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# Admission profile and management of community acquired pneumonia in Nigeria-5 year experience in a tertiary hospital<sup>☆</sup>

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## KEYWORDS

Pneumonia;  
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## Summary

**Background:** Studies examining the prevalence, baseline characteristics and outcome of patients admitted with Community Acquired Pneumonia (CAP) are not readily available in Nigeria. This study aims to evaluate the management of CAP at a tertiary hospital in Nigeria with a view to determining the prevalence, characteristics, severity and outcome of the admitted patients.

**Methods:** We retrospectively collected data from 160 admitted patients with final diagnosis of CAP who met the inclusion criteria. Data relating to their age, gender, clinical details, severity assessment using CURB65 score, laboratory results, initial antibiotics prescribed, and outcome (length of stay, hospital mortality) were collected. Descriptive statistics of demographic and clinical variables were calculated and presented as frequencies, percentage, means, standard deviation and range.

**Results:** CAP accounted for 2.5% of all medical admissions during the study period. The mean age of the admitted patients was  $52.9 \pm 18.98$  years with about 35% of the patients being at least 65 years and above. Sputum culture, Fasting blood sugar and HIV screening were requested for in 49(30.6%), 50(31.3%) 56(35%) patients respectively. None of the patients had severity score documented on admission and only 32(20%) patients had severity score of  $\geq 3$  when calculated. Commonly prescribed antibiotics were a combination of intravenous ceftriaxone and metronidazole. Hospital mortality rate was 11.9%

**Conclusion:** We suggest multicenter prospective studies to determine the prevalence and burden of CAP in Nigeria. There is need for an improved assessment and appropriate use of guidelines in the management of patients presenting with CAP.

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## Introduction/background

Community acquired pneumonia (CAP) is a leading infectious disease requiring hospital admission in both developed and developing countries including Nigeria. It is a common cause of illness and death from infectious disease both in western and developing countries<sup>1</sup> and constitutes a major burden on health care resources.

CAP is commonly defined as an acute infection of the pulmonary parenchyma that is associated with symptoms of acute infection accompanied by the presence of acute infiltrate on a chest radiograph in a patient who has not been hospitalized for more than 14 days before the onset of the symptoms.<sup>2</sup>

A diagnosis of CAP is often made on clinical grounds and patients are often started on treatment empirically before the results of laboratory investigations are seen.

Previous studies in the USA showed an annual incidence of about 3–5 cases per 1000 inhabitants among adults and a mortality of about 5–15% among hospitalized patients.<sup>3,4</sup>

In a study in Ethiopia, mortality among admitted patients with CAP was found to be 11%.<sup>5</sup>

Mortality due to CAP is often related to the severity of the CAP and associated co existing illnesses like HIV infection, Diabetes mellitus and Chronic Obstructive Pulmonary Disease.

Bacterial pneumonia is more frequent in HIV-infected individuals than in the general population<sup>6</sup> and there is often high prevalence of HIV in CAP patients especially among those with PTB suggesting it as a possible strong risk factor for developing CAP.<sup>7</sup> This becomes an important consideration with regards to the high prevalence of HIV in a developing country like Nigeria. Despite the fact that several scoring systems and guidelines have been developed by international organisations to stratify risks and prognosis in patients with CAP,<sup>8</sup> these scoring systems have rarely been used in most of our hospitals to identify those that are likely going to be admitted.

In Nigeria, few data are available concerning the overall incidence, prevalence, severity of illness, prognostic factors, and choice of antibiotic treatment in community acquired pneumonia which is a common condition requiring hospital admission in Nigeria<sup>9</sup> and those that had been done had concentrated on the aetiological profile and were mostly carried out in children.<sup>10</sup>

The aim of this study is to determine the hospital prevalence of CAP at a tertiary hospital during the study period, to determine the characteristics of patients admitted, find out the severity of the illness in those admitted using the standardised CURB65 score, identify the initial antibiotics prescription pattern and finally to determine the outcome of the patients admitted. This study is hoped to contribute to the documentation of the burden of CAP in our region and identify the problems associated with the management of this common but serious medical condition.

## Methods

### Setting

The study was conducted at the University of Nigeria Teaching Hospital, Ituku Ozalla Enugu Nigeria, a tertiary hospital in

southeast Nigeria. The hospital has about 700 beds, with a workforce of more than 5000 staffs.

The hospital receives patients from Enugu and other parts of the southeast region of Nigeria comprising of five states.

Majority of the patients were admitted through the accident and emergency unit of the hospital, and were usually seen by the emergency room doctors and reviewed by medical registrars on call before admission to the medical wards.

### Study design and patients (patients and methods)

Data were retrieved retrospectively from case notes and drug charts of adult patients aged 18 years and above with a provisional clinical diagnosis of Pneumonia admitted into the medical wards of the UNTH between 1st July, 2003 and 30th June, 2008. Patient's case notes were included for the final analysis if they had a final diagnosis of pneumonia with new infiltrates on chest radiograph and presented acutely with at least two compatible clinical features: cough, sputum production, breathlessness, pleuritic chest pain, haemoptysis, fever, headache, and signs consistent with pneumonia on chest auscultation.<sup>11</sup> They would not have been admitted to the hospital or health care facility in the last 14 days prior to presentation.<sup>2</sup> Patients who did not have chest ray during the admission and those that developed symptoms more than 48 h following admission were excluded. Patients were also excluded if the diagnosis was changed soon after admission.

The study was approved by the ethics committee of the University Teaching Hospital Enugu.

Data were collected with respect to their age, gender, clinical details, co-existing illness, severity, laboratory requests and results, antibiotics used, previous antibiotics use and outcome (hospital length of stay, hospital mortality).

Disease severity was assessed retrospectively by calculating the CURB65 score<sup>8,12</sup> based on recorded clinical parameters on the assumption that, unless otherwise stated, that the patient was not confused. Severe disease was defined as score of  $\geq 3$ .<sup>12</sup>

Data were analysed using SPSS version 15.0 for windows. Descriptive statistics of demographic and clinical variables calculated included frequencies, percentage, means, standard deviation and range.

## Results

249 admissions were due to Pneumonia out of a total 6387 patients (4175 males and 2212 females) during the period under review. 230 case notes were retrieved, out which 160 cases qualified for a final diagnosis of Community Acquired Pneumonia and were eventually studied. This gave a hospital prevalence of about 2.5% among medical admissions during the study period.

The baseline characteristics showed that 88 (55%) of the patients were males. The mean age of the patients was  $52.9 \pm 18.98$  years with range from the youngest of 25 years to the oldest patient of 80 years of age.

The most common symptoms were fever (75%) cough (71.3%) breathlessness (55%) and chest pain (50%).

Sputum culture was requested for in 49(30.6%) patients while Serum Electrolytes, Urea and creatinine were done in only two patients. Fasting blood sugar was done in 50 (31.3%) of cases.

Fifty six patients (35%) were screened for HIV and 48 patients representing 30% of the whole patients studied and 85.7% of those screened for HIV were positive for HIV antibodies.

Co-existing illnesses include COPD (10%), Diabetes Mellitus (10%), Previous Cerebrovascular Disease (10%), HIV coinfection (87.5% of those screened) and Asthma (3.1%). Sixty two of the patients representing 38.8% had at least one co morbidity or the other.

Fifty six of the patients (35%) of the patients were 65 years and above.

None of the patients studied had disease severity score documented. Thirty two patients (20% of the patients) however had severe pneumonia with CURB65 score of 3 and above when calculated retrospectively.

Sixteen patients (10%) had used antibiotics before presentation. Commonly prescribed antibiotics initially on admission were intravenous ceftriaxone combined with metronidazole in 52.5% of cases followed by Intravenous ceftriaxone alone in 20.6% of cases (Table 1). Fourteen patients (8.8%) were commenced on oral antibiotics while on admission. Eight patients were current smokers.

Hospital length of stay during the study period ranged from the shortest stay of two days to the longest stay of 21 days with the mean duration of stay of  $10.5 \pm 5.2$  days (Table 2).

Nineteen of the patients (11.9%) died while on admission in the hospital while the rest were discharged. Ten of the patients that died (52.6%) had co morbidities while six of those that died (31.6%) were HIV positive.

## Discussion

Comprehensive Studies examining the prevalence, baseline characteristics and outcome of patients with CAP are not readily available in Nigeria<sup>9</sup> and those that had been done had concentrated on the aetiological profile and were mostly carried out in children.<sup>10</sup> To the best of our knowledge, this is

**Table 1** Antibiotics commenced on admission.

Antibiotics combination on admission	Number (%)
IV Ceftriaxone + IV Metronidazole	84 (52.5)
IV Ceftriaxone only	33 (20.6)
IV ampiclox + IV Metronidazole	3 (1.9)
IV augmentin only	8 (5)
IV Augmentin + IV Ceftriaxone + Metronidazole	8 (5)
IV Ciprofloxacin	9 (5.6)
IV Ceftazidime and Metronidazole	1 (0.6)
Oral antibiotics (mainly septrin, doxycycline, flagyl combinations)	14 (8.8)
Total	160 (100)

**Table 2** Patients characteristics, Clinical assessment findings and outcome measures of patients with CAP (N = 160).

Baseline characteristics	Mean (SD), range or n (%)
Age n (%)	52.9 (18.98), 25–80
Age ( $\geq 65$ ) n (%)	56 (35)
Male n (%)	88 (55)
Female	72 (45)
<i>Presenting symptoms</i>	
Cough n (%)	114 (71.3)
Sputum n (%)	96 (60)
Fever n (%)	120 (75)
Breathlessness n (%)	88 (55)
Chest Pain n (%)	80 (50)
Myalgia	8 (5)
Headache n (%)	24 (15)
Diarrhoea n (%)	8 (5)
Vomiting n (%)	24 (15)
<i>Clinical parameters</i>	
Systolic blood pressure n (%)	128.68 (26.44), 90–180
Diastolic blood Pressure n (%)	76 (16.61), 50–110
Respiratory rate	32.25 (12.32), 16–60
CURB65 score	
0–1	56 (35%)
2	72 (45%)
$\geq 3$	32 (20%)
<i>Laboratory assessment</i>	
Chest X-ray n (%)	160 (100)
Sputum Culture n (%)	49 (30.6)
ZN Stain n (%)	51 (31.9)
Blood Culture n (%)	13 (8.1)
SEUC n (%)	2 (1.3)
Haemoglobin n (%)	128 (80)
WBC n (%)	120 (75)
HIV Screening n (%)	56 (35)
Fasting Blood Sugar n (%)	50 (31.3)
<i>Laboratory results</i>	
Hb (g/dl)	10.56 (2.43), 6–14
WBC	7160 (3343.38), 2300–13000
FBS (mmol/l)	6.2 (2.2) 3.3–13.1
Positive HIV screening	48 (30%) 85.7% of those screened
<i>Co-existing illnesses</i>	
COPD n (%)	16 (10)
Asthma n (%)	5 (3.1)
DM n (%)	16 (10)
Cerebrovascular Disease n (%)	16 (10)
HIV n (%)	48 (30)
At least one co morbidity (%)	62 (38.8)
Current Smoker n (%)	8 (5%)
Previous antibiotics used n (%)	16 (10%)
<i>Outcome measures</i>	
Died during admission n (%)	19 (11.9)
Discharged n (%)	141 (88.1)
Hospital length of stay (days)	10.5 (5.23), 2–21

the first study in the South East Nigeria to characterise adult patients admitted with CAP and to show their outcome.

The main findings of this study were: (1) More male patients with CAP were admitted; (2) Patients above 65 years of age constituted 35% of those admitted. (3) About 80% of the patients admitted for CAP at this center may not have needed admission as they had non severe pneumonia with CURB65 severity score of 0–2; (4) Co existing illnesses were common in patients with CAP and HIV positivity was very common occurring in 87.5% of those that were screened; (5). Most patients admitted did not have detailed laboratory work up like sputum culture, blood culture, HIV screening, fasting blood sugar and SEUC; (6) Medical Registrars who saw the patients initially tended to prescribe a combination of a intravenous cephalosporin with metronidazole; (7) Hospital Mortality rate among those studied was 11.9% and more than half of the patients that died had co morbidities.

The major limitation of this study was that it was a retrospective study and was not able to assess carefully the aetiological organisms, assess the severity scores in details and unable to get full information on other outcome details like the need for ICU admission, need for mechanical ventilation and 30 day mortality and the actual cause of the patients deaths due to poor documentation in the patients case notes. Also, this study was done in tertiary referral hospital, so whatever was found here might just be the tip of iceberg.

This study showed that more males were admitted with pneumonia as has been reported in previous studies.<sup>1,7,8</sup> Elderly people were more affected with about 35% of them being above 65 years of age, this is not surprising as this shows that old people tend to have more attacks of severe CAP and are more likely to be admitted during the cause of the illness.

Majority of the patients did not have detailed laboratory workup that would have been useful both in severity assessment and the holistic management of these patients. It is quite revealing that less than half of the patients had requests for the investigations that will reveal the organisms responsible for the infection (sputum culture and staining for mycobacterium). This calls for a critical review of the assessment of these patients at and during admission considering the importance of identification of the aetiological agents of the CAP more so when it has been shown in previous studies<sup>7</sup> that Tuberculosis prevalence among CAP patients is high and have very important implications in their management.

Risk factors for developing CAP like HIV status and Diabetes Mellitus were not assessed for in the majority of the patients studied. At least 38.8% of the total number of patients had co existing illnesses like HIV, COPD, Diabetes Mellitus, Asthma, previous Cerebrovascular disease etc. This is higher than what was obtained in another study in western Nigeria where the prevalence of comorbidity was about 25%.<sup>13</sup> The higher rate of co morbidity in this present study could be explained by the inclusion of HIV infection as a comorbidity which was not considered in the other study.

Less than half of these patients were screened for HIV infection, however a high prevalence of 85.7% of those screened and 30% of the total population of patients studied were shown to be HIV positive. The 30% prevalence of HIV positivity among the patients studied is higher than

17.4% obtained in a previous study in Nigeria.<sup>7</sup> The high prevalence of HIV positivity (85.7%) among those screened for HIV could be due to the fact that the screening tests were done only for patients with high risk factors and those with classical features of advancing HIV infection. It is important that HIV screening is done routinely in CAP patients because CAP patients with HIV infection are more likely to present with severe symptoms<sup>14</sup> and the fact that bacterial pneumonia may accelerate the progression of HIV disease.<sup>15</sup>

None of the patients studied had the CURB65 score documented in their hospital case notes. Poor or no documentation of severity assessment scores for CAP before admission is not peculiar to our region as it has been reported in some previous studies done even in developed societies with advanced health care facilities and manpower.<sup>16,17</sup>

The 5% prevalence rate of smoking among the patients with CAP was lower than the smoking prevalence in Nigeria,<sup>18,19</sup> this could be explained by poor documentation in the case notes of patients because of the retrospective nature of the study and the fact that when patients perceive that their illnesses may be related to smoking, they tend to deny the history of smoking to avoid blame from their relatives.

A significant percentage of the patients (80%) could have been considered for outpatients care based on the retrospectively calculated CURB65 scores of less than 3 and managed in the community possibly with oral antibiotics since they had nonsevere CAP thereby saving health care resources. It is necessary to point out that poor documentation may have made it difficult to retrospectively calculate the CURB65 score as in many cases the conscious level was not documented and only two of the whole patients reviewed had records of their serum—urea levels. We posit that attending physicians should be trained in the use of pneumonia severity assessment tools to help in stratifying these patients initially and avoiding unnecessary admissions which invariably put a lot of stress on the scarce health care resources.

The initial choice of antibiotics which included intravenous metronidazole in majority of cases did not show that the attending medical officers were empirically treating for the common organisms known to cause CAP in this sub region. This prescription pattern does in no way reflect the presence of more nonbacterial pneumonia in our environment. This is rather surprising and disturbing more so when this is happening in a referral center. Though we are not aware of any national guidelines for treating CAP, Physicians need to constantly update themselves on current management of common but severe illness like CAP.

The hospital mortality rate of 11.9% found in this study was comparable to the 11% obtained in a study in Ethiopia<sup>5</sup> but higher than what has been found in Hong Kong,<sup>8</sup> Guinea and France.<sup>1</sup> The mortality rate found in this study was for only during the admission period and could be higher than what was obtained in the previous studies that looked at 30 day mortality which was however difficult to extrapolate from the case notes because of poor documentation. It is equally nice to remember that in the previous studies with lower mortality, patients with HIV infection were excluded unlike in this study.

In conclusion, we suggest that multicenter prospective studies should be designed and done in Nigeria to enable



proper documentation of the prevalence and the burden of CAP in Nigeria. Severity assessment scores for CAP should be of importance in the initial assessment of patients with CAP to prevent unnecessary admissions.

Assessment for co morbidities like HIV co infection and Diabetes Mellitus should be done as majority of the patients are HIV positive and tend to have co morbidities and this could have far reaching implication in their management. Also physician's guidelines on the use of appropriate antibiotics in CAP should be introduced as part of continuing medical education on national and institutional levels to enable proper management of these cases.

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## Ethical approval

Obtained from the ethics committee of the University of Nigeria Teaching Hospital Enugu.

## Authors contributions

The two authors were involved in the design of the study protocol. CCO entered, analyzed, and interpreted the data. CCO and CJC drafted and wrote the manuscript. All authors read and approved the final manuscript. CCO is the guarantor of the paper.

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## Conflict of interest

There is no potential conflict of interest.

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