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ORIGINAL ARTICLE

Impact of the COVID-19 Pandemic on Elderly Medical Admissions and Outcomes in a Tertiary Hospital in Northeastern Nigeria: A Comparative Retrospective Study

Impact de la Pandémie de COVID-19 sur les Admissions et les Résultats Médicaux des Personnes Âgées dans un Hôpital Tertiaire du Nord-Est du Nigeria

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ABSTRACT

BACKGROUND: The coronavirus infectious disease 2019 (COVID-19) has been shown to be more lethal in the elderly (>65 years), especially those with co-morbidities. This study examined the impact of the pandemic lockdown period on trends in elderly medical admissions and deaths.

METHODOLOGY: This is a retrospective study of elderly medical admissions and deaths in the medical wards of a Nigerian hospital. Data for the months of March, April, May, June, and July of 2020 was compared to the same months before (2019) and after (2021). Analysis was done using STATA version 15.0.

RESULTS: During the study period, two hundred and seventy-six elderly patients were admitted, with a mean age (±SD) of 73.4 ± 7.4 years. The most common diagnoses at admission were chronic kidney disease (CKD) (26.85%, n=74) and hypertensive heart disease (HHD) (21.7%, n=60). The highest admission was in 2021, with a total of 99 (35.9%). Overall, 60 mortalities were recorded, with a proportional mortality rate of 21.7%, which was highest in 2020 (25.0%) and lowest in 2021 (17.1%). There was no difference between the mortality rates of 2019 versus 2020 (P=0.82) and 2020 versus 2021 (P=0.18). Sepsis (35.0%) and CKD (25.0%) were the major contributors in 2019.

CONCLUSION: CKD and HHD were the most common diagnoses at admission, whereas sepsis, CKD, and CVD were the commonest causes of death. The Covid-19 pandemic did not significantly alter the elderly admission pattern in our setting. **WAJM 2022; 39(12): 1238–1244.**

Keywords: COVID-19, Elderly, Admission pattern, Mortality.

RÉSUMÉ

CONTEXTE: Il a été démontré que la maladie infectieuse à coronavirus 2019 (COVID-19) est plus mortelle chez les personnes âgées (>65 ans), en particulier celles qui présentent des comorbidités. Cette étude a examiné l'impact de la période de verrouillage pandémique sur les tendances des admissions médicales et des décès de personnes âgées.

MÉTHODOLOGIE: Il s'agit d'une étude rétrospective des admissions et des décès de personnes âgées dans les services médicaux d'un hôpital nigérian. Les données relatives aux personnes âgées pour les mois de mars, avril, mai, juin et juillet 2020 ont été comparées aux mêmes mois avant (2019) et après (2021). L'analyse a été réalisée à l'aide de STATA version 15.0.

RÉSULTATS: Au cours de la période, deux cent soixante-seize patients âgés ont été admis, avec un âge moyen et un écart-type (ET) de 73,4 7,4 ans. Les diagnostics les plus fréquents à l'admission étaient l'insuffisance rénale chronique (IRC) (26,85 %, n=74) et la cardiopathie hypertensive (HHD) (21,7 %, n=60). Le nombre d'admissions le plus élevé a été enregistré en 2021, avec un total de 99 (35,9 %). Au total, 60 décès ont été enregistrés, avec un taux de mortalité proportionnel de 21,7 %, qui était le plus élevé en 2020 (25,0 %) et le plus faible en 2021 (17,1 %). Les preuves étaient insuffisantes pour montrer une différence entre les taux de mortalité de 2019 par rapport à 2020 (P=0,82) et de 2020 par rapport à 2021 (P=0,18). Le sepsis (35,0 %) et l'IRC (25,0 %) étaient les principaux facteurs de mortalité en 2019.

CONCLUSION: L'IRC et l'HHD étaient les diagnostics les plus courants à l'admission, tandis que la septicémie, l'IRC et les MCV étaient les causes les plus fréquentes de décès. La pandémie de Covid-19 n'a pas modifié de manière significative le schéma d'admission des personnes âgées dans notre contexte. **WAJM 2022; 39(12): 1238–1244.**

Mots clés: COVID-19, Personnes âgées, Mode d'admission, Mortalité.

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Abbreviations: CAP, Community-Acquired Pneumonia;**CKD,** Chronic Kidney Disease; **COVID-19,** Coronavirus disease 2019;**CVD,** Cerebrovascular Disease; **ED,** Emergency Department; **HHD,** Hypertensive Heart Disease; **ICU,** Intensive Care Unit; **NCDs,** Noncommunicable Diseases;**PLCC,** Primary Liver Cell Carcinoma; **PTB,** Pulmonary Tuberculosis; **SARS-CoV-2,** Severe Acute Respiratory Syndrome Coronavirus 2;**UTI,** Urinary Tract Infection; **YSUTH,** Yobe State University Teaching Hospital.

INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has infected over a quarter billion people and killed more than five million people globally.[1] Africa has the least morbidity and mortality figures reported, with over 6 million cases and about 150 thousand deaths resulting from the same coronavirus disease 2019 (COVID-19).[1] However, an estimated 6 in every 7 cases of the infection in the continent go undetected.[2] This is true given that the continent as a whole has administered just above 70 million tests among its over 1.3 billion people, while the United Kingdom, which has less than one-tenth the population of Africa has administered tests four-fold that of Africa.[2] Africa's most populous nation, Nigeria,[3] reported it's confirmed COVID-19 index case on February 27th, 2020.[4] In a span of twenty-one months, it has spread to infect over 200,000 people while claiming the lives of nearly 3,000 Nigerians.[1,5] However, in Yobe State northeastern Nigeria, only 502 laboratory-confirmed cases, as well as 9 deaths, have been reported as at September 2021.[5]

The morbidity and mortality risks for COVID-19 are proportionately associated with increasing age, leaving the elderly (>65 years) population most vulnerable to the more serious forms of the infection with disproportionately heightened mortality.[6] Individuals above 60 years carry an overwhelming majority of hospitalizations as well as deaths resulting from the infection.[6,7] However, advancing age alone is not the only risk factor for developing complicated COVID-19 or dying from it. Male sex, ethnicity, and comorbidity are other associated sociodemographic factors that have also been shown to determine COVID-19 severity or mortality.[8] Association of heightened morbidity and mortality from Covid-19 with some comorbid medical illnesses, especially chronic noncommunicable diseases (NCDs) has also been established.[9] For example, chronic kidney disease (CKD) has been shown to have the closest association with COVID-19 severity risk and mortality.[10] COVID-19 has also been implicated as a risk factor for stroke,[11] and has been reported to affect stroke admissions as well as care.[11] Yonas *et al,*[12] reported a poor prognosis and a significantly accelerated mortality rate in heart failure (HF) patients hospitalized for COVID-19.

The widespread restrictions and lockdown policies imposed by governments all over the world to mitigate the effects of the COVID-19 pandemic have resulted in significant reductions in hospital admissions as well as "in-hospital" deaths.[13] Yet, these policies carry along with them some painful collateral consequences on patient admission, discharge, referral, prioritization, and to some extent the quality of care given, especially to non-COVID-19 patients.[14] For example, in a study by Wongtanasarasin *et al.,*[15] daily visits to the emergency department (ED) reduced significantly by 36%; while resuscitation, emergency level triage, ED admission as well as intensive care unit (ICU) admissions rose by 29.1%, 19.2%, 33.5%, and 28.3%, respectively, over the same period. A similar reduction in ED admissions (by 32%) was reported by Nourazari *et al* across 12 EDs in the United States.[16] Although this trend is to a large extent proportional to certain factors, including exceptions, design, tightness, and overall community compliance with the measures and policies put in place by the government, and institutions. The aberrant and rather loose trajectory of Nigeria's imposed lockdowns has played an important role in the further spread of the infection through multiple rebounds, with resultant deaths.[17]

To analyze this impact in our setting, we conducted a 15-month retrospective analysis of elderly medical admissions and deaths, 5 months before and 5 months during the lockdown period, and 5 months after, at Yobe State University Teaching Hospital (YSUTH), Damaturu, a tertiary institution in Yobe State, northeastern Nigeria. To the best of our knowledge, at the time of preparing this manuscript, this is the first study that examined the effect of covid-19 on elderly medical admission patterns and mortality in sub-Saharan Africa.

MATERIALS AND METHODS

Study Setting

This study was conducted in Yobe State University Teaching Hospital, a 200-bed tertiary health care facility located in Damaturu, Yobe State, north-eastern Nigeria. It provides a wide range of specialized services and general care for different categories of patients it receives from within the state and neighboring states. It has many fully functioning departments which include: internal and family medicine, surgery, anesthesiology and intensive care, chemical pathology, and others.

Study Design and Population

This was a retrospective study of elderly medical admissions and deaths in both female and male medical wards of Yobe State University Teaching Hospital, Damaturu, northeastern Nigeria, to measure how they were impacted by the first wave of the COVID-19 pandemic in the country. We analyzed the total number of medical admissions of the elderly (65 years and older) age group for the months of March, April, May, June, and July of 2020, which corresponds to the period of the first wave of the pandemic in the country, and during which there were consequent lockdowns measures imposed by the government to contain the nationwide spread.[18] These were then compared to the same months of the years 2019 and 2021, respectively.

Data Collection

Data was collated from the admission and discharge register of the hospital's record department, patient case notes, nurses' registers, and the monthly morbidity and mortality review.

Patients' data including age, sex, tribe, occupation, date of admission, source of admission, final diagnosis, comorbidities, duration of hospitalization, and outcome were collated. The data were entered into an Excel spreadsheet.

Outcomes

The primary outcomes desired in this study were changes in rates of admission and mortality of the elderly age group as a result of the COVID-19 pandemic and its resultant lockdown measures in northeastern Nigeria.

Data Analysis

Data were analyzed using STATA version 15.0 (StataCorp LLC, College

Station, TX, USA). Mean and standard deviation (SD) were used to summarize the age of the respondents and the duration of admission was expressed using the median (IQR). The overall number of admissions across different months and years was presented as counts and percentages. The proportion of deaths out of total admissions was calculated, for different years and months.

RESULTS

Background Characteristics of the Respondents

Out of a total of 2964 patients admitted into the medical wards of YSUTH during the study period, there were 276 (9.3%) elderly. Their age ranged from 65 to 98 years with a mean and standard deviation (±SD) of 73.4 ±7.4 years. 59.6% (n=161) of the study participants were between 65-74 years. Duration of admission ranged from 0.25–90 days with a median duration and interquartile range (IQR) of 7 (4,14) days.

Table 1 shows the background characteristics of the respondents. There were 160 (61.6%) males. About a quarter (26.1%, n=72) of the respondents were from the Kanuri tribe, and approximately a third (34.4%, n=95) lived in Damaturu town. The majority of the respondents (78.9%, n=218) were admitted via accident and emergency (A&E) and 48.9% (n=135) had at least one comorbidity in addition to the primary diagnosis at admission.

Table 1: Background Characteristics of the Respondents

Characteristic (N)	Frequency (%)
Sex (276)	
Male	170 (61.6)
Female	106 (38.4)
Age in years (270)	
65 – 74	161 (59.6)
75 – 84	78 (28.9)
85 or more	31 (11.5)
Tribe (276)	
Kanuri	72 (26.1)
Fulani	62 (22.5)
Hausa	51 (18.5)
Karai-Karai	26 (9.4)
Bade	21 (7.6)
Others	39 (14.1)
Unknown	5 (1.8)
Town (276)	
Damaturu	95 (34.4)
Potsikum	61 (22.1)
Bade	266 (9.4)
Geidam	18 (6.5)
Fune	15 (5.4)
Others	61 (22.1)
Source of admission (276)	
Accident and Emergency (A&E)	218 (78.9)
Medical outpatient department (MOPD)	24 ((8.7)
General outpatient department (GOPD)	30 (10.9)
Others	4 (1.5)
Diagnosis (276)	
Chronic Kidney disease (CKD)	74 (26.8)
Hypertensive heart disease (HHD)	60 (21.7)
Sepsis	39 (14.1)
Cerebrovascular disease	35 (12.7)
Primary Liver Cell Carcinoma (PLCC)	16 (5.8)
CAP (Community-acquired pneumonia)	13 (4.7)
Urinary Tract Infection	10 (3.6)
Pulmonary Tuberculosis	7 (2.5)
Others	22 (8.0)
Number of co-morbidities (276)	
0	98 (35.5)
1	135 (48.9)
2	42 (15.2)
3	1 (0.4)

Elderly Admissions across Five Months of 2019–2021

Table 2 shows that 276 admissions were recorded within the first five months (March to July) of 2019 to 2021. 99(35.9%) patients were admitted in 2021, with the highest admission in March (27.3% n=27). In 2020, there were 92 (33.3%) patients admitted with the highest number in March (25.0%, n=23). In 2019, a total of 85 (30.8%) admissions were recorded, out of which 27 (31.8%) occurred in April. The lowest admission rates were documented in June, May, and July for the years 2019, 2020, and 2021, respectively (Figure 1).

Mortality among Elderly Patients Admitted Across the five months of 2019–2021

Over three years, there were 60 mortalities among the respondents, with an overall proportional mortality of 21.7%. Proportional mortality was highest in 2020, 23(25.0%), and lowest in 2021, 17 (17.1%). There was insufficient evidence to show a difference between the mortality rates of 2019 versus 2020 (P=0.82) and 2020 versus 2021(P=0.18). Comparing proportional mortality across all three years, there was no significant difference in the numbers recorded.

The highest number of deaths in 2019 was recorded in May, April in 2020, and July in 2021. In 2019 and 2020, the least mortality proportions occurred in March, however, this happened in

April for the year 2021, as shown in Figure 2.

Respondents' Diagnosis at Admission

Hypertensive heart disease (HHD) was the most common reason for elderly admission in 2019, accounting for 22.4% (n=19) of all admissions. In 2020, there was a decline in the proportion of admissions contributed by HHD (14.1%, n=13); however, a steady increase in the number of CKD admissions from 2019 across all three years was noticed (16.5%, 26.1%, and 36.6%). A decline in the number of elderly admissions due to sepsis (18.8% Vs 10.9%), PTB (3.1% Vs 1.1%), and UTI (11.8% Vs 9.8%) from 2019 to 2020 were observed. Admissions due to PLCC were significantly higher in 2020 relative to 2019 (9.8% vs 1.2%, P=0.01).

Comparing 2021 to 2020, elderly admissions due to HHD significantly increased (14.1% Vs 28.3%, P=0.02), while CVD appreciably reduced (15.2% Vs 6.1%, P=0.04). Although in 2021 admissions due to PLCC (9.8% Vs 5.1%), UTI (4.4% Vs 2.0%), and CAP (7.6% Vs 2.0%) reduced from the 2020 values, there was insufficient evidence to show a significant difference in these admissions. Proportions of admissions contributed by sepsis (10.9% Vs 13.1%), and PTB (1.1% Vs 3.0%) were also seen to have increased (Table 3).

Proportional Mortality by Diagnosis

Stratifying proportional mortality by diagnosis, it was realized that sepsis (35.0%) and CKD (25.0%) were the major contributors in 2019. In the same year, elderly death due to CAP was not recorded. In 2020, CVD outdid other diagnoses to be the foremost contributor to elderly death. Chronic kidney disease contributed the most in 2021 (52.9%). Deaths due to CAP, CVD, and others were not recorded in the same year, as shown in Figure 3.

DISCUSSION

This is a comparative retrospective study that aimed at determining the impact of the COVID-19 pandemic on elderly medical admissions & mortality. Our results demonstrated that the elderly admission followed a similar pattern both before and during the pandemic. The

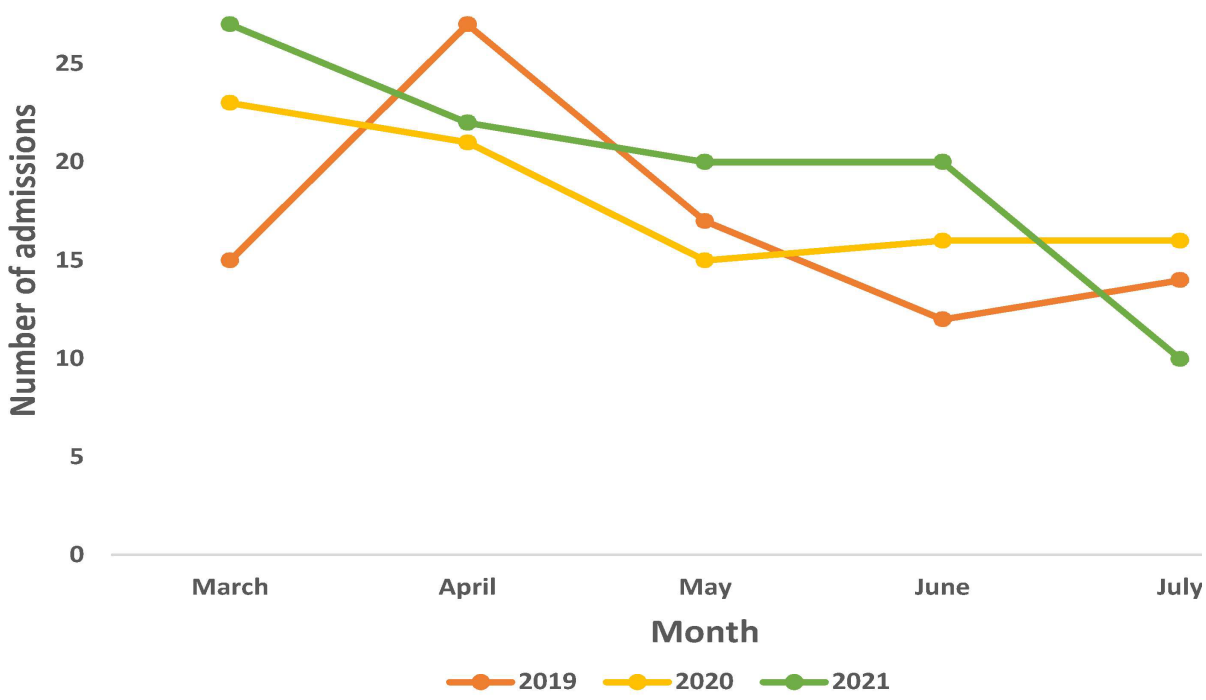


Fig. 1: Number of Admissions by month over three years.

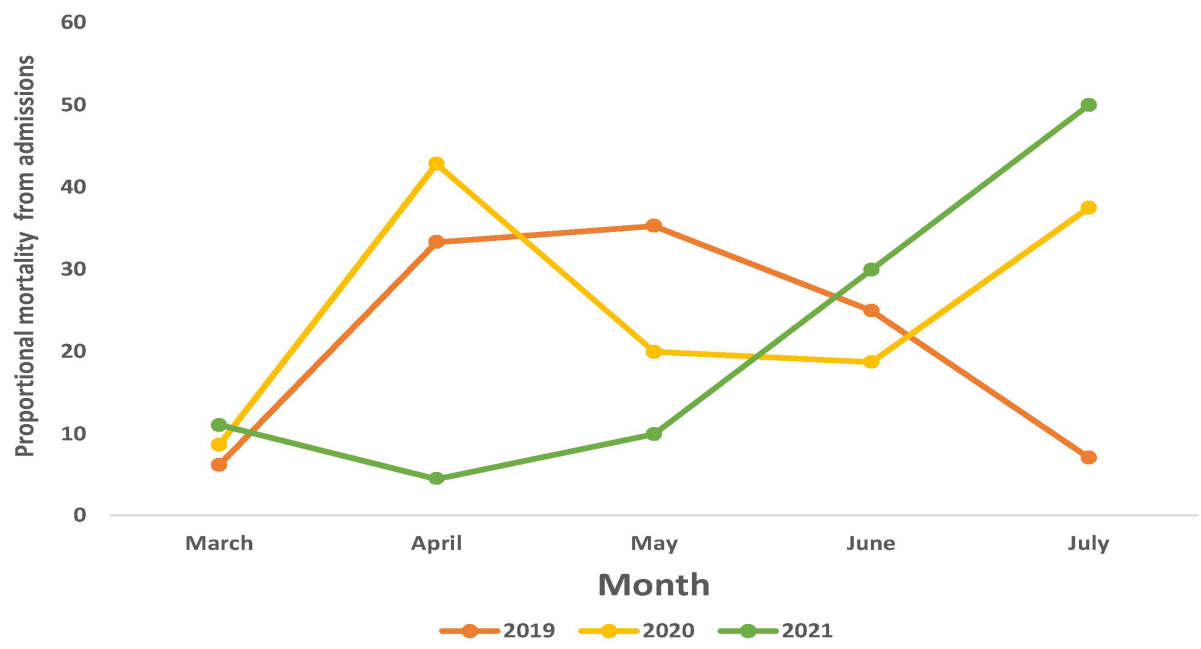
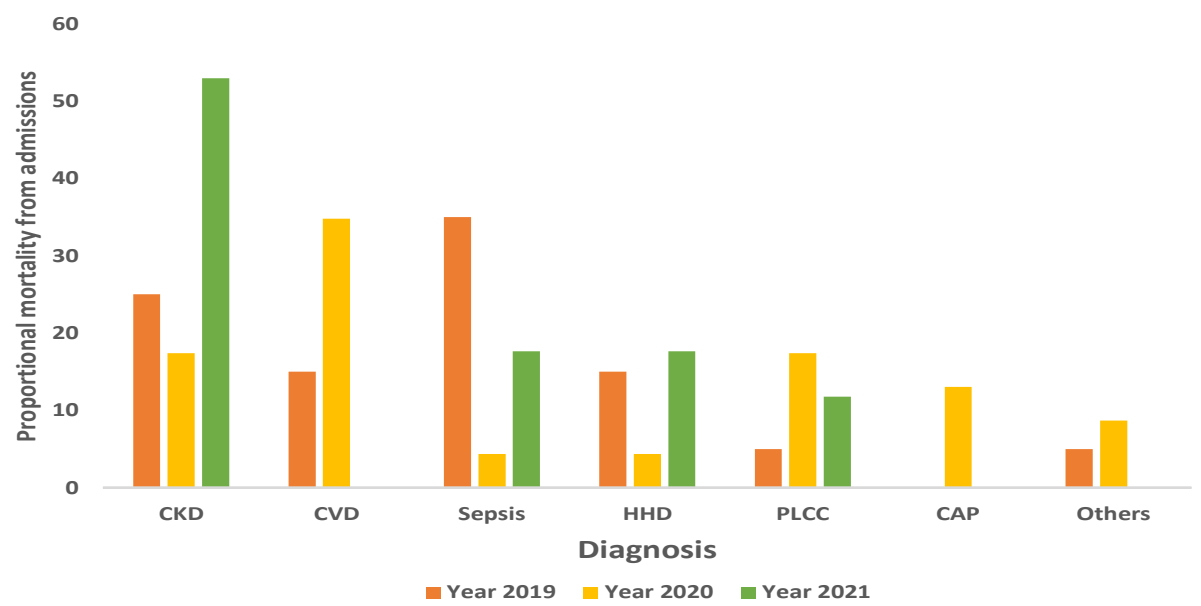


Fig. 2: Proportional Mortality by month over three years.



CKD: Chronic Kidney Disease, CVD: Cerebrovascular Disease, PLCC: Primary Liver Cell Carcinoma, HHD: Hypertensive Heart Disease, CAP: Community-Acquired Pneumonia

Fig. 3: Proportional Mortality by Diagnosis over three years

Table 2: Total Admissions and Mortality by Year

Year	Admissions	Number Dead (Proportional Mortality)	P-value[a]	P-value[b]
2019	85	20 (23.5)	0.82	
2020	92	23 (25.0)		0.18
2021	99	17 (17.1)		

[a] *Comparing 2019 to 2020.* [b] *Comparing 2020 to 2021.*

Table 3: Respondents' Diagnosis at Admission

Diagnosis	Year			Year		
	2019	2020	P-value[a]	2020	2021	P-value[b]
CKD	14 (16.5)	24 (26.1)	0.02	24 (26.1)	36 (36.6)	0.13
HHD	19 (22.4)	13 (14.1)	0.16	13 (14.1)	28 (28.3)	0.02
Sepsis	16 (18.8)	10 (10.9)	0.14	10 (10.9)	13 (13.1)	0.63
CVD	9 (10.6)	14 (15.2)	0.36	14 (15.2)	6 (6.1)	0.04
PLCC	1 (1.2)	9 (9.8)	0.01	9 (9.8)	5 (5.1)	0.21
CAP	4 (4.7)	7 (7.6)	0.42	7 (7.6)	2 (2.0)	0.07
UTI	5 (5.9)	4 (4.4)	0.64	4 (4.4)	2 (2.0)	0.36
PTB	3 (3.5)	1 (1.1)	0.28	1 (1.1)	3 (3.0)	0.34
Others	10 (11.8)	9 (9.8)	0.67	9 (9.8)	3 (3.0)	0.06

[a]*Comparing 2019 to 2020.* [b]*Comparing 2020 to 2021*
CKD: Chronic Kidney Disease, CVD: Cerebrovascular Disease, PLCC: Primary Liver Cell Carcinoma, HHD: Hypertensive Heart Disease, CAP: Community-Acquired Pneumonia, UTI: Urinary tract infection, PTB: Pulmonary tuberculosis.

highest admission was recorded in 2021 with CKD and HHD being the most common diagnoses at admission over the three years. However, proportional mortality was highest in 2020, during the peak of the pandemic, although there was no significant difference between the numbers. Sepsis, CKD, and CVD were the commonest causes of death.

One of the key findings of our study is that the COVID-19 pandemic has not significantly altered the elderly admission pattern in our setting. In fact, we found a 7.6% increase in admission rates during the pandemic when compared with the previous year. This contradicts the findings of the following studies that analyzed the impact of COVID-19 on hospital admissions, many of which reported a significant drop in the volume of patients visiting hospitals during the first wave of the pandemic. A study conducted to determine the impact of the pandemic on hospital admissions and emergency departments in Alberta reported a significant reduction in both medical and surgical admissions.[19] A similar hospital-based study in Thailand that evaluated the impact of the national lockdown on emergency department visits and admission patterns found a significant reduction in average daily ED visits.[15] Likewise, the number of patients visiting the emergency departments in the United States was said to have reduced by nearly half at the onset of the pandemic.[20] The increase in elderly medical admissions in this study could be due to the loose nature of the lockdown in Nigeria, which allowed people to sustain their routine activities at the onset of the pandemic. A series of three lockdowns were imposed by the government over three months, starting from 4th May to 27th July 2021, with occasional easing of the lockdown: albeit in contravention to the WHO-laid guidelines for easing lockdowns.[17] Furthermore, the highest number of admissions in 2020 was recorded in March, which was before the restrictive measures were put in place, and when imposed, the restriction did not involve any of the northeastern states in the initial period. It is also worth noting that, unlike our work, most of the studies that reported a reduction in hospital admissions focused on overall admissions or admission due to particular diseases among all age groups.

The admission pattern in this study followed a similar trend across all three years, with the maximum number of admissions recorded in April 2019, and March for the following two years. These months mark the transition period between harmattan and dry seasons in northeastern Nigeria and the temperature gradually begins to increase in March with the mean monthly maximum temperature exceeding 38°C during the months of April and May.[21] Rise in environmental temperature has been shown to influence hospital admissions by several studies from different parts of the world. A group of researchers examined the relationship between weather phenomena and pollution levels and daily hospital admissions in China in an 11-year retrospective study.[22] The result of this study demonstrated that hospitalizations increase during extreme temperatures. And the authors further stressed that admissions increased by almost 5% for every increase of 1°C above 29°C during hot weather and by 1.4% for every decrease of 1 °C between 8.2°C and 26.9°C during cold weather.[22]

CKD and HHD were the two most common reasons for hospital admission in this study. On the one hand, we found a steady increase in the number of CKD admissions across all three years. CKD is common in our environment, particularly CKD of undetermined etiology mostly affecting young people, in whom it is suspected to be due mainly to exposure to environmental nephrotoxic compounds.[23] However, most elderly people presenting with this condition in our environment have a long-standing history of hypertension and/or diabetes, suggesting that the underlying cause of the CKD in them could perhaps be atherosclerotic vascular disease. This rising pattern of CKD may reflect a shift from communicable to non-communicable diseases as part of the epidemiologic transition. The global burden of CKD is increasing at an alarming rate and is more prevalent in less developed countries.[24] On the other hand, overall admissions due to HHD declined during the initial

phase of the pandemic, even though it was the most common reason for elderly admission in the preceding year before the onset of the pandemic. However, this decline was reversed in the following year. It seems likely that the observed reduction in admissions for HHD may be due to the fear of contracting the infection. As with other NCDs, the prevalence of hypertensive heart disease is increasing worldwide and is said to follow the same pattern as that of hypertension.[25]

We found a slight increase in mortality during the onset of the pandemic, although the difference across all three years was not statistically significant. Several studies have reported an increase in mortality during the first wave of the pandemic. For example, a study that examined the effects of the pandemic on mortality in 2020 in 29 high-income countries reported nearly one million excess deaths in these countries, and the excess mortality rates were noted to be higher in men than women in almost all the countries.[26] Similar findings were obtained by another multinational work that extracted data from World Mortality Dataset involving 103 countries and territories.[27] However, some countries such as Australia and New Zealand had no detectable excess mortality.[28] Although the causes of this mortality were not fully understood, several distinct factors attributed to it include; the pandemic itself and the resultant medical system collapse,[29] excess deaths from other natural and unnatural causes, and deaths from extreme events in some countries.[27] We found CVD to be the major cause of elderly death during the acute phase of the pandemic. Studies have associated CVD with increased morbidity and mortality in patients with covid-19 infection.[30]

CONCLUSION

The COVID-19 pandemic has not significantly altered the elderly admission pattern in our setting, as the admissions followed a similar trend both before and during the pandemic. The highest admission was recorded in 2021, with CKD and HHD being the most common diagnoses at admission over the three years. Proportional mortality was highest in 2020, although no significant difference was found between the numbers, with sepsis, CKD, and CVD being the commonest causes of death.

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Conflict of Interest

The authors declare none.

Ethics approval and consent to participate

This study was conducted in accordance with the Helsinki declaration and was approved by the research ethics committee of the Yobe State University Teaching Hospital, Damaturu, Nigeria (YSUTH/MAC/EC/0013).

Authors' Contribution

Conceptualization, AYA, SKS, MSM; Data collection, SKS, GU, AGI, AAI; Methodology: SKS, MSM, AYA, Formal analysis, FIT (lead), SKS (support), MSM (support); Data curation, SKS, FIT; Writing original draft preparation, SKS, MSM; Writing—review and editing, AYA, FIT, MAW, SB, GU, AH, AGI, AAI; Supervision, AYA, FIT, MSM, MAW; Project administration, SKS, MSM, MAW. All authors have revised the manuscript for intellectual content. All authors have read and approved the final version of the manuscript.

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