

Current Data on the Profile of Patients Hospitalized for Stroke in a Neurology Department in West Africa: Abidjan (Ivory Coast)

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Abstract: Background and purpose: With a hospital prevalence oscillating between 28% and 32% the strokes represent the first cause of hospitalization in our department [1] Stroke is emerging as a leading cause of preventable death and disability in adults in many developing nations. The general objective was to describe the profile of patients. Problem: The management of stroke is real public challenges under tropic regions. Methodology: We prospectively studied consecutive patients presenting to the neurology unit of Abidjan- Cocody, over a one year period (March 2012-February 2013). The socio-demographic, clinical data, the risk factors as well as the CT scan findings were collected in the patients registers. Results: The hospital prevalence of stroke was 28.3%. The average age was 58 years, and a quarter of patients had less than 50 years. A slight male predominance was noted with a sex ratio of 1.13. The average admission time was 6.7 days and the average period of hospitalization was 10 days. The main risk factor listed was hypertension (79.3%). The percentage of recurrent stroke was 21.6%. The main reasons for admission were: a motor deficit (100%) and headache (88.4%). Computed tomography has allowed the diagnosis of 59% of ischemic stroke especially the MCA territory and 41% of hemorrhagic strokes, mostly basal ganglia. The main causes were, for ischemic stroke, 47% of vascular causes, and hemorrhagic stroke, 74% of micro aneurysms associated with hypertension. Exploration difficulties were responsible for a significant percentage of undetermined causes. We recorded 24.1% of deaths. Conclusion: As in lot of developing African countries, the study suffers from strokes undetermined causes due to lack of financial means, and the failure of the technical platform.

Keywords: Stroke, CT, Cardiovascular Risk Factors, Etiologies, Death

1. Introduction

According to the World Health Organization, stroke is defined as the rapid development of localized or global signs of cerebral dysfunction with symptoms lasting more than 24 hours, which can lead to death without any other apparent cause apart from a vascular origin.

In our practice, cerebrovascular diseases are the most common acute neurological disorders and the first neurological cause of hospitalization. In Ivory Coast, strokes are at the forefront of neurological disorders. They represent more than 32% of the hospitalizations in the Neurology

department. If the mortality rate is down from 43.9% [1] to 24.1%, it remains a concern for the clinician.

2. Methodology

Prospective descriptive study over a period of one year from March 1st, 2012 to February 28th, 2013; performed in the largest neurology department of the capital which counts 02, located in the University Hospital of Cocody. It has a 32 bed capacity and lacked of stroke unit at the time of the study. Inclusion criteria were: all patients admitted during the study period for stroke confirmed by brain CT scan. Thus every patient with a neurological deficit of non traumatic sudden onset with CT confirmation lesions was included. The hypertension was defined by blood pressure $\geq 140 / 90$ mm Hg. The scanner was realized with a monobarette X device, axial, sagittal, and coronal slides of floors above and under tentorial without and with contrast injection products (gadolinium).

The cerebral venous thrombosis, the absence of CT, all focal motors deficits with non-imaging for stroke was exclusion criteria. For ethical reasons, we requested the consent of patients or families, and the sheets were indicated Privacy object.

The following parameters were studied:

- Socio-demographic data and risk factors
- The admission period and performing a brain imaging.
- The TOAST criteria were used for the classification of etiologies of ischemic stroke.
- The complications during hospitalization and stroke mortality.

For statistical analysis, we used the chi-square test with a probability value of 0.05 set as the statistical significance level.

3. Results

3.1. Epidemiological Characteristics

During the study period, 819 patients were hospitalized including 232 cases of stroke, with a hospital prevalence of 28.3%. Patient age ranged between 20 and 94 years with an average of 58 years. The under 50 accounted for one quarter of the workforce (25%) (TABLE I). The sex ratio M / F was 1.13. Stroke significantly affected more women than men after age 70 [khi2 ($\chi^2 = 12.094$ P = 0.0005)].

Table I. Distribution of patients according to age.

Ages	Workforce	Percentages(%)
20 - 29	06	02,6
30 - 39	15	06,5
40 - 49	36	15,5
50 - 59	49	21,1
60 - 69	73	31,5
70 - 79	36	15,5
80 - 94	17	07,3
TOTAL	232	100

The study population was predominantly made up of

people with no income (59.9%), no fixed employment, pensioners, housewives and unemployed.

3.2. Clinical Features

The average admission time was 6.17 days, less than 20% of patients admitted within 24 hours and 50% in the 72 hours following stroke. The average hospital stay was 10.43 days with a range of 1-94 days.

At the examination, hypertension was the major vascular risk factor found as family history in 44% of cases and as a personal history with nearly 80% of our patients. A stroke recurrence was found in 21% of cases (TABLE II).

The study population consisted of right-handed in 92% of cases and 13% of non-Ivorian patients (87% of Ivorian nationality). The assessment of vigilance on admission found 52.2% of patients with a Glasgow score less than 11 (Table III). The main reasons for admission were: motor deficit (100%), headache (88.4%), vigilance disorders (52.1%), vomiting (45,7%) and seizures (24,6%) (Figure 1).

The motor deficit was hemiplegia in 59% of cases, on the left side (50.6%), most often proportional (80%). The clinical examination revealed a pyramidal syndrome in 100% of cases, a deficit of higher cerebral functions in 65.9% dominated by Broca's aphasia (35.3%) and a sensory disorder in 44.5% of cases (Figure 2).

We compared the value of meningeal syndrome depending on the type of stroke: it was significantly higher in ICH (Table IV).

Table II. Distribution by risk factors.

Risk factors	Total (%)
	Number (%)
hypertension	184 (79,3)
diabetes mellitus	42 (18,1)
alcohol	63(27,2)
tobacco smoking	49(21,1)
heart disease	15(6,5)
stroke	50 (21,6)
dyslipidemia	2(0,9)
oral contraceptives	10(4,3)
anticoagulant therapy	2(0,9)

Table III. Distribution by the Glasgow Coma Scale (GCS) at admission.

State of consciousness (GCS)	Workforce	Percentages
Normal =15	111	47,8
Confusion (11- 14)	50	21,6
Coma (8 -10)	46	19,8
Deep coma (3-7)	25	10,8
Total	232	100

Table IV. Comparing the frequency of meningeal syndrome depending on the type of stroke.

Type of stroke	Meningeal syndrome		Chi-square	
	Found	Not found	probability	significance
AIS	13(9,4%)	125(90,6)	0,0003	S
ICH	26(27,7%)	68(72,3%)		

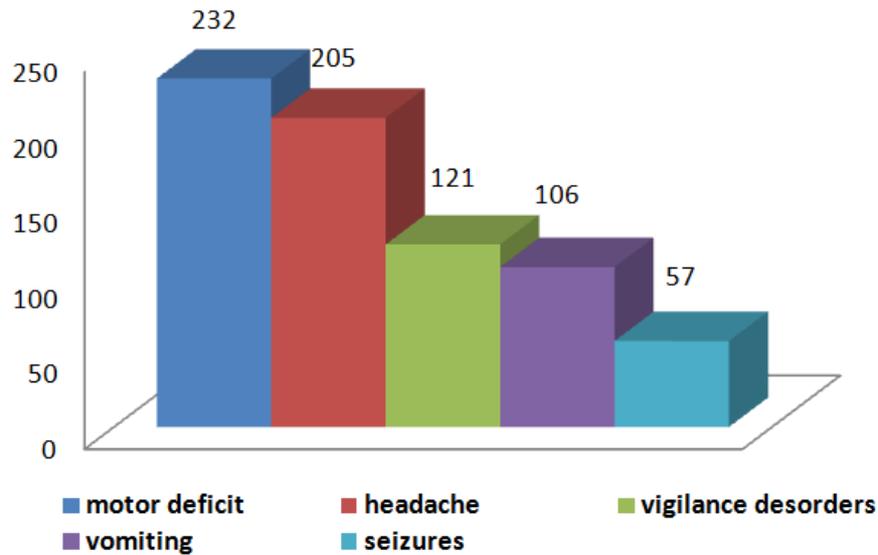


Figure 1. Distribution by early symptoms.

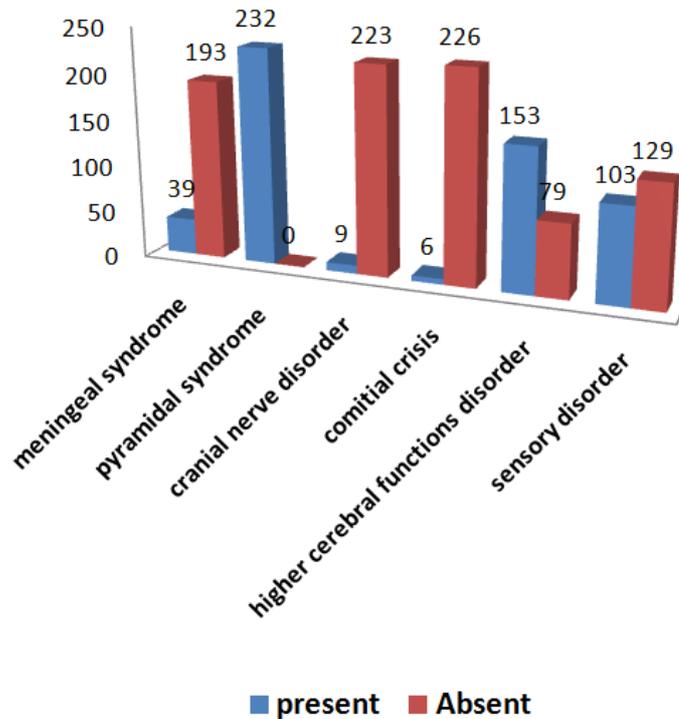


Figure 2. Distribution by syndromes and signs found on clinical examination.

3.3. Paraclinical Features

Brain computed tomography (CT) scan was performed in one quarter (25.1%) of patients in the first 48 hours post stroke, with a range of 0-60 days (average completion time = 4.6 days post stroke) (Table V). The mechanism of stroke was ischemia in 59% of cases, hemorrhage in 41% of cases (Figure 3). The topography of ischemic strokes interested the territory of the middle cerebral artery in 45.2% of cases and location of hemorrhagic stroke involved the basal ganglia in 60.4%. The main signs associated with CT were: mass effect

with (52.5%), cerebral atrophy (20%) and old stroke sequelae (8.6%). CT angiography (CTA) was performed for 30% of patients with AIS; and MRI for less than 1% of cases.

Table VI reviews the major biological analyzes of patients in this study.

The main cardiovascular examination performed was ECG (44.8%). Figure 4 indicates cardiovascular explorations made and their percentage.

The main anomaly found is left ventricular hypertrophy in 44% of 44.8% of subjects who received a cardiac evaluation.

The atherosclerotic vascular causes were implicated in 47%

of ischemic stroke and hypertension in 74% of hemorrhagic strokes (Figure 5- Figure 6).

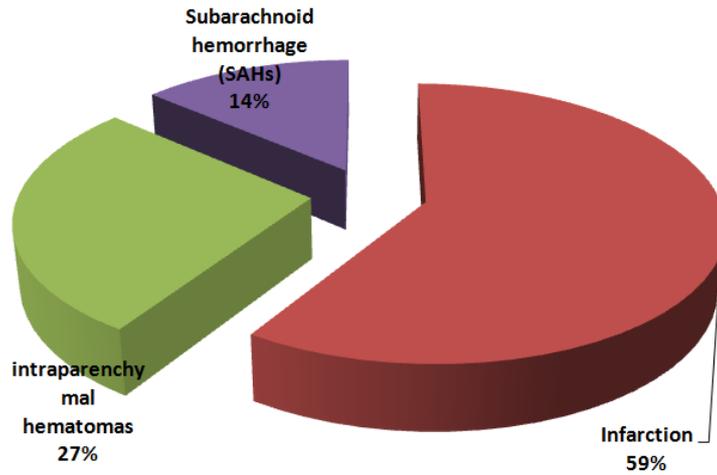


Figure 3. Distribution by type of stroke on CT.

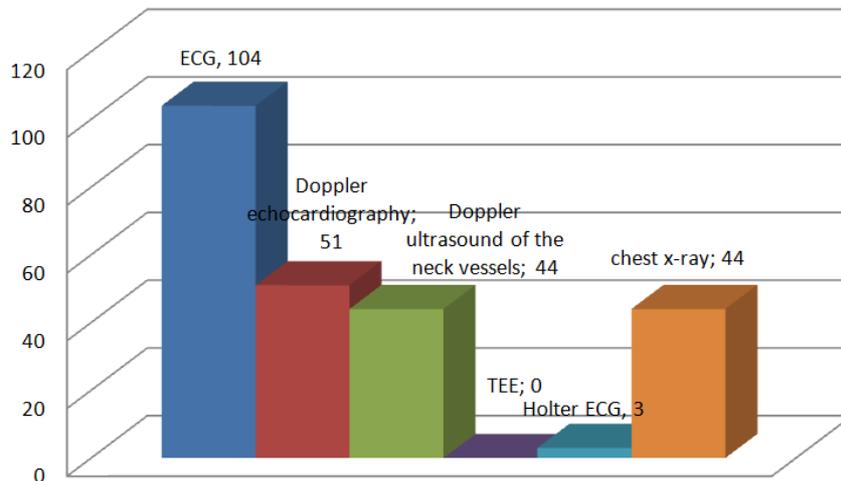
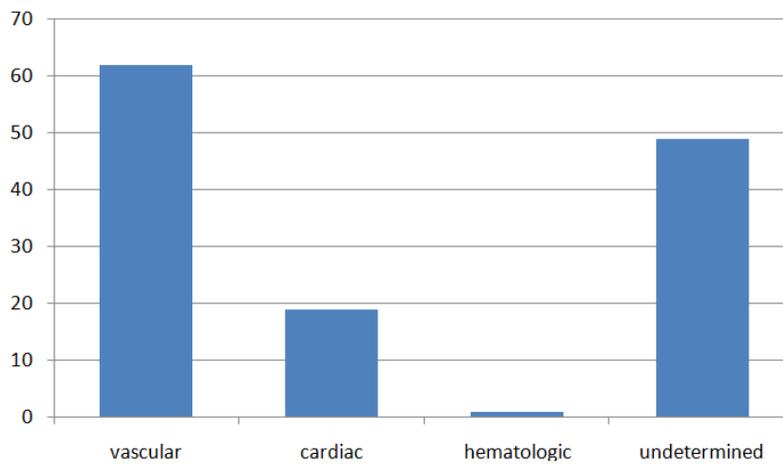


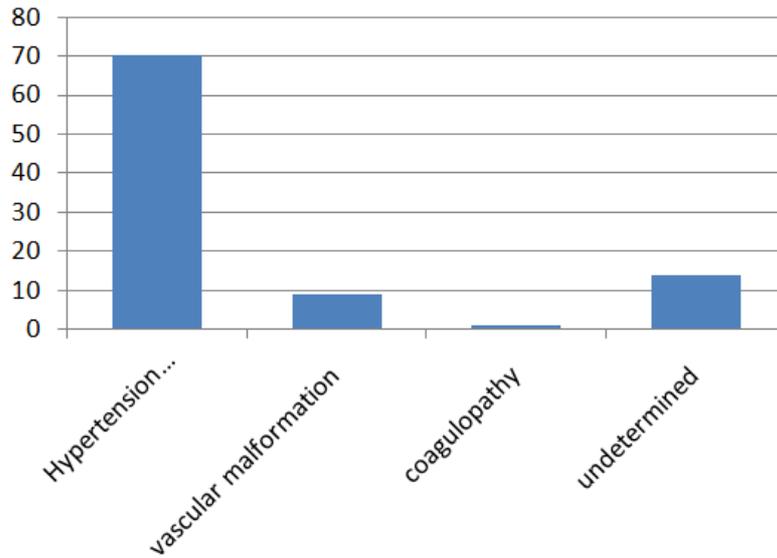
Figure 4. Distribution of the different cardiovascular imaging.

ECG: electrocardiogram (ECG)
 TEE: Transesophageal echocardiography
 Holter ECG: holter electrocardiogram



AIS = Acute Ischemic Stroke

Figure 5. Distribution of patients with AIS according to etiological diagnosis (N= 138 number of patients diagnosed AIS).



ICH = IntraCerebral Hemorrhage

Figure 6. Distribution of patients with ICH according to the etiological diagnosis.

Table V. Distribution by the completion time of CT relative to early signs.

Completion time (days)	Workforce	Percentages
< 48 h	58	25,1
3 à 5	107	46
6 à 10	42	18,2
11 à 20	12	6,9
21 à 60	9	3,87
TOTAL	232	100,0

Table VI. Main paraclinical tests realized.

Paraclinical tests	Workforce	Percentage
Blood glucose	232	100
Complete blood count	231	99,6
Renal function tests	231	99,6
Haemostatic tests	230	99,1
Serum electrolytes	230	99,1

Paraclinical tests	Workforce	Percentage
Liver function tests	228	98,2
Serum lipid profile	206	88,8
Lumbar puncture	21	9,1

3.4. Treatment and Evolution

The correction of cardiovascular risk factors required the prescription of antihypertensive drugs (90.5%), statins (51.7%) and diabetes mellitus medical care (16.4%). The most frequently prescribed symptomatic and causal treatment is summarized in Table VII and VIII.

Evolution in hospital was marked by 37% of decubitus complications (figure 7) and a mortality rate of 24.1%.

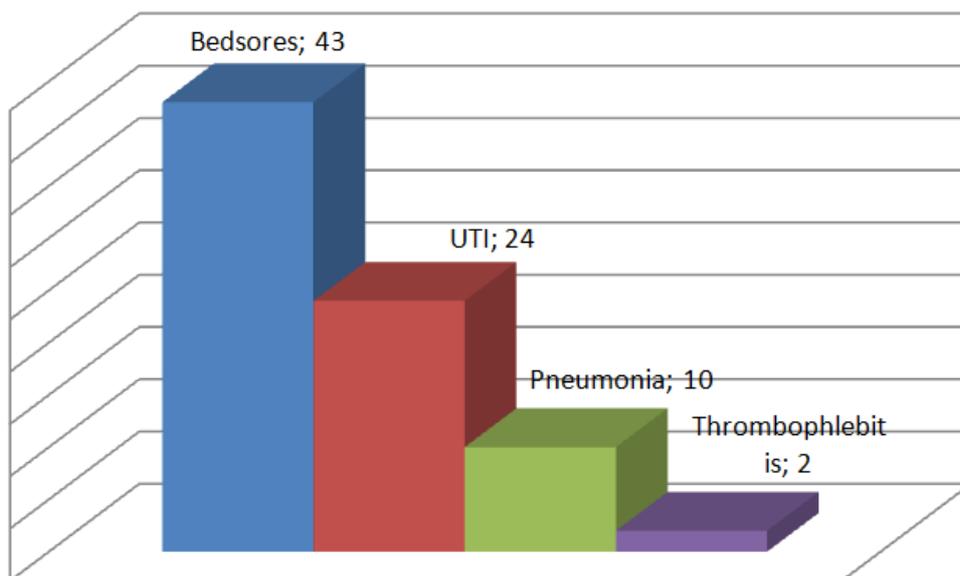


Figure 7. Types of complications during hospitalization.

Table VII. Distribution by type of treatment.

Symptomatic treatment	Number observed	Percentages %
analgesics	230	99,1
platelet antiaggregation agents	138	59,5
anticoagulation therapy	26	11,2
Antiepileptic drugs	25	10,8
cerebral oxygenator	8	3,4
anti-oedematous drugs	7	3,0

Table VIII. Distribution by type of anti hypertensive agents.

Type of anti hypertensive agents	Workforce	Percentages
ACEIs + diuretics combination	142	67,2
ACEIs	37	15,9
Calcium antagonists	27	11,6
Beta blockers	4	1,7
Undetermined	22	9,4
Total	232	100

ACEIs : Angiotensin-converting enzyme inhibitors

4. Discussion

The work we present reflects hospital prevalence, prevalence probably undervalued in light of selection biases: patients met the clinical selection criteria without performing brain CT scan, the temporary closure of the service.

Despite these difficulties, strokes are a common reason for hospitalization: 32.4% in neurology and in our series, they represent more than a quarter of our hospitalizations.

The median age was 58.2 years and one quarter of strokes occur in people under 50. The occurrence of strokes at a relatively young age in developing countries is due, at least in part, to the significant percentage of some risk factors (smoking alcoholic); the relatively young general population, including the management of risk factors, education and public awareness on the concept of care for chronic diseases such as hypertension, diabetes mellitus and cardiovascular diseases. In this population about 6 out of 10 patients (60%) had low socioeconomic status reflecting the difficulties in the daily management and realization of explorations. Jaillard et al [2] also recognize that low income, associated with illiteracy and unemployment significantly influenced the prognosis of stroke in general.

In Africa, more than 90% of patients with hemorrhagic stroke and more than half with ischemic stroke are found to have high blood pressure [3]. Hypertension remains the most important modifiable cardiovascular risk factor of ischemia and hemorrhage in both sexes and regardless of age (79.3% in our series). This is usually an ignored or poorly controlled hypertension, found by other African studies [4, 5, 6, and 7]. In a study in South Africa, 58% patients had never had their blood pressure measured. This does not necessarily mean that high blood pressure is not a problem, but rather that hypertension as a risk factor for disease in this population does not receive much attention [8]

It is imperative to conduct a health policy focused on primary, collective and individual prevention.

Alcoholism is found in our series with 27.1% of patients; it is the second risk factor in Gabon according to Kouina [9]. Tobacco is the third risk factor in our work; this could be explained by the importance of smoking in urban areas and among the younger population. In the series of Kouina [9], smoking represents 16.2% of cases. For Duc et al. [10], smoking triples the risk of ischemic stroke by an arterial vasoconstriction mechanism and platelet aggregation. We found a significant percentage of recurrent strokes (21.6%).

Many factors could explain the occurrence of this recurrence: Patient Information problem on the disease, its risk factors, but also the care of patient. We emphasize the need to develop own training strategies to our realities: training of community health center doctors often in the first line in the care of patients and popularize the international recommendations measures in the context of secondary prevention.

In developed countries, the awareness of the early symptoms of stroke, telemedicine and the creation of stroke units have revolutionized the treatment of stroke in the acute phase.

In our series, the hospitalization period ranged from 0 to 60 days, irrespective of the type of stroke with an average of 6.17 days

Only 19.8% of cases were admitted in our service within 24 hours. This could be explained by the lack of policy of population awareness but also, of the first-level medical personnel in the health pyramid of our country. This relatively long delay at admission contributed to postpone the early management, decisive element of the care.

Furthermore over half of patients (52.2%) were admitted with a Glasgow score less than 11 which can be a predictive value of a guarded prognosis.

The presence of hemiplegia in almost 60% of patients, aphasia in one third of patients in a service with a single, not a speech therapist, physiotherapist poses real functional management difficulties, retards the start-up of adequate rehabilitation measures.

In the first 24 hours, only 5% of patients had access to CT; this percentage reflects both the ignorance of the signs of stroke and the long circuit and difficulties of access to imaging studies. MRI, available in some private and public structures, is rarely performed due to its average cost price of 125 US dollars (against 35 US dollars for CT) and the low rate of prescription because of the obvious diagnosis on CT. In our series, thanks to the contribution of CT, preponderance of ischemia is confirmed (59%) and a high proportion of hematoma is noteworthy.

According to studies and countries, the predominance of stroke type varies [11, 6, 12, 7]. But, most of these studies report a slightly higher percentage of ischemia compared to hemorrhage as reported in this work. This high percentage of cerebral hematoma in various African studies could be explained in most cases by poor adherence in the treatment of hypertension or, sometimes, an ignorance of this chronic disorder responsible for 74% of ICH (intracerebral

hemorrhage) in our series.

Apart from conventional explorations (biological and cardiac), we had to realize in about 10% of AIS, a lumbar puncture in the etiologic research of infectious vasculitis.

HIV prevalence in our regions is about 5%. In the study of Kouna in Gabon 15.5% of patients tested were infected with HIV [9] In South Africa, among the young people not addicts, 16% of young patients of stroke occurred in patients infected with HIV [13]. In our work environment research of infectious vasculitis by the achievement of the PL and testing for HIV should be systematic.

Vascular causes (atherosclerosis, vasculitis and other vascular causes) were found in 47% of patients with ischemia. Specific etiologies of vasculitis have not always been found. More expensive examinations were necessary. But, given the modest socio-economic level, lots of patients have not been able to continue forward investigations. This was probably the same for heart disease, which accounted for 15% of the causes of AIS, rate underestimated given the insufficiency of cardiac imaging realization. The inadequacy of the technical equipment, the difficulties of explorations, and the rate of AIS without classically described causes in the literature partly explain the 37% of undetermined causes.

Hypertension was the main cause of ICH. It was apparent from our study that 74% of ICH were hypertensive origin. There are two types of lesions involved according to Cambier J. *et al.* [14]: Charcot-Boucharid aneurysms and arteriolar lipohyalinosis associated with chronic hypertension. The finding was the same with 15% undetermined causes.

Therapeutically, in secondary prevention, focus is on the correction and treatment of cardiovascular risk factors especially hypertension which remains worrying. Thus, the combination of angiotensin-converting enzyme inhibitors (ACEIs) and diuretics was the most prescribed therapy because of our patients' profile.

In this work, we found that one in four patients hospitalized for stroke dies from complications due to stroke. This finding may be explained by delayed diagnosis and management of stroke in our context. This rate is much lower than that reported by Dewar *et al.* [12] in South Africa and that of Kwasa *al.* [15] in Kenya which respectively recorded 38% and 46% of deaths in their samples.

However, decubitus complications were a concern, affecting 37% of the subjects in our workforce with an emphasis given to bedsores (50%). Adequate preventive measures: adopt anti bed sore mattresses, achieve proper nursing, initiate early a physiotherapy are all simple and urgent measures to practice every day but sometimes difficult to achieve in our practice.

There are several important messages in this paper. The mean age of the patients was 58 years, about

10–15 years younger than patients with stroke in developed countries. The study provides no data on stroke subtype, but the high early case fatality could be due to a high proportion of hemorrhagic stroke. There are few data available on stroke subtype in sub-Saharan Africa, although hemorrhagic stroke may be more prevalent than in developed

countries. [16]

Data suggest that stroke is already a major health problem in African countries, health-care systems are already over-stretched, the burden of stroke will increase in the future, and cheap interventions are available.

Long-term follow-up of stroke patients is extremely difficult because of the lack of central identification registries, few census reports, no address. The choice is therefore to accept hospital data or have no data at all.

Stroke units could be of benefit in Africa but primary prevention can reduce stroke occurrence and can be implemented for example: national strategies to reduce tobacco smoking, promote healthy lifestyles, and

Strokes and cardiovascular diseases will represent the main challenge of developing countries health care management systems in the coming years. [17]

5. Conclusion

In sub-saharian Africa countries strokes represent the first cause of disability in neurological departments. In Cote d'Ivoire, strokes have high hospital prevalence, with a very high socio-economic impact in terms of mortality and morbidity in the populations of young adults. Primary prevention of stroke remains a major challenge in our African countries. The management of this disease requires the opening of neurovascular units. Around these key structures, radiology accessible at all times, an organization of stroke sector, implementing a multidisciplinary collaboration: neurologist - radiologist - emergency physician - cardiologist - rehabilitation doctors.

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