

# The Burden of Inpatient Neurologic Disease in a Tropical African Hospital

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**ABSTRACT: Background:** Neurologic disorders represent a major burden of disease globally and the spectrum ranges from non-communicable disorders like stroke and neurodegenerative disorders to central nervous system infections. **Objective:** The purpose of the study is to assess the burden of neurological diseases in a tropical environment. **Methods:** A one year retrospective survey of neurological diseases seen at the University of Calabar Teaching Hospital, Nigeria, was evaluated using patients' medical record. **Results:** Neurological diseases constituted 24.2% of all medical conditions seen over a one year period. Stroke was found to be the commonest cause of admissions accounting for 42.1% of the cases followed by peripheral neuropathy (13.8%) and meningococcal meningitis (7.2%). The immediate case fatality rate was 33.6%. Fifty two percent were discharged home with various levels of recovery while 12.5% left against medical advice. About 2% were referred to other tertiary health institutions. **Conclusion:** The pattern of neurologic diseases in the local medical wards was not remarkably different from those observed in Nigeria and elsewhere. Stroke remains the most frequent cause of neurologic admissions and mortality in this region is same as observed elsewhere.

**RÉSUMÉ: Le fardeau des maladies neurologiques chez les patients hospitalisés dans un hôpital de l'Afrique tropicale. Contexte :** Les maladies neurologiques constituent un fardeau majeur au niveau mondial et leur éventail va de maladies non contagieuses, comme l'accident vasculaire cérébral et les maladies neurodégénératives, aux infections du système nerveux central. **Objectif :** Le but de l'étude était d'évaluer le fardeau que constituent les maladies neurologiques dans cet environnement tropical. **Méthode :** Nous avons effectué une étude rétrospective des dossiers des patients atteints d'une maladie neurologique, admis à l'Hôpital universitaire de Calabar, au Nigeria. **Résultats :** Au cours d'une année, 24,2% des patients admis étaient atteints d'une maladie neurologique. L'accident vasculaire cérébral était la plus fréquente, soit 42,1% de ces patients, suivi de la neuropathie périphérique (13,8%) et de la méningococcalite (7,2%). Le taux de létalité immédiate était de 33,6%. Cinquante-deux pour cent des patients ont quitté l'hôpital pour rentrer chez-eux avec des niveaux de récupération variés à leur sortie de l'hôpital et 12,5% des patients ont quitté l'hôpital contre l'avis du médecin. Environ 2% ont été référés à d'autres institutions de soins tertiaires. **Conclusion :** L'éventail des maladies neurologiques dans ce service de médecine n'était pas remarquablement différent de celui observé dans le pays et ailleurs dans le monde. L'accident vasculaire cérébral demeure la cause la plus fréquente d'admission en neurologie et la mortalité dans cette région est la même que celle observée ailleurs dans le monde.

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## INTRODUCTION

Neurologic disorders represent a major burden of disease globally<sup>1</sup>. The spectrum ranges from non-communicable disorders like stroke and neurodegenerative disorders to neurological infections like meningitis and tetanus. These contribute considerably to the high burden of diseases<sup>2</sup>. The spectrum of these neurologic diseases in Calabar, Nigeria is not known. The knowledge of the spectrum of neurological diseases can help define ways of improving both the management and outcome of these disorders. The study was undertaken to determine the types, frequency and outcome associated with these neurologic conditions admitted into the medical wards of our hospital and to compare these with similar studies elsewhere.

## METHODOLOGY

The study was carried out in the only teaching hospital in the Cross River state of Nigeria, which has a wide catchment area particularly for neurologic diseases. We reviewed the records of all the adult in-patients in the medical wards of the University of Calabar Teaching Hospital, Calabar, Nigeria from May 2009 to April 2010. The University of Calabar Teaching Hospital is a

tertiary hospital in Calabar, the capital of Cross River State, in south eastern Nigeria. The population of Cross River State is 2,888,966 based on the 2006 population census<sup>3</sup>.

The patients admitted into the medical wards are usually recruited from both the medical out-patients and the emergency departments of the hospital. Data extracted from the register in the wards were age, sex, diagnosis and outcome (this concerned discharged cases, mortality, referrals, and those that left against medical advice-LAMA/ absconded). Inclusion criteria were patients who were aged 14 years and older admitted into the medical wards. Patients excluded were those less than 14 years and those with incomplete data. Some of the diagnoses were

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**Table 1: Distribution of neurological disorders by sex**

Diagnosis	Male	Female	Total	Percentage
Stroke	43	21	64	42.1
Peripheral neuropathy	13	8	21	13.8
Meningoencephalitis	8	3	11	7.2
Hepatic encephalopathy	5	-	5	3.3
Tetanus	5	1	6	3.9
Spinal cord disorders	6	1	7	4.6
Hypertensive encephalopathy	5	3	8	5.3
Parkinson's disease	4	-	4	2.6
Acute confusional state	4	4	8	5.3
Brain tumours	2	3	5	3.3
Transient ischaemic attack	1	1	2	1.3
Bell's palsy	2	-	2	1.3
Cognitive impairment	-	1	1	0.7
Total	103	49	152	100

made purely on clinical grounds while some had laboratory supports.

The data was analyzed using the Epi Info software. Results were presented in simple frequency table proportions.

## RESULTS

Of the 699 medical cases admitted during the study period, 169 were neurological cases. This constituted 24.2% of the total medical admissions during the study period. Seventeen of these patients were excluded from further analysis due to incomplete data. That brought the total number of neurological cases reviewed in this study to 152. The sex distribution of patients was 103(68%) males and 49 (32%) females giving a sex ratio of

2.1:1. The ages of the patients ranged from 14 years to 83 years with a mean of 51.2 years and a median of 52 years.

Table 1 shows the distribution of neurological disorders by gender. The commonest disorder was stroke followed by peripheral neuropathy and meningoencephalitis.

Table 2 shows the outcome of the various neurological diseases. Fatality rates ranged from nil percent for spinal cord diseases, Parkinson's disease, transient ischaemic attack, Bell's palsy and cognitive impairment to 40.6% for stroke. The total outcome of the neurologic diseases showed that 79 (52%) of the cases were discharged home, 51 (33.6%) died, 19 (12.5%) left against medical advice, 3(1.9%) of the patients were referred to other tertiary hospitals and none absconded during the study period. The mortality rate represented 7.3% of the medical deaths.

## DISCUSSION

This study has shown that neurologic diseases are common in Calabar, south eastern Nigeria. The spectrum of neurological diseases was stroke, peripheral neuropathy (mainly from diabetes mellitus), meningoencephalitis, hepatic encephalopathy, tetanus, spinal cord disorders, HIV encephalopathy, Parkinson's disease, acute confusional state, brain tumour, transient ischaemic attack, Bell's palsy and cognitive impairment.

These disorders constituted 24.2% of the total medical admissions during the study period. This value was slightly higher than that reported by Ojini (19.6%) in Lagos and Ogun et al (19.6%) in Sagamu, both in Nigeria<sup>4,5</sup> was lower than that reported by Chapp- Jumbo in Port Harcourt, Nigeria where neurological diseases constituted 33.1% of medical admissions<sup>6</sup>. Reports from previous studies in Nigeria, had recorded lower values<sup>7-9</sup>. There was a notable sex predilection in these diseases as there were more males than females with a male to female sex ratio of 2.1: 1. Other studies had also demonstrated neurological diseases to be more frequent among men than women<sup>8,10,11</sup>.

**Table 2: Outcome of neurological diseases**

Neurological Condition	Total	Case fatality n (%)	Discharge n (%)	Referred n(%)	LAMA n(%)
Stroke	64	26(40.6)	30(46.9)	1(1.6)	7(10.9)
DM neuropathy	21	5(23.8)	13(61.9)	-	3(14.3)
Meningo-encephalitis	11	6(54.5)	3(27.3)	-	2(18.2)
Hypertensive encephalopathy	8	3(37.5)	4(50.0)	-	1(12.5)
HIV Encephalopathy	8	4(50.0)	3(37.5)	-	1(12.5)
Acute confusional State	8	2(25.0)	6(75.0)	-	-
Spinal cord diseases	7	-	6(85.7)	-	1(14.3)
Tetanus	6	2(33.3)	2(33.3)	-	2(33.3)
Hepatic encephalopathy	5	2(40.0)	2(40.0)	-	1(20.0)
Brain tumour	5	1(20.0)	1(20.0)	2(40.0)	1(20.0)
Parkinson's Disease	4	-	4(100.0)	-	-
Transient ischaemic attack	2	-	2(100.0)	-	-
Bell's palsy	2	-	2(100.0)	-	-
Cognitive Impairment	1	-	1(100.0)	-	-
Total	152	51	79	3	19

However a study carried out by Ekenze et al in Enugu, Nigeria, showed no significant sex predilection in neurological diseases<sup>7</sup>.

The three most common neurological cases admitted during the study period were stroke, peripheral neuropathy (mainly from diabetes mellitus) and meningoencephalitis. Hypertensive encephalopathy, HIV encephalopathy, acute confusional state and spinal cord diseases were also common. Epilepsy and Guillain Barre were rare in our study. The diagnosis of stroke was made purely on clinical grounds due to the lack of computed tomography (CT) scan in the hospital during the study period. Studies have shown that clinical examination alone is unreliable in distinguishing ischemic from haemorrhagic stroke hence the need for imaging techniques like the CT scan<sup>12,13</sup>. In the absence of a CT scan, stroke subtypes, hemorrhagic and ischemic, have been classified using Siriraj and Allen scoring systems. In a prospective study carried out in Tanzania, East Africa, both the Siriraj and Allen scoring systems were found to be unsatisfactory in classifying stroke subtypes<sup>14</sup>. Weir et al<sup>15</sup> had also confirmed the poor accuracy of stroke scoring systems in differentiating intracranial haemorrhage from infarction. In another study carried out by Nouria et al<sup>16</sup> in Tunisia, North Africa, the use of Siriraj score was found to be valid and useful in predicting stroke subtypes. The scoring systems are therefore inconsistent and conflicting in differentiating the subtypes of stroke clinically. Our study was a retrospective one and the scoring systems were not applied. Stroke was observed to be the most frequent cause of neurologic admissions constituting 42.1% of such admissions. This study compares with similar studies in other parts of Nigeria where stroke was found to be the commonest cause of neurological admissions<sup>6,7,10,11</sup>. McLigeyo in the 1990's had also reported a high stroke frequency amongst geriatric admissions at the Kenyatta National Hospital, Kenya<sup>17</sup>. In addition, the peak age of admission for stroke was above 50 years, with the majority of the cases affecting those between 56 and 60 years. This goes to confirm findings from previous studies that found stroke to be a disease of the elderly<sup>5,6,18</sup>. This finding contrasted with earlier reports that stroke was more frequent below 50 years of age in Africans<sup>19,20</sup>. The high frequency of stroke in developing countries might be accounted for by the increasing prevalence of the traditional risk factors like hypertension (which increases with age), diabetes mellitus, hyperlipidemia and smoking, as more urbanized lifestyle is being adopted<sup>21</sup>.

Peripheral neuropathy, a microvascular complication of diabetes mellitus, was the second commonest neurologic disorder. The commonest presentation was that of distal symmetric polyneuropathy. Studies have also shown this to be the most frequent form of peripheral neuropathy in diabetes mellitus<sup>22</sup>. Diabetes mellitus is an increasing non-communicable disease in our environment. Particular challenges in management of diabetic peripheral neuropathy have not only been due to lack of screening, early detection, treatment and prevention of the disorder but also due to lack of awareness and poor foot care by patients<sup>23,24</sup>. The high incidence of diabetic peripheral neuropathy in our study is therefore not surprising.

Osuntokun in the 70's in Ibadan, Nigeria, had reported infections of the nervous system to be the commonest cause of neurological admissions<sup>18</sup>. Kwasa in Kenya had also observed central nervous system infections, mainly meningitis (23.1%), to be the most frequent neurologic disorder<sup>9</sup>. In our study,

meningoencephalitis ranked third as the commonest cause of admission. This confirms the changing pattern of neurologic illness in Africa.

The death rate and the percentage of those discharged were similar to that observed by Chapp-Jumbo in Niger Delta who reported a mortality rate of 36.5%; and 56% for those discharged home<sup>6</sup>. In an earlier study in Kano, Nigeria, Owolabi et al had reported a lower mortality rate of 22.4%. The percentage of those who left against medical advice (12.5%) was significantly higher in our study than the 5.8% and 0.8% reported by both Chapp- Jumbo in Port Harcourt, Nigeria and Owolabi et al in Kano, Nigeria respectively<sup>6,10</sup>.

The most frequent disease among spinal cord disorders was Pott's disease with peak age-range of 37-45 years. All the patients with the Pott's disease were males. This is similar to an earlier study that also found a male preponderance in those with Pott's disease<sup>6</sup>. All the patients with the Pott's disease were discharged home.

The case fatality for stroke was 40.6%. Stroke was thus found to be associated with high mortality. In a review by Chapp-Jumbo, the mortality of stroke represented 65% of neurologic deaths<sup>6</sup>.

The case fatality rate for meningitis was 54.5% which is high compared to other studies. Lower case fatality rates were reported by Mobarak et al (17.6%) in Egypt and Thigpen et al (14.3%) in the United States<sup>25,26</sup>. This may reflect a higher standard of care and/or early presentation in these societies.

## CONCLUSION

The pattern of neurologic diseases in our Nigerian hospital medical wards was not strikingly different from those observed in other parts of the country and elsewhere. Stroke remains the most frequent cause of neurologic admissions and the commonest cause of neurologic mortality in this region, as is observed elsewhere. Diabetic peripheral neuropathy and central nervous system infections including tetanus and meningoencephalitis were also common. Aside from Parkinson's disease, other movement disorders were very rare. Since stroke is a preventable neurologic condition, public campaigns on awareness and control of the risk factors should be carried out. Moreover, establishment of a well equipped stroke unit is encouraged in hospitals in our region. Good management of diabetes mellitus in our environment is a major challenge which if overcome, would reduce the incidence of neuropathy.

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