Original Article

Patterns and outcomes of cardiovascular disease admissions in the medical wards of the Rivers State University Teaching Hospital, Port Harcourt, Nigeria: A two-year review.

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Abstract

Background: Cardiovascular diseases (CVD) are widespread and significantly contribute to global mortality with a rising prevalence in developing countries. The aim of this study was to identify the pattern and outcome of admissions related to cardiovascular diseases within the medical wards at the Rivers State University Teaching Hospital.

Methodology: The study was a retrospective cross-sectional hospital-based study. The records of all patients admitted into the medical wards from January 2021 to December 2022 were extracted to include information on biodata, admitting diagnosis, duration of admission, and patients' outcomes.

Results: Over this 2-year period, a total of 1,540 patients were admitted into the wards and751(48.8%) persons were admitted for CVDs with a mean age of 59.6±15. 1years.The commonest cardiovascular diseases documented included heart failure (HF) and cerebrovascular accident (CVA) which occurred in 251(33.4%) and 311(41.1%) patients respectively. Other CVDs recorded were hypertensive crisis in 163(21.7%), acute coronary syndrome (ACS) in 12(1.6%) and pulmonary embolism (PE) in 6(0.8%) patients. During the study period, 311 deaths were recorded representing 20.2% of all admissions with 146(46.6%) hospital deaths attributed to CVDs, accounting for 19.4% of the total cardiovascular admissions with 125 of these deaths occurring in patients with CVA and HF.

Conclusion: Heart failure and Cerebrovascular accidents emerged as significant contributors to the morbidity and mortality of patients on admission in Rivers State. Policies to incorporate appropriate, preventive and management strategies in the community to reflect this distribution are essential to significantly reduce cardiovascular deaths in our population.

Keywords: Cardiovascular Diseases; Medical Wards; Mortality; Nigeria.

Quick Response Code:

Introduction

The cluster of disorders that affect the heart and blood vessels constitute what is typically referred to as Cardiovascular diseases (CVDs)[1]which have been noted to contribute significantly to mortality worldwide accounting for a third of all deaths globally in 2019according to the World Health Organization (WHO),of which, a staggering 77% occurred in low- and middle-income countries, including Sub-Saharan Africa (SSA).[2]

Over the past twenty years, the burden of non-communicable disease has steadily been on the rise in sub–Saharan Africa, the bulk of this increase has been said to be a result of cardiovascular diseases.[3,4] This rise in cardiovascular diseases can be attributed to the mounting incidence of cardiovascular risk factors many of which are modifiable including hypertension, diabetes, dyslipidaemia, physical inactivity, unhealthy diet, stress, and air pollution;[5]with a projection that by 2030, non-communicable diseases, currently the second leading cause of death in sub-Saharan Africa will overtake communicable, maternal, neonatal, and nutritional (CMNN) disease to be the leading cause of death.[3]

Information on disease prevalence in communities is of vital importance and while community surveys accurately elucidate the burden of diseases, in Nigeria and in most SSA countries, these studies are sparse due to problems of logistics, lack of reliable databases and registries, and the high cost of implementing them.[4] Hospital-based studies can however provide indirect evidence of the burden of disease in the general population and are infinitely easier to carry out in the absence of a population-based study. Various hospital-based studies from different regions in Africa [5-7] and geological zones within Nigeria [4,8] differ with the inclusion of stroke as a cardiovascular disease, however, they all agree on the enormous contribution of cardiovascular diseases to in-hospital morbidity and mortality in the medical wards.

The prevalence of cardiovascular disease admissions and mortality has increased progressively over the past few decades and a couple of studies have described this temporal trend[4,6] with Appiah et al over a ten-year period reporting a 78% increase in CVD admissions and a 102% increase in hospital deaths from a cardiovascular nature.[6]These findings provide strong evidence of the epidemiological transition from communicable infectious diseases to a preponderance of chronic non-communicable diseases in various hospitals across developing countries including Nigeria.

The top causes of cardiovascular admissions into the medical wards consistently remain cerebrovascular accidents and heart failure, [4-8] while hypertensive diseases or complicated hypertension [7,8] closely follow behind. Whereas up to 85% of deaths from CVDs have been attributable to ischaemic heart disease and stroke worldwide,[2] the pattern in Nigeria differs as a hospital-based study reported more deaths from stroke and heart failure. [8] Differences may be ascribed to the patient population as hospital-based studies may not be fully representative of the entire population, as well as racial differences and variations in risk factors. [4,5]

The aim of this study was to identify the patterns of cardiovascular disease admissions into the medical wards, as well as describe the outcomes of these cases at the Rivers State University Teaching Hospital, with a view to determining the disease and mortality trend in this environment.

Methodology

This study area was the Rivers State University Teaching Hospital (RSUTH) which is in Port Harcourt, the capital of Rivers State, in the South-South region of the Federal Republic of Nigeria. It is a tertiary hospital owned and funded by the Government of Rivers State and serves a population of 7.4 million people of Rivers State in addition to an unestimated population from neighbouring states. The hospital contains 405 beds, of which, 90 beds are in the medical wards.

The study design was a retrospective cross-sectional hospital-based study from the period of January 2021 to December 2022.The records of all patients aged 18 years and above who were admitted into the medical wards during the study period were included. Patients with incomplete data or those aged less than 18 years were excluded from the study. The admission, discharge, and mortality registers of the male and female medical wards were utilized to extract information on biodata (age, sex), admitting diagnosis, duration of admission, and patients' outcome of all admissions over this two-year period. All the diagnoses were based on the final diagnoses made by the supervising consultants. These were arrived at on a combination of clinical and laboratory parameters of patients. The records of the patients admitted under the Cardiology unit with cardiovascular diseases were further extracted and analysed. Ethical approval was obtained from the Health Research and Ethics Committee of the hospital. (RSUTH/REC/2023378).

The data were analysed with Statistical Package for the Social Sciences (SPSS) version 25. The categorical variables were presented as proportions and percentages while numerical variables were presented as means and standard deviations. Chi-square and Fisher's exact test were used to test for significant relationships between variables and a p-value of <0.05 was considered statistically significant.

Results

In this two-year retrospective review, a total of 1,540 patients were admitted into the medical wards. The mean age was 55.7 ± 16.8years (range of 18 to 103years) and whereas 752 (48.8%) were women, 788 (51.2%) were men, with a male-to-female ratio of 1.05:1. Out of this total number, 751 patients were admitted for cardiovascular diseases which represent 48.8% of recorded cases. The mean age of the patients with cardiovascular diseases was 59.6 ± 15.1years (range of 18 to 100years) with almost half of the participants aged between 51 to 70years, and a slight male preponderance as 380(50.6%) were men as shown in Table 1.

Table I. Sex and age group distribution of Cardiovascular admissions in the Medical Ward

Age group	Male Frequency (%)	Female Frequency (%)	Total Frequency (%)
18-30years	11(2.9)	8(2.2)	19(2.5)
31-40years	35(9.2)	34(9.2)	69(9.2)
41-50years	60(15.8)	67(18.1)	127(16.9)
51-60years	82(21.6)	85(22.9)	167(22.2)
61-70years	95(25.0)	83(22.4)	178(23.7)
71-80years	63(16.6)	67(17.6)	130(17.3)
≥81years	34(8.9)	27(7.3)	61(8.1)
Total	380(50.6)	371(49.4)	751(100.0)

$\chi2= 2.556$, p= 0.862

The commonest cardiovascular diseases documented included heart failure (HF) and cerebrovascular accidents (CVA) which occurred in 251(33.4%) and 311(41.1%) patients respectively. Others recorded included hypertensive crisis in 21.7%, acute coronary syndrome (ACS) in 1.6%, pulmonary embolism (PE) in 0.8%, arrhythmias in 0.4%, peripheral arterial disease (PAD) in 0.4%, and pericarditis in 0.3% of patients. As demonstrated in Table 2, HF, CVA, ACS, and pericarditis occurred in more males than females whereas hypertensive crisis, PE, arrhythmias, and PAD were more common in women; however, this difference was not statistically significant.

Table II. Distribution of cardiovascular diseases among the sexes

Cardiovascular diagnosis	Sex		Total
	Male	Female	
	Frequency (%)	Frequency (%)	
	N=380	N=371	
Heart failure	141(37.1)	110(29.7)	251
Cerebrovascular accident	158(41.6)	153(41.2)	311
Hypertensive crisis	68(17.9)	95(25.6)	163
Acute coronary syndrome	8(2.1)	4(1.1)	12
Pulmonary embolism	2(0.5)	4(1.1)	6
Arrhythmias	0(0)	3(0.8)	3
Peripheral arterial disease	1(0.3)	2(0.5)	3
Pericarditis	2(0.5)	0(0)	2

Fishers exact test =17.614, p=0.014

Whereas cerebrovascular accidents and hypertensive crises occurred more in the middle-aged and elderly patients, heart failure occurred amongst all age groups during the study period, arrhythmias occurred within the age group of 50 to 70years and pericarditis occurred in the older patients. (Table 3)

Table III. Distribution of cardiovascular diseases with age groups of the patients

Cardiovascular diagnosis	Age group (in years)						
	18-30	31-40	41-50	51-61	61-70	71-80	≥81
	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
Heart failure	10(52.6)	28(40.6)	54(42.5)	47(28.1)	49(27.5)	40(30.8)	23(37.7)
CVA	4(21.1)	22(31.9)	43(33.9)	76(45.5)	85(47.8)	60(46.2)	21(34.4)

Hypertensive crisis	3(15.8)	15(21.7)	26(20.5)	40(24.0)	38(21.3)	26(20.0)	15(24.6)
ACS	1(5.3)	3(4.3)	2(1.6)	3(1.8)	1(0.6)	2(1.5)	0(0)
PE	0(0)	1(1.4)	1(0.8)	0(0)	2(1.1)	1(0.8)	1(1.6)
Arrhythmias	0(0)	0(0)	0(0)	1(0.6)	2(1.1)	0(0)	0(0)
PAD	1(5.3)	0(0)	1(0.8)	0(0)	0(0)	1(0.8)	0(0)
Pericarditis	0(0)	0(0)	0(0)	0(0)	1(0.6)	0(0)	1(1.6)
Total	19	69	127	167	178	130	61

Fishers exact test = 4.908, p=0.093. Key: f=frequency, CVA= cardiovascular accident, ACS=acute coronary syndrome, PE= pulmonary embolism, PAD= peripheral arterial disease

Of the total number of cases admitted into the medical wards within the two years, 311(20.2%) died, of which, 146persons died due to cardiovascular disease which represents 46.6% of in-hospital total deaths, and 19.4% of total cardiovascular admissions, (figure1). Other outcomes of cardiovascular disease admissions included 552 (73.5%) persons who were discharged home and 40(5.3%) persons who signed against medical advice or absconded from the hospital as shown in Table 4.
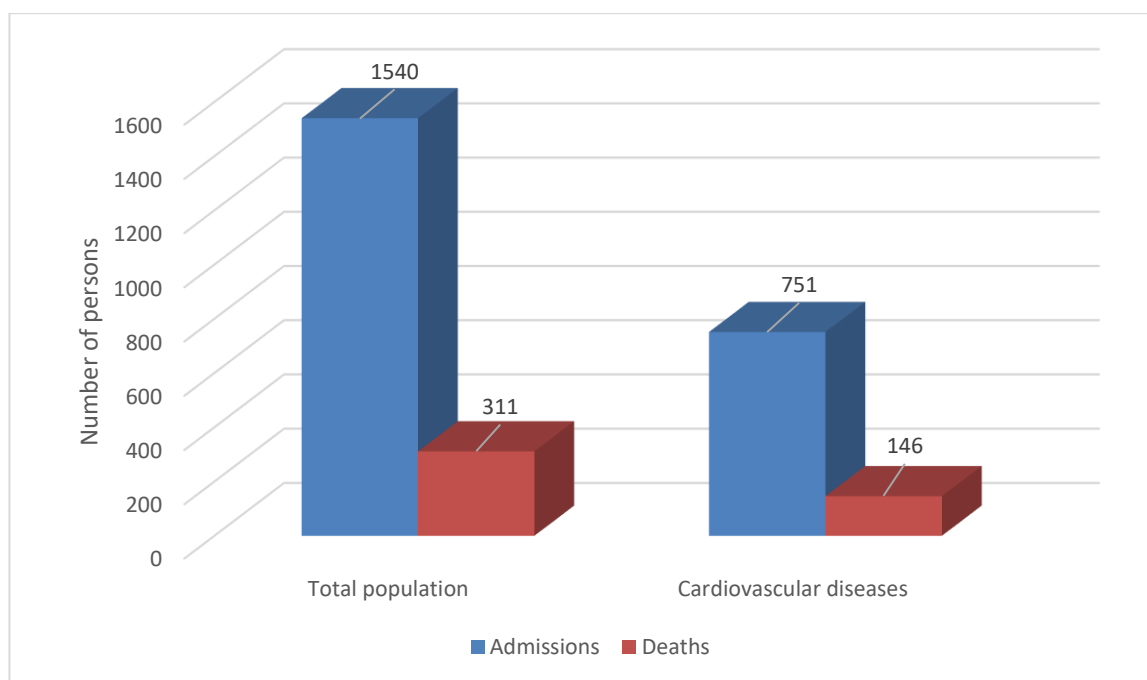

Figure 1. Total and Cardiovascular admissions and deaths

Table IV. Outcome of cardiovascular disease admission

Outcome	Frequency (%) N=751
Discharged home	552(73.5)
Deceased	146(19.4)
Transferred/Referred	13(1.7)
Signed against medical advice	40(5.3)

Among the 146 persons that died, the mean age was 62.8±14.6years with a range of 18 to 92 years and 76(52.1%) were male while 70(47.9%) were female. The greatest contributors to cardiovascular causes of mortality were CVA in 76(52.0%) persons and heart failure in 49(33.6%) persons. Others included hypertensive crisis in 19(13.0%) patients, while acute coronary syndrome and pulmonary embolism were identified as the causes of death in 1(0.7%) patient each. The distribution of cardiovascular diagnosis by gender and age groups is shown in Tables 5 and 6.

The duration of admission before death ranged between 1to52 days with a mean of 9.3±9.7days and a median of 6 days IQR (3.0 to 12.25 days). Seventy-eight (53.4%) in-hospital deaths from cardiovascular disease occurred within the first seven days, 37(25.3%) between 7-14 days, and 31(21.2%) occurred after 14days.

Table V: Distribution of cardiovascular diagnosis at death among the sexes

Cardiovascular diagnosis at death	Sex		Total
	Male	Female	
	Frequency (%)	Frequency (%)	Frequency (%)
Heart failure	27(35.5)	22(31.4)	49(33.6)
Cerebrovascular accident	42(55.3)	34(48.6)	76(52.0)
Hypertensive crisis	6(7.9)	13(18.6)	19(13.0)
Acute coronary syndrome	1(1.3)	0(0)	1(0.7)
Pulmonary embolism	0(0)	1(1.4)	1(0.7)
Arrhythmias	0(0)	0(0)	0(0)
Peripheral arterial disease	0(0)	0(0)	0(0)
Pericarditis	0(0)	0(0)	0(0)
Total	76(100.0)	70(100.0)	146(100.0)

Fishers exact test =9.317, p=0.157

Table VI. Distribution of cardiovascular diagnosis at death among the different age groups

Cardiovascular diagnosis at death	Age group (in years)						
	18-30	31-40	41-50	51-61	61-70	71-80	≥81
	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
Heart failure	2(50.0)	2(50.0)	14(66.7)	8(25.0)	12(33.3)	8(23.5)	3(20.0)
CVA	2(50.0)	2(50.0)	7(33.3)	20(62.5)	17(47.2)	19(55.9)	9(60.0)
Hypertensive crisis	0(0)	0(0)	0(0)	4(12.5)	6(16.7)	6(17.6)	3(20.0)
ACS	0(0)	0(0)	0(0)	0(0)	0(0)	1(2.9)	0(0)
PE	0(0)	0(0)	0(0)	0(0)	1(2.8)	0(0)	0(0)
Arrhythmias	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
PAD	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Pericarditis	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Total	4(100)	4(100)	21(100)	32(100)	36(100)	34(100)	15(100)

Fishers exact test=66.836, p=0.001. Key: f=frequency, CVA= cardiovascular accident, ACS=acute coronary syndrome, PE= pulmonary embolism, PAD= peripheral arterial disease

Discussion

Developing countries have traditionally demonstrated a high prevalence of infectious diseases and poverty-related morbidities and mortalities, however, a rising incidence of non-communicable diseases has resulted in a double burden of diseases in these regions.[4] This study was aimed at assessing the pattern of cardiovascular diseases admitted into the medical wards as well as describing the mortality rates from the various cardiovascular diseases.

Almost half (48.8%) of the patients admitted into the medical wards of the hospital had cardiovascular disease. This is much higher than that described in a recent African study where CVD admissions constituted over a quarter of the admissions into the medical wards [9] as well as numerous Nigerian studies which reported rates of 13.6% to 20.8% [4,8,10] in various parts of the country. This increase buttresses the fact that cardiovascular diseases are on the rise. This rising trend in cardiovascular disease admissions was demonstrated by Mbakwem et al [4] where the authors over a 16-year period reported an 847.9% increase in cardiovascular disease admissions into the medical wards of a major tertiary hospital in Lagos, Nigeria. In a meta-analysis of data on 86,307 medical admissions from in sub-Saharan African countries covering a 61-year time period, Etyang et al [11] also noted that the proportion of admissions due to cardiovascular disorders increased five-fold over the period from 3.9% of admissions to 19.9% of admissions. These data suggest that the epidemiological transition from communicable to non-communicable diseases is occurring in Nigeria, with CVD occupying a major burden.

The spectrum of cardiovascular diseases admitted and managed were predominantly cerebrovascular accident, heart failure, and hypertensive crisis, with acute coronary syndrome and pulmonary embolism trailing far behind. This pattern was also noted by various authors [4,8] both in southern Nigeria; whereas hypertension and its complications were the predominant reason for admission reported by Oguanobi et al in eastern Nigeria.[12] The reason for this may be the high prevalence of hypertension in the eastern regions as reported from a Nigerian national survey.[13]

Most Nigerian studies [4,8,9,14]reported a low occurrence of acute coronary syndromes (ACS) and this study had a prevalence rate of 1.6% but these figures are expected to increase as demonstrated in a 16-year review of cardiovascular admissions where ACS had the highest exponential rate of increase within the study period.[4]The paucity of the full range of diagnostic facilities for ACS in the various government-funded teaching hospitals may represent an underestimation of the true figures.[15]Interestingly, this study reported the occurrence of acute coronary syndrome in young persons. Whereas traditional risk factors of atherosclerotic coronary artery disease are common in middle-aged and elderly persons,[1] factors that may account for this may be the rising prevalence of both biological (hypertension, dyslipidaemia, obesity, and diabetes) and behavioural risk factors such as excess alcohol consumption, cigarette smoking, illicit drug use, unhealthy diets, sedentary lifestyle, and psychosocial stress among young persons in Nigeria.[4]

The mean age of patients admitted with CVD was 59.6 years and almost all of them were middle-aged and elderly with only 11.7% being young person's less than 40 years old. This age distribution of CVD admissions mirrors other Nigeria studies [4,12] probably because of the age dispersal of the Nigerian population. With the advent of improved health care, and better diagnostic and treatment facilities, there is an emerging need to develop geriatric cardiology to cater to elderly persons as the life expectancy of the average Nigerian increases.

Cardiovascular disease, most specifically, stroke, coronary heart disease, and heart failure is a major and largely preventable cause of death globally as reported by Lopez et al, who estimated that CVD accounted for 29% of all deaths globally.[16] In this study, cardiovascular diseases contributed to almost half of all in-hospital mortalities (46.6%) in the medical wards within the study period, with cerebrovascular accidents and heart failure accounting for the majority of these deaths. Various Nigerian studies reported the rates of death from cardiovascular disease to range from 10.3% to 32.9% [8,14,17,18] with most of these deaths occurring in patients with cerebrovascular accidents and heart failure. This huge burden of deaths in stroke patients is alarming and may be due to late presentation to the hospital in addition to the presence of comorbidities as well as complications of stroke which are widespread in our environment.[19] Dedicated stroke units for acute stroke care as well as neurosurgical facilities must be made available and affordable to improve stroke outcomes.

Pulmonary embolism is a common and serious complication of hospitalized patients,[20] and although only one patient admitted for pulmonary embolism died, routine autopsies were not carried out to determine the cause of death. A systematic review of venous thromboembolism (VTE) in Africa reported the prevalence of VTE and its associated mortality to be higher in the surgical wards and pregnant/postpartum women than in patients admitted into the medical wards[20] which may account for the low frequency in this report, however in Nigeria, a retrospective autopsy report reported that only 15.6% of patients who died of pulmonary embolism had the diagnosis made ante-mortem,[21] which implies that over 80% of patients with PE were undiagnosed and untreated and ultimately died. This emphasises the need to screen hospitalized patients to determine their venous thromboembolism risk to institute adequate mechanical or pharmacological prophylaxis [22] to prevent mortality from this disease as well as implement institutional policies for optimal and prompt diagnostic and treatment strategies for PE.

The mean age of the patients at death was 62.8years and almost two-thirds of mortality occurred in patients above 60 years. Various authors have reported worsening outcomes in elderly patients admitted into the hospital with cardiovascular disease, [9,18] possibly due to the presence of comorbidities as well as age itself. There is still a need to be aware of the causes of death in the relatively younger age groups which represent the economically viable workforce and can pose a devastating burden for low-income developing countries like Nigeria. Education of young persons and more aggressive interventions should be encouraged to mitigate risk factors for cardiovascular disease and ultimately, death.

A key limitation of this study was the absence of electronic records which may result in clerical errors typified by incomplete/missing data. Also, the hospital-based nature of this study with a lack of registries and reliable databases only provides indirect evidence of the burden of the disease in the general population.

Conclusion

Cardiovascular disease contributed immensely to the patient burden in the medical wards and contributed significantly to mortality. The spectrum of cardiovascular diseases admitted and managed were predominantly cerebrovascular accident, heart failure, and hypertensive crisis. Government policies to incorporate appropriate, cost-effective preventive and management strategies in the community are essential to significantly reduce cardiovascular deaths in our population

Disclosure of conflict of interest

The authors declare no conflict of interest.

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