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Mortality and morbidity among hospitalized adult patients with neurological diseases in Cameroon

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ABSTRACT

Background: There is inadequate information on the morbidity and mortality (M & M) from neurological diseases in sub-Saharan Africa.
Objective: To record the M & M from neurological diseases in adults in Cameroon from 2013 to 2015 using a registry and surveillance from two urban health care centers.
Methods: Records from all adult admissions from two urban hospitals over a two year period were reviewed. Adult cases with neurological diagnosis as the main cause for admission were identified. The neurological diagnosis was made by a neurologist in all cases. Variables analyzed were: demographics, neurological diagnosis, medical history, medical center characteristics, morbidity and mortality (M & M). Neurological diseases were classified according to ICD-10.
Results: Among the 2225 neurological admissions of adults, death from neurological disease was recorded in 423 patients (19.01%), and disability in 819 of the survivors (53.6%). The factors that were significantly associated with death in the multivariate analysis were age, history of ischemic cardiac disease, and neurological diagnoses of CNS infection, cerebrovascular disease, and CNS tumor. Similarly, factors associated with disability were medical history of HIV, and cerebrovascular disease, and neurological diagnoses of cerebrovascular disease and CNS tumor. Higher educational level and epilepsy were associated with less disability.
Conclusions: As expected in this sample, older patients with neurological diseases had more M & M. Morbidity was inversely associated with education, which given that cerebrovascular disease is by far the most common cause of morbidity, indicates the power of risk factor control in preventing neurological disability.

1. Introduction

Neurological and psychiatric disorders make up at least 25% of the global burden of disease and are responsible for an even greater proportion of people living with disability [1,2] In developing countries, the burden of neurological diseases results from disorders being both under-recognized and under-treated [1,2]. The disabling rather than fatal nature of many neurological disorders, the stigma associated with them, the shortage of specialized trained health professionals, and the enormous difficulty in gathering epidemiological data have resulted in neurological diseases being under-recognized, under-reported and undertreated [1,2]. Despite the high prevalence and disease burden of these disorders, most Sub-Saharan countries have less than one neurologist per one million people, they lack medically trained personnel, have limited formularies and social disease stigmatization, all increasing the societal impact of neurological diseases [3]. Furthermore, systematic epidemiological data are lacking in most countries of Sub-Saharan Africa. Population-based epidemiological surveys are difficult to perform in Africa to due to logistical and resource limitations [4].

While obtaining information on the burden of neurological diseases by region or district is important so that interventions can be targeted, measurements of mortality and morbidity provide benchmarks against which the success or otherwise of control strategies can be measured. Estimating mortality of a disease is not an easy task as many deaths occur at home and are not registered in any formal way.

Furthermore, the principal data source for cause specific mortality is civil registration systems. Adequately functioning systems that produce statistics on causes of death on a regular basis exist in only about one-

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third of all countries of the world. Few countries in Africa have vital registration systems that are > 50% complete. Coverage is about this level in Kenya and Zimbabwe, and close to 90% in South Africa [5]. The absence of complete vital registration data in virtually all countries of the region nonetheless means that we need to rely on epidemiological research and demographic surveillance to generate model-based estimates of deaths by cause.

All these factors underscore the reality of a pressing need to establish a reliable database system to record the prevalence of neurological diseases in the Sub-Saharan African countries. We conducted a collaborative project with African neurologists in Cameroon to create a registry and surveillance of neurological disorders including neurodevelopmental disorders, stroke, epilepsy, neurodegenerative diseases, neuromuscular diseases and central nervous system infections. Our objective was to provide reliable data of neurological disease surveillance in the context of these urban hospitals and rural clinics, thus encompassing both urban and rural areas. In this part of the project, though, we present mortality and morbidity from neurological diseases only among hospitalized patients in the urban area.

2. Methods

2.1. Start-up & ethics

The principal investigators (ECD and KK) travelled to Laquintinie Hospital, Douala, Cameroon, to invite physicians to participate in the registry of neurological diseases. During a one-day course, the basis of the neurological diseases registry, project methodology and local networks between neurologists and primary care doctors were discussed. A local neurologist (JD) was designated as the principal co-investigator in Cameroon. Regular teleconferences between the co-principal investigators, the local database manager and the local principal coordinator were performed to discuss database collection and analysis issues. Data of neurological patients was collected in paper forms and entered into the database by a single individual, a medical student from the University of Douala Medical School (TN).

This project was submitted for local Internal Review Board (IRB) review at Hospital Laquintinie in Douala (Cameroon) and at the principal investigators´ IRBs (Hospital Universitario Burgos, Spain). The project was funded by a grant from the International Parkinson and Movement Disorders Society and the World Federation of Neurology.

2.2. Project description

In-Patient records from all adult admissions from May 31, 2013 to May 31, 2015 in two urban hospitals in Douala (Laquintinie and General Hospital) were reviewed by TN. Cases with an ICD 10 neurological diagnosis as the main problem resulting in admission were identified. Neurological diagnosis was given by a neurologist in 89.9% of patients. Assessment of data accuracy was established by showing interrater agreement between the neurological diagnosis established by the local neurologist (JD) based on the information collected from the medical chart and the neurological diagnosis given by TN using a Kappa coefficient (Kappa coefficient: first round 0.5; second round 0.98). By using the local neurologist as the gold standard against which we compared the medical student, who collected the data, and by establishing a strong inter-rater agreement between the two, we feel we provided a strong validation of the accuracy of the diagnosis assigned by the latter.

2.3. Outcomes

Variables collected were: demographics, living situation, marital status, employment status, educational level, type of physician making the diagnosis, presenting complain, neurological diagnosis, medical history, treatment, response to treatment, disability status, hospitalization outcome, discharge disposition (home, other facility, death). Neurological diseases were recorded according to ICD-10 classification.

2.4. Statistical analysis

Data were analyzed using Chi-square and *t*-Student or *U*-Mann-Whitney tests for univariate comparisons. Multivariate analysis was performed with logistic regression to establish the association of death/disability with sociodemographic and clinical variables. All statistical analyses were performed with SAS 9.3 (SAS Institute Inc., Cary NC, USA). A p-value < 0.05 was considered significant.

3. Results

From May 2013 to May 2015 medical charts of adult patients seeking care in the two hospitals in Douala were reviewed. In this review 2225 adult cases with neurological diagnoses as the main problem resulting in admission were identified. Death rate was calculated in this inpatient sample and disability was assessed in the survivors of this sample.

The demographic characteristics of this inpatient cohort of patients were as follows: 51.82% female; 99.86% living with family; marital status: 60.44% married, 24.75% single, 14.81% widowed; employment: 49.02% actively employed, 25.92% homemakers, 13.34% retired, and 11.71% unemployed; education: 59.6% with less than middle school education, 27.6% middle-high school and 13.3% university-level education. The overwhelming majority had access to CT (89.89%), microbiology lab (89.89%), or general laboratory (100%) for diagnostic purposes (Table 1).

The most frequent diseases resulting in neurological admission in this sample were cerebrovascular disease (ICD 10 diagnoses: G45, G46) accounting for 51.05% of the sample; Central Nervous System (CNS) infections (B50, B99, G00, G04, G06) 24.26%; epilepsy (G40) 10.02%; mono- poly-neuropathy (G50, G51, G56, G57, G61, G63) 4.4%; CNS tumor (C70, C71, C72) 3.91%; Headache (G43) 2.11%; Dementia (G30, G31) 1.75%; parkinsonism (G20, G21) 0.8% (Table 2).

During the course of the neurological hospitalization, there were 423 deaths (19.01%). The diseases resulting in the greatest mortality were cerebrovascular disease (55.32%), CNS infection (36.41%), CNS tumor (3.78%), and epilepsy (2.36%). In the multivariate analysis the factors associated with mortality were age and medical history of ischemic cardiac disease. The neurological diseases that were significantly associated with death in the multivariate analysis were CNS infection, cerebrovascular disease, and CNS tumor (Table 3). Among the 819 disabled survivors, 314 (38.34%) patients had mild-moderate dependence (need for help with Activities of Daily Life-dressing, feeding, bathing-but could do most things by themselves) and 275 patients (33.58%) patients were fully dependent. The neurological diseases mostly contributing to disability were cerebrovascular disease (79.73%) and CNS infection (11.36%). In the multivariate analysis, higher education was associated with less disability, while medical history of HIV, and cerebrovascular disease were associated with more disability. The neurological diseases that were associated with the presence of disability in the multivariate model were cerebrovascular disease and CNS tumor. Epilepsy, on the other hand was associated with less disability (Table 4).

4. Discussion

Cameroon is located in Central Africa with a population of over 22 million people (World Bank 2013) and life expectancy 54.59 years (World Bank 2012). It has been identified by the World Health Organization as having critical shortage of health care workers and geographic distributional inequalities that are even more severe in rural areas [6]. This is a report on the mortality and morbidity among