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Stroke admission and case-fatality in an urban medical unit in sub-Saharan Africa: A fourteen year trend study from 1999 to 2012

Alain Lekoubou [a], Clovis Nkoke [b], Anastase Dzudie [c,d], Andre Pascal Kengne [d,e,*]

[a] Medical University of SC, Department of Neurology, Charleston, USA
[b] Faculty of Medicine and Biomedical Sciences, Department of Internal Medicine, Yaoundé, Cameroon
[c] Department of Internal Medicine, Douala General Hospital, Douala, Cameroon
[d] Department of Medicine, University of Cape Town, Cape Town, South Africa
[e] South African Medical Research Council of South Africa, Cape Town, South Africa

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ABSTRACT

Background: Data on recent stroke trends in the context of rapidly deteriorating risk profile of populations within Africa is very limited. We investigated the admission trend for stroke and related outcomes in a major referral hospital in Cameroon.

Methods: Admission and discharge registries, and patient files for the period 1999–2012 of the medical department of the Yaoundé Central Hospital were reviewed for evidence of admission for stroke, and outcomes during hospitalization. Trajectories of case-fatality and risk factors over time were assessed, with adjustment for confounders using logistic regression models.

Results: Of the 28,239 medical admissions registered during the study period, 1688 (6.0%) were due to stroke. This proportion ranged from 2.5% in 1999–2000 to 13.1% in 2011–2012 overall and similarly in men and women. Mean age, alcohol consumption and history of stroke varied across years (all $p \leq 0.006$). Computed tomography confirmed that stroke increased from 34.4% in 1999–2000 to 84.2% in 2011–2012, while the length of stay decreased from 21 to 10 days (both $p < 0.0001$ for linear trend). Case-fatality rate increased from 14.4% to 22.4%. The adjusted odd ratio (95% CI) 2011–2012 vs. 1999–2000 was 2.93 (1.40–6.13), $p < 0.0001$ for the linear trend across years. The unadjusted relative risk of death from stroke patients vs. general admissions was 0.95 (0.87–1.05) overall, 0.82 (0.71–0.94) in men and 1.08 (0.95–1.23) in women.

Conclusion: During the last decade and a half, stroke admissions and case-fatality have increased in the study setting, reflecting in part the inadequate coping capacity of the health care system.

1. Introduction

Globally, stroke is a major health problem. It accounts for more than 10% of all deaths and represents the second cause of acquired adult disability worldwide. The burden of stroke is however unevenly distributed with more than 80% of all stroke deaths occurring in low-income and medium-income countries [1–3]. A handful of risk factors accounts for more than 90% of the population attributable risk for stroke with hypertension, smoking and diabetes carrying the greatest risk [4]. The prevalence of stroke risk factors is projected to increase in sub-Saharan Africa (SSA) as the result of the health and demographic transitions. It is estimated that the number of people with hypertension in Africa will increase by 68% from 75 million in 2008 to 126 million in 2025 [5]. Likewise, the number of people with diabetes mellitus in the region will nearly double within the same time period [6].

Despite the considerable stroke burden in SSA, there has been limited progress in the care and rehabilitation of the victims [7]. The inadequacy between the projected increase in stroke incidence and limited resources for care is an ingredient for a rise in stroke fatality. Pre-hospital care is inexistent in most places due to lack or poor emergency medical service, and late or no presentation to hospitals remain frequent [8–10]. While substantial gain can be anticipated from the implementation of stroke units in SSA, there are currently few of such units operating on the continent [7,10]. There are also indications that post-hospital management of stroke in SSA is non-optimal [11,12].

Put together, the ongoing health and demographic changes, the anticipated changes in stroke risk factors distribution and management, suggest that stroke admissions and fatality rate are changing in SSA. This report presents an analysis of trends in stroke admission and fatality in a major medical unit in Cameroon over a consecutive period of time from January 1999 through 2012.

* Corresponding author at: Medical Research Council of South Africa, PO Box 19070 Tygerberg, 7505 Cape Town, South Africa. Tel.: +27 21 938 0529; fax: +27 21 938 0460.
E-mail address: andre.kengne@mrc.ac.za (A.P. Kengne).

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Table 1
Admissions and death in the medical department overall and by 2-year of study.

Year	Total admission			Total death			Stroke admission rate (%)			Relative risk of death Stroke vs. non-stroke		
	Overall	women	men	Overall	Women	men	Overall	Women	men	Overall	women	Men
1999–2000	3558	1887	1671	763	340	422	2.5 (2.1–3.3)	2.9 (2.2–3.7)	2.2 (1.6–3.0)	0.67 (0.40–1.11)	0.82 (0.43–1.56)	0.54 (0.24–1.23)
2001–2002	3738	1929	1809	712	321	391	4.0 (3.4–4.7)	3.7 (2.9–4.6)	4.3 (3.5–5.3)	0.59 (0.37–0.93)	0.75 (0.41–1.40)	0.46 (0.24–0.90)
2003–2004	4203	2229	2074	765	402	363	4.5 (3.9–5.1)	3.7 (3.0–4.5)	5.1 (4.2–6.1)	0.93 (0.67–1.29)	1.16 (0.75–1.78)	0.80 (0.50–1.29)
2005–2006	5115	2634	2479	1059	571	488	5.4 (4.8–6.0)	5.1 (4.3–6.0)	5.6 (4.8–6.6)	0.87 (0.68–1.13)	0.89 (0.62–1.27)	0.86 (0.59–1.25)
2007–2008	4072	2081	1987	931	483	500	5.7 (5.0–6.5)	5.7 (4.8–6.7)	5.8 (4.8–6.9)	1.03 (0.81–1.31)	1.14 (0.83–1.56)	0.82 (0.57–1.18)
2009–2010	4032	2002	1943	1062	551	511	7.3 (6.5–8.1)	7.3 (6.2–8.5)	7.6 (6.5–8.8)	1.01 (0.83–1.23)	0.99 (0.76–1.31)	0.98 (0.74–1.30)
2011–2012	3521	1768	1753	797	389	408	13.1 (12.0–14.2)	13.7 (12.2–15.4)	12.4 (11.0–14.1)	0.98 (0.82–1.18)	1.17 (0.92–1.48)	0.81 (0.61–1.08)
Total	28,239	14,530	13,716	6089	3057	3083	6.0 (5.7–6.3)	5.8 (5.5–6.2)	6.1 (5.7–6.5)	0.95 (0.87–1.05)	1.08 (0.95–1.23)	0.82 (0.71–0.94)

2. Methods

2.1. Study setting and clinical pathway of patients with stroke

The Yaoundé Central Hospital is the largest hospital in the capital city of Cameroon, with a catchment population of about two million individuals. The medical unit of this hospital is the largest department of the hospital. The unit has a capacity of 141 beds distributed across seven subspecialty units including the neurology. At the end of the year 2012, the department was staffed with 29 specialist physicians (including three neurologists), working in collaboration with four emergency physicians, two intensivists, three neuroradiologists and two neurosurgeons, twelve general practitioners, and junior specialist physicians in training. Patients admitted to the units were referred from the emergency department, other departments, out-patients clinics and other hospitals. For each patient, upon discharge or in the event of in-hospital death, both the initial diagnosis and the final diagnosis were recorded in the registers. Recorded diagnoses were usually expanded to include serious comorbidities. The study was approved by the administrative authorities of the hospital acting as the local ethic committee.

2.2. Recruitments and data collection

Hospital registers were surveyed for the period from January 1999 through December 2012 to identify patients with stroke. Recruitment started in January 1999 as this date coincided with the implementation of the standardized medical record in the study setting, which has the advantage of reducing the likelihood of missing data and improving standardization of medical information. Briefly, the standardized medical record includes a section filled by the Emergency department nurse and physician that summarizes patient's demographic chief complaints, vital signs, arrival time, focus clinical exam and disposition. The second section of the standardized medical record which is filled by the resident under the supervision of an attending physician while the patient is on the floor includes a detailed history of the chief complaint, physical examination, summary of significant laboratory and imaging investigations as well as initial and final diagnoses. Final diagnosis as reported in chart is made by the attending physician which signature is required. Medical records of all patients with the diagnosis of stroke were reviewed. The diagnosis of stroke was retained if patients met the World Health Organization definition of stroke [13] and both recurrent and first-ever strokes were included; supplemented where available by a brain computerized tomography (CT). For each eligible patients, data were recorded on the age, sex, length of stay, place of residency (urban vs. rural), history stroke, hypertension, current smoking, diabetes mellitus, admission systolic and diastolic blood pressure (BP), level of consciousness, stroke subtype (ischemic vs. hemorrhagic stroke) and vital status upon discharge. All patients with stroke were included in the final analysis. Furthermore, data were collected on the total number of admissions and in-hospital deaths in the department by year of study overall and for men and women.

2.3. Definitions

We applied the WHO definition of stroke [13] as a rapidly developing clinical sign of focal (or global) disturbance of cerebral function lasting more than 24 h (unless interrupted by death). When a CT scan was not available, stroke was judged unlikely in the presence of 1) preceding fever (suggestive of abscess), 2) recent weight loss (suggestive of malignancy), neck rigidity or blood in the CSF (suggestive of subarachnoid hemorrhage). Hypertension or diabetes was based on documented history, ongoing drug treatments, or a documented previous systolic (and/or diastolic) BP ≥ 140 mm Hg (90 mm Hg) for hypertension or fasting blood glucose > 126 mg/dL. Hyperlipidemia was based on documented history, ongoing drug treatment or documented