in hospitals.[6] Studies have also shown high levels of adult mortality in the Sub-Saharan Africa (SSA) compared with reports from developed countries.[7] Africa including Nigeria currently experiencing the epidemiologic transition, has witnessed a rise in the prevalence of Non-Communicable Diseases (NCDs) such as hypertension, diabetes mellitus, malignancies, cerebrovascular diseases, coronary heart disease, congestive heart failure, and chronic kidney disease in recent years.[8] This is in spite of the fact that Communicable Diseases (CDs) have continued to prevail in these climes with occasional degeneration into outbreaks and epidemics. This implies that these regions now suffer from a double burden of diseases.[9] The World Health Organization (WHO) had predicted that by 2020, the causes of disease and deaths in SSA would have undergone a significant shift from CDs to NCDs).[10]

The aim of this study was to determine the pattern and short-term outcomes of adult medical admissions in the Niger Delta University Teaching Hospital (NDUTH), a tertiary hospital in the Niger Delta region of Nigeria. Although there have been a few similar studies involving some hospitals in Nigeria, this is the first study among medical admissions in NDUTH, to the best of the author's knowledge. Considering the peculiarities in the Niger Delta area including oil exploration, gas flaring and environmental pollution, it is possible that the pattern of morbidities and mortalities may differ from what obtains elsewhere. It would also be useful to observe the trend in disease prevalence over the years.

Materials and Methods

The study was carried out in the Niger Delta University Teaching Hospital in Okolobiri, Bayelsa State. Bayelsa is an oil rich state occupying a prominent position in the Niger Delta region of Nigeria with a population of about 2 million residents. This tertiary hospital serves as a referral centre for primary and secondary health facilities in Bayelsa and neighbouring states. It is currently the only teaching hospital in the state and hosts students of the Niger Delta University (NDU) located in Amassoma, a nearby community. The hospital also runs a postgraduate residency programme for various specialties and sub-specialties, including internal medicine with several consultants in various fields. Sub-specialty services rendered in internal medicine include cardiology, neurology, nephrology, infectious disease, gastroenterology, dermatology and respiratory medicine.

Patients requiring in-patient care beyond 24 hours are admitted from the accident and emergency centre into the 40-bedded combined medical ward having a male and female section. There is also a separate 10-bedded isolation ward for infectious cases. Patients may also be admitted directly from the out-patient department into the wards.

The study design was retrospective and involved a review of case notes of adult patients that were admitted into the medical wards of the hospital between January 2013 and December 2019. Patients less than 15-years-old (considered under the pediatric age group) and those with incomplete records were also excluded from the study.

Case notes were made available on request from the Records Department of the hospital. Patient's age, sex and diagnosis were extracted from the records. A total population study within the period under review was intended. However, because of incomplete documentation, a purposive sampling of all admissions with complete data in the male and female medical wards was eventually done. Data was subsequently entered and stored in an SPSS spread sheet.

To allow for uniformity and standardization, the International Statistical Classification of Diseases (ICD-10) with the three-digit coding system was used to classify the diseases in this study.[11] Diagnosed diseases were classified into CDs and NCDs. Non-communicable diseases were further classified on the basis of the affected systems. For instance, hypertension, heart failure, stroke and related conditions was grouped under *Diseases of the circulatory system*. Obesity, Diabetes Mellitus (DM), thyroid disease, etc. were group under *Endocrine, Nutritional and Metabolic diseases* while peptic ulcer, Gastro Esophageal Disease (GERD), diarrheal illnesses, liver, biliary and pancreatic diseases were classified under *Gastrointestinal system (GIS) diseases*. Diseases caused by micro-organisms such as bacteria, viruses, spirochaetes, helminths etc. were grouped under *Certain infectious and parasitic diseases*.

Pneumonias and other chest-related medical illnesses was categorized under *Diseases of Respiratory System* while kidney disease and related disorders were classified under *Diseases of the genitourinary system*. The diagnosis made by the supervising consultant or the most senior doctor in the unit after corroboration with the relevant laboratory or radiological investigation was the one used. For patients having multiple co-morbidities, the indication for admission was considered as the primary diagnosis while for those who had multiple admissions, each individual admission was considered as a separate one.

For the purpose of the study, patients' age was categorized into three groups: younger age (<45 years old), middle age (45-65 years old) and elderly (>65 years old). Also, disease outcome was categorized as follows: Discharged, died, referred, transferred and Left Against Medical Advice (LAMA).

Ethical consideration

Ethics approval for the study was obtained from the Research Ethical Committee (REC) of the Niger Delta University Teaching Hospital, Okolobiri with protocol no: NDUTH/REC/2020/10123. Personal identifiable information such as names were avoided during the data entry process and alternatives such as serial numbers used in its stead. All data retrieved was kept privately and with strict confidentiality. To protect from unauthorized use, electronic data was password-protected and encrypted.

Data analysis

Data was analysed using IBM Statistical Product and Service Solutions (SPSS) version 20.0. Simple descriptive statistical analysis was performed including measures of dispersion such as mean, standard deviation and range. Differences between means of quantitative variables such as age, was analysed using the independent t test. Frequency and cross-tabulation were used for categorical data and differences between groups analysed with chi square. Results were presented in forms of tables and charts. A p-value of <0.05 was considered significant.

Results

Characteristics of participants

There were 1858 admitted patients with available data out of which females comprised 1125 (60.5%) while males were 733 (39.5%). No record of admitted male patients was however found for the year 2014. The mean age of the patients was 50.14±16.66 years (males was 52.67±16.44, females was 48.49±11.25) with ages ranging from 15-98 years. Males were significantly older than females (t = 5.328, p<0.001). Seven hundred and fifty one patients (40.4%) were young, 745 (40.1%) were middle aged while the remaining 362(19.5%) were elderly.

Pattern of diseases

NCDs accounted for a vast majority of diagnoses (1270; 68.4%) while 588 (31.6%) diagnoses were CDs. Although NCDs were prevalent across both genders, it was more among males (p=0.03). CDs were the leading cause of morbidities among females. All age groups also had a high prevalence of NCD, but it was more common in older individuals (p<0.001) Table 1.

The common diagnoses reported among the male patients were retroviral disease, stroke, heart failure, DM, pulmonary tuberculosis and renal disease. The trend was quite similar for women except that heart failure replaced stroke as the second most com-

mon morbidity with stroke coming third and DM, renal disease and hypertension following in that order. The miscellaneous causes included other causes grouped together for the purpose of this study (Table 2).

The classification of the morbidities encountered according to ICD-10 category is shown in Table 3. Infectious and parasitic diseases constituted the highest disease burden among females in 385 (34.2%) with diseases of the circulatory system coming next (344; 30.6%). On the other hand, diseases of the circulatory system were the most common among males, found in 254 (34.7) closely followed by infectious/parasitic diseases in 204 (27.8%). For both gender, infectious/ parasitic diseases and diseases of the circulatory system put together accounted for up to three-fifth of total cases. Diseases of the digestive system, endocrine/nutritional/metabolic diseases as well as diseases of the genitourinary system were also commonly reported for both gender.

Diseases of skin and subcutaneous tissue and external causes of morbidity and mortality were rarely reported as causes of medical admission (Tables 3 and 4).

There was generally an increase in trend of NCDs across the years for both genders except for the years 2016 /2017 where there was a sharp decline in rate for males (Figure 1) and 2016 for females (Figure 2).

Short term outcome of patients

Out of the 989 female patients who had their disease outcome documented, one hundred and five patients died while 107 males died out of 674 patients giving a mortality rate of 10.6% and 15.9% for females and males respectively with an overall mortality rate of 12.7%. While 834 (84.3%) females were discharged, 38 (3.8%) left against medical advice. Similarly, while 513 (76.1%) males were discharged, 43 (6.4%) left against medical advice (Figure 3).

The major causes of mortality documented were infectious diseases (47; 44.8%) and circulatory disorders (26; 24.8%) for females and 37 (34.6%) and 35 (32.7%) for males respectively. All-cause mortality was significantly higher among males (x^2=9.965, p=0.002).

The disease specific mortality rates among women were highest for retroviral disease (45; 42.9%), followed by stroke (19; 18.1%), congestive cardiac failure (9; 8.6%), chronic kidney disease (7; 6.7%) and DM (6; 5.7%). Patients who died from HIV (mean age 40.09±8.36 years) and congestive cardiac failure (mean age 41.14±17.08 years) were significantly younger than those dying from stroke (mean age 54.53±16.25 years) and CKD (mean age 47.60±17.27 years)

The major causes of mortality among males were retroviral disease (27; 25.2%), stroke (20; 18.7%), chronic liver disease, (9; 8.4%), congestive heart failure (8; 7.4%), diabetes (7; 6.5%), pulmonary tuberculosis (7; 6.5%) and chronic kidney disease (7; 6.5%). Male patients who died from HIV (mean age 44.63±9.904) were also significantly younger than those dying from stroke with mean age of 64.75±18.90 years (p<0.001).

Table 1. Disease category in relation to age group and gender.

Variable	Total	CD Category (%)	NCD Category (%)	p-value
Age group				
Young	751	359(47.8)	392(52.2)	< 0.001*
Middle aged	745	177(23.8)	568(76.2)	< 0.001*
Elderly	362	52(14.4)	310(85.6)	< 0.001*
Gender				
Male	733	203(27.7)	530(72.3)	0.03*
Female	1125	385(34.2)	740(65.9)	0.03*

CD: Communicable Diseases; NCD: Non-Communicable Diseases; χ²: chi-square.

Table 2. The causes of morbidities among the patients.

Diagnosis	Total n (%)	Male n (%)	Female n (%)
Retroviral disease	385(20.7)	96(13.3)	289(25.7)
Stroke	219(11.8)	94(12.7)	125(11.1)
Heart failure	217(11.7)	82(11.1)	135(12.0)
Diabetes	180(9.7)	67(9.1)	113(10.0)
Hypertension with emergencies	115(6.2)	43(5.9)	72(6.4)
Pulmonary tuberculosis	139(7.5)	80(10.9)	59(5.3)
Renal disease	118(6.4)	44(6.0)	74(6.6)
Chronic liver disease	73(3.9)	38(5.2)	35(3.1)
Sepsis	47(2.5)	24(3.3)	23(2.1)
Miscellaneous*	365(19.6)	165(22.5)	200(17.7)
Total	1858(100.0)	733(100.0)	1125(100.0)

*Miscellaneous includes less commonly encountered diseases grouped together such as malaria, gastroenteritis, peptic ulcer disease, meningitis, alcohol and drug related conditions, asthma, chronic obstructive airway disease, sickle cell disease, hematologic malignancy, etc. for the purpose of the study.

Discussion

Our findings of cardiovascular and infectious diseases as the overall most common cause of medical admission in this study agree with previous reports.[2,12] Also, circulatory disorders ranked highest among men and was closely followed by infectious diseases. It is believed that men develop cardiovascular disease at a younger age, compared with women, a phenomenon that is partly explained by a protective effect of female sex hormones during premenopausal life.[13] On the other hand, infectious diseases constituted the highest burden of female medical admissions with HIV being largely responsible. The higher prevalence of HIV infection among females compared with males in many regions has been reported since the onset of the HIV epidemic.[14] Gender inequalities in prevalence has been attributed to the differences in distribution of predisposing factors. For instance in SSA, the lower socio-economic status of women, the greater tendency to be uneducated and unemployed, unequal power relationship and subordinate positions and other socio-cultural factors such as increased likelihood of receptive intergenerational sex, abuse and rape have all contributed to the increased spate of the infection among the female populatioo.[15] Even though SSA is home to only 12% of the global population, it is said to account for up to 71% of the global burden of HIV infection.[16] Pulmonary tuberculosis was second to HIV as a leading cause of infectious disease for both genders in the population. TB was also the most common co-morbid infection observed in the HIV patients. This deadly duo of tuberculosis with HIV infection is recognized in literature.[17] Despite the fact that malaria is endemic in our environment, it was not commonly reported. This is possibly because most cases of adult malaria are treated on an out-patient basis and are only seldom admitted except for severe cases.

Akoria *et al.* also reported cardiovascular disease as being next to HIV infection among females.[12] In that study, heart failure was the most common cardiovascular morbidity reported among females while stroke was the leading cause of morbidity among males in keeping with our findings. Age-specific stroke rates are known to be generally higher in men until much later in life when gender differences tend to equalize.[18] In South Africa, cardiovascular disease was identified as the second leading cause of death after HIV accounting for up to 40% of deaths among adults.[19] It has long been projected that developing nations including African countries will account for the major part of the increase in cardiovascular disease prevalence worldwide.[20]

The study shows a double burden of diseases but with a relative increase in NCDs compared with CDs over the study period. The reason for this reported decline is not clear. The changing epidemiologic transition in Africa, including Nigeria has seen cardiovascular diseases gradually replace infectious disease as the leading cause of morbidity and mortality in communities.[21] There was

Table 3. Classification of diseases encountered according to the ICD 10 classification.

ICD 10 disease Classification	Total	Male n (%)	Female n (%)
Infectious and parasitic diseases	588 (31.6)	204(27.8)	384(34.1)
Diseases of Nervous system	34(1.8)	13(1.8)	21(1.9)
Diseases of Digestive system	142(7.6)	61(8.3)	81(7.2)
Diseases of Respiratory system	47(2.5)	25(3.4)	22(2.0)
Diseases of circulatory system	599(32.2)	254(34.5)	345(30.7)
Supplementary factors related to morbidity and mortality not classified elsewhere	2(0.1)	127(6.8)	2(0.3)
Diseases of genitourinary system	49(6.7)	0(0.0)	78(6.9)
Endocrine, nutritional and metabolic diseases	194(10.4)	75(10.2)	119(10 .6)
Mental and behavioural disorders	22(1.2)	14(1.9)	8(0.7)
Diseases of blood and blood forming organs	41(2.2)	17(2.3)	24(2.1)
Diseases of musculoskeletal system & connective tissue	20(1.1)	4(0.5)	16(1.4)
Malignant Neoplasm	23(1.2)	12(1.6)	11(1.0)
External causes of morbidity and mortality	4(0.2)	1(0.1)	3(0.3)
Symptoms and signs and abnormal clinical and laboratory findings	8(0.4)	1(0.1)	7(0.6)
Diseases of skin and subcutaneous tissue	7(0.4)	6(0.5)	1(0.1)
Total	733(39.5)	6(0.5)	1125

n: frequency.

Table 4. Disease-specific mortalities for the most common diseases among male and female patients.

Disease	Mortality		
	Total	Male n (%)	Female n (%)
Retroviral disease	72(40.9)	27(31.8)	45(49.5)
Stroke	39(22.2)	20(23.5)	19(20.9)
Congestive heart failure	17(9.7)	8(9.4)	9(9.9)
Chronic kidney disease	14(8.0)	7(6.5)	7(7.7)
Diabetes	13(7.4)	7(8.2)	6(6.6)
chronic liver disease	12(6.8)	9(10.6)	3(3.3)
Pulmonary tuberculosis	9(5.1%)	7(8.2)	2(2.2
Total	176(100.0)	85(100.0)	91(100.0)

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a rise in prevalence of NCDs with a relative decline of infectious diseases for both genders over time. Similarly, NCDs accounted for 60.3% of total admitted cases in Enugu while CDs made up 39.3% of the cases.[22] The relative decline in CDs mirrors the recent drop in HIV prevalence estimates and reduction in new infections that have been attributed to better health surveillance system.[23] NCDs have been projected to account for more than half all deaths by 2030 in SSA.[24] The increasing trend in prevalence of these NCDs may be related to changes from traditional African lifestyle and dietary pattern to increased urbanization, sedentary lifestyle, consumption of refined foods and increasing obesity characteristic of western society.

Other non-communicable diseases such as DM, hypertension and heart disease as well as renal diseases were also commonly reported. DM was the most common endocrine/nutritional disorder occurring in 83.3% of cases. This is not surprising as previous reports show the prevalence of DM rising to alarming levels in Africa with the highest potential for an increase in burden by 156% in 2045.[25,26] Also, about 1 in 17 Nigerian adults currently live with DM.[27]

Diseases of the digestive system ranked fourth among leading causes of morbidity in our population followed by diseases of the genito-urinary tract. This is not much different from the findings of Ogun *et al.* in south-western Nigerian where gastro-intestinal diseases was among the third leading causes of morbidity while genito-urinary diseases and neurological diseases came 4th and 2nd respectively.[3] However, the disease classification system used in that study was different from ours. While they classified stroke under neurological diseases in their study we classified it under disease of the circulatory disorders in ours in line with the ICD 10 classification. Also notable among the disease of the genito-urinary system was chronic kidney disease, which has been reported to have a high burden in SSA.[28]

External causes of morbidity and mortality such as conditions secondary to trauma and diseases of the skin and subcutaneous tissue were infrequently encountered in our study. Trauma related cases are usually not admitted in medical wards except patients have a co-morbid medical illness. Skin lesions are usually treated on an out-patient basis without a need for admission except in severe cases.

The overall mortality rate of 12.7% in this study is comparable to studies done in similar settings in Nigeria. Odenigbo et al reported an overall mortality of 12.9%[29] while a rate of 16% was reported by Adeoti *et al.*[30] In this study, we found a significantly higher rate of all-cause mortality among males compared with females consistent with other reports.[31] Patients with HIV/ AIDS and stroke had the highest mortality as corroborated by the findings of Ezeala-Adikaibe *et al.*[32]

The study also shows that over 5.2% of admitted males left the hospital against medical advice compared with 3.4% of females. Reported rates of LAMA vary across centres and socio-cultural backgrounds. Ogunmola *et al.* and Fadare *et al.* reported rates of 4.5% and 7.2% in South West Nigeria respectively[33,34] while Akande *et al* in North Central Nigeria found a much lower rate of 3.3%.[35] However there was no age exclusion in Akande *et al.*'s study and paediatric cases were included. Other factors that may account for these differences in the rates include economic variations and differences in study setting. Leaving against medical advice is however a cause for concern as patients who self-discharged against medical advice have been found to carry a significantly increased risk of readmission and death.[36] Reasons for LAMAs among patients have been adduced to poverty, faulty socio-cultural or religious beliefs and ascribing cause of illness to
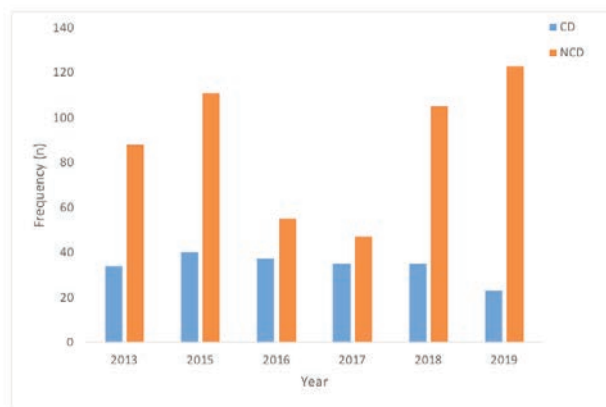

Figure 1. Morbidity patterns among males. CD: Communicable Diseases; NCD: Non-Communicable Diseases.
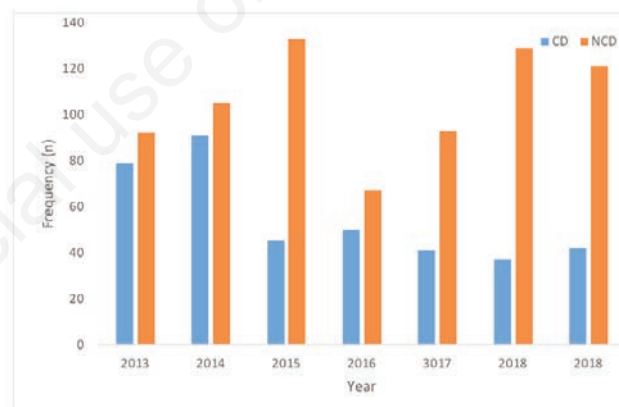

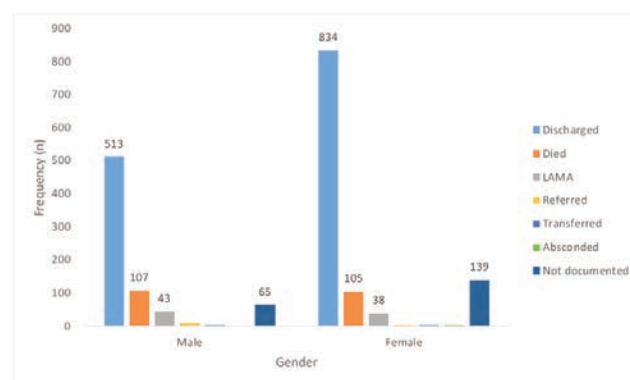**Figure 2. Morbidity patterns among females. CD: Communicable Diseases; NCD: Non-Communicable Diseases.**

Figure 3. Short-term outcome of medical admissions. LAMA: Left Against Medical Advice.

spiritual attacks.[33]

This study brings to limelight the poor health record-keeping characteristic of health institutions in Nigeria as no data was found for an entire year among admitted males. This may partly explain the smaller number of males in the study. It is likely though that entry had been made but overtime the books had become mutilated or damaged. This buttresses the need for digital storage of data in medical records department of hospitals. Advantages of electronic records include less susceptibility to physical wear and tear and lower requirement for manpower. Others include reduced medical errors, financial and operational benefits, compactness of data, ease of access to information and improved ability to conduct research.[37] Unfortunately however, the use of paper filing, with all its flaws still dominates the record keeping system in most hospitals in Nigeria. Factors that have been adduced to this may include high upfront acquisition costs of digital equipment, ongoing maintenance costs, and disruptions to workflows resulting from need to learn a new system and reluctance to change among staff.[12, 37]

The study however had some limitations. Since the study design was retrospective in nature, we could only make use of data that had been pre-collected. There were cases of incomplete information and missing data. Certain information of potential interest such as the duration of admission for the patients were not captured in the study. The causes of mortality were clinically determined by the doctor who certified the patient dead in most cases without a post-mortem examination.

Conclusions

In conclusion, we have done a 7-years audit of the admitted medical cases in a tertiary hospital in Bayelsa State. The most commonly reported diseases were HIV/AIDS, stroke, heart failure, chronic liver disease and renal disease. The study has shown an increasing toll from NCDs over the years while CDs have continued to remain a burden. Another disturbing finding is the high rate of LAMA and mortality among admitted patients. There is therefore need for government and other stakeholders of the Nigerian health care industry to put strategic measures in place at all levels of health care for the prevention and prompt management of cardiovascular and other non-communicable diseases to reduce mortality while strengthening the already existing infection control policies.

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