Original Research

Clinical characteristics and outcomes of patients with stroke admitted to three tertiary hospitals in Zimbabwe: A retrospective one-year study

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Abstract

Background
Epidemiological data on stroke in Zimbabwe are scarce and few clinical studies have been performed to date.

Methods
A retrospective review of the medical records of patients admitted for stroke during the year 2012 was performed at 3 tertiary hospitals in Harare Province (Chitungwiza Central Hospital, Harare Central Hospital, and Parirenyatwa Group of Hospitals). Sociodemographic data were recorded, alongside comorbidities and outcomes. Scoping over a period of 1 year using records of patients admitted for stroke helped to quantify and qualify the stroke problem. Descriptive analysis was done using Stata version 13.0.

Results
A total of 450 stroke cases (63% women) were included in the final analysis. The proportion of stroke cases among the admissions was 0.61%. Mean age of the stroke patients was 61.6 ± 16.8 years (95% CI = 60.1 to 63.2). Risk factors were hypertension (58.5%), diabetes (18%), and HIV, (14%). Diagnosis was clinical and 39.4% had a CT scan. Mean length of hospital stay was 8.1 ± 5.6 days, with a significant difference noted among hospitals (P < 0.001). In-hospital mortality was 24.9% (95% CI = 20.9 to 29.0%). Mortality was associated with place of admission (P < 0.001). There was a significant association between gender and side of stroke (P < 0.001).

Conclusions
The sociodemographic characteristics mirrored findings from elsewhere. Mean age was higher than reported for Zimbabwe in the nineties and more recently in Malawi. The majority of patients were female, elderly, and hypertensive, in line with findings from other countries. The relationship between gender and affected side needs further research. There is need to standardise acute care, through proper diagnosis, to reduce mortality. There is need to support caregivers post-discharge.
Data handling is poor and there is limited capacity for sub-Saharan African hospitals to provide optimal stroke care. This may have long-term implications on the outcome of survivors and caregivers. There is need of vigilance in acute stroke care.

Introduction

As first highlighted in the early nineties, stroke continues to be a public health issue in Zimbabwe.[1] Although the prevalence of stroke in sub-Saharan Africa was said to be less than half that of developed countries,[2] the burden of stroke seems to be on the increase with a major impact on society.[3,4] Recent studies show that incidence of stroke is comparable in developing and developed parts of the world.[5] Data on the extent of this increase in the region is however, limited with much of it coming from South Africa and recently from Malawi.[6] This increase of stroke in sub-Saharan Africa is attributed to a surge in noncommunicable diseases, HIV,[6,7,8] and an emerging vascular disease epidemic attributed to urbanisation.[4,9,10,11] A difference in hypertension levels was found between rural and urban dwelling stroke patients, with lower numbers in the rural dwellers.[12,13] A 40% higher rate of ischaemic stroke was found in HIV patients compared to HIV-negative controls.[8] Although the HIV incidence in Zimbabwe has decreased over the last 20 years from 3% to 1.2%[15] then to 0.74% in 2015[15] there are still many people living with HIV who may be predisposed to stroke. There is however no literature with regard to the prevalence of HIV among patients with stroke in Zimbabwe.

Most people who suffer a stroke (patients) may not present to hospitals hence hospital based data is not the best to give an accurate picture of the epidemiology of stroke in sub-Saharan Africa,[4,13] and Zimbabwe in particular. Some patients may die soon after stroke while others may not go to hospitals as their symptoms maybe mild or if they cannot afford the hospital costs for services[13] or better still seek help elsewhere affecting hospital data. Community based studies to get adequate information on stroke have been recommended.[4] These are however expensive and not affordable for most researchers. Epidemiological data on stroke in Zimbabwe is scarce and reports available are quite old.[1,13] The authors[1,13] reported a rise in the incidence of stroke in Zimbabwe from 31/100,000 to 57/100,000 in a decade. In the first study most of the patients were in the economically active group with mean age of 52, and less than a third were 65 years or older which when compared to the World Health Organization multicentre stroke registry,[16] 54% of all patients were older than 64years. This difference reflected the difference in age structure between Zimbabwe and developed countries.

With regards to mortality in stroke, similar fatality rates ranging from 22% to 58% at 1 month following stroke were reported in Zimbabwe and other African studies.[1,3,17] Cumulative mortality at 3 months was found to be 25.5% in South Africa.[18] The same authors[18] also reported a mean length of hospital stay of 6 ± 4 days. Thus, patients are discharged to the community while still needing further care.[14] Elsewhere, findings show higher mean length of hospital stay due to ability to pay for services.[2,19] This study aimed to describe

Table 1: Proportion of patients admitted with stroke at the three hospitals in 2012

Study site	Total admissions n (%)	Total stroke n (%)	Retrieved records n (%)	Proportion of stroke admissions n (%)
Harare Hospital	50,191(58.2)	141 (26.6)	83 (58.9)	0.28
Parirenyatwa Hospital	34,617 (40.1)	276 (52.1)	276 (100)	0.80
Chitungwiza Hospital	1465 (1.7)	113 (21.3)	91 (80.5)	7.71
Total	86,273	530	450 (84.9)	0.61

Table 2: Sociodemographic characteristics, alcohol use, and smoking among patients with stroke

Demographic characteristics	Male n (%)	Female n (%)	Total (N = 450)	Missing data
Gender	164 (37)	282 (63)	**446**	4
Age (mean years ± standard deviation)	62.3 ± 16.6	61.0 ± 16.9	61.6 ± 16.79	
Marital status				
Married	105 (75.4)	133 (64.9)	238 (58.5)	
Single/Widowed	40 (24.6)	72 (35.1)	169 (41.5)	
Total	**145**	**205**	**407**	43
Mode of payment for hospital services				
Cash	79 (50.3)	135 (48.9)	214 (49.4)	
Medical insurance	10 (6.4)	20 (7.2)	30 (6.9)	
Social dimension fund	3 (1.9)	2 (0.7)	5 (1.2)	
Pensioners	65 (41.4)	119 (43.1)	184 (42.5)	
Total	**157**	**276**	**433**	17
Alcohol use				
Yes	75 (48.1)	17 (6.4)	92 (21.8)	
No	81 (51.9)	249 (93.6)	330 (78.2)	
Total	**156**	**266**	**422**	28
Smoking				
Yes	53 (34.9)	11 (4.2)	64 (15.3)	
No	99 (65.1)	254 (95.8)	353 (84.7)	
Total	**152**	**265**	**417**	33

Table 3: Side of stroke by patient gender

	Left	Right	Bilateral	Total (N = 450)
Male	56 (12.9%)	81 (18.7%)	23 (14.0%)	
Female	119 (27.4%)	138 (31.8%)	17 (6.2%)	
Total	175	219	40	434
Missing data				16

Table 4: Comorbid conditions

Condition	Yes (%)	No (%)	Total (N = 450)	Missing data
HIV	63 (14.0)	5 (7.4)	68	382
Hypertension	263 (58.4)	187 (41.6)	450	0
Diabetes Mellitus	81 (18.0)	8 (8.9)	89	361
Heart Disease	25 (5.6)	8 (22.2)	33	417
Aspiration Pneumonia	41 (16.0)	6 (12.8)	47	409

the clinical characteristics and the outcomes of patients with stroke admitted at 3 tertiary hospitals in Zimbabwe between January and December 2012.

Methods

Study design
This was a retrospective cross-sectional study based on hospital records.

Participants and research setting
Records of patients admitted for stroke during the year 2012 were retrieved. The study was carried out at Chitungwiza Central Hospital (CCH), Harare Central Hospital (HCH), and Parirenyatwa Group of Hospitals (PGH) in Harare Province, Zimbabwe. These are major public referral hospitals. The staff working at these hospitals are trained to be able to diagnose stroke. Only 1 hospital (PGH) has a CT scan and the other hospitals refer to other centres for this service. None has a Magnetic Resonance Imaging (MRI) for confirming in case there is any doubt with the clinical diagnosis. The authors only relied on the diagnosis as entered in the patients' files in the records. Not all patients therefore had a stroke confirmation.

Study procedures
Patients admitted with a diagnosis of stroke[20,21] between January and December 2012 were identified from the ward admission registers. The names and hospital identification numbers of the patients were used to retrieve their records. Four hundred and fifty records were reviewed and the following data were collected (age, gender, marital status, employment status, level of education, type of stroke, dates of admission, discharge or death and history and results of CT scan) and recorded on a data abstraction sheet. Stroke risk factors including diabetes mellitus, hypertension, heart disease (both structural and atrial fibrillation), current or past history of smoking or alcohol consumption and HIV status were examined. Presence of aspiration pneumonia as a complication of stroke was also noted. The method of payment for hospital services which included payment using cash, medical insurance, social dimension fund and patients above 65 years do not pay was recorded.

Statistical analysis
Data were analysed using Stata 13 to generate means and standard deviations, and proportions with their 95% confidence intervals where appropriate.

Ethical considerations
Ethical approval for the study was provided by the University of Zimbabwe College of Health Sciences and Parirenyatwa Hospital Joint Ethics Committee (JREC 324/12) and The Medical Research Council of Zimbabwe (MRCZ/A/1738). Data collection forms were anonymised to ensure confidentiality.

Results

During the 12-month review period, a total of 86,273 patients were admitted at the 3 hospitals. Of these 530 (0.61%) were diagnosed as having a stroke and 450 (85%) records for stroke patients were successfully retrieved. Some of the records had incomplete information. Missing data were treated as missing. Higher proportion of stroke cases among the admissions (7.7%) was at CCH, where the mortality rate was also highest (Table 1).

Types of stroke and side affected
Stroke diagnosis was based on the clinical assessments by physicians. Approximately 39.4% had a CT scan done. No post mortem reports on any of the deaths were done to suggest type of stroke. Taking into account that some data were missing, 175 (40.3%) patients had a stroke on the left side of the brain, 219 (50.5%) had a stroke on the right, 40 (9.2%) had a stroke on both sides. Both gender and side of stroke were mentioned in 434 patients. Fifty-six (12.9%) males had a left sided stroke while 119 (27.4%) females had a left stroke. Eighty-one (18.7%) males had a right stroke while 138 (31.8%) females had a right stroke. More male patients (14%) than females (6.2%) had stroke on both sides. Chi Square test showed an association between gender and

Table 5: Mortality among patients with stroke

Hospital	Alive n (%)	Dead n (%)	Total (N = 450)	95% confidence interval
Chitungwiza Hospital	58 (68.2%)	31 (34.8)	89	24.7 to 44.9
Harare Hospital	68 (91.9%)	6 (8.1)	74	1.7 to 14.5
Parirenyatwa Hospital	199 (73.7%)	71 (26.3%)	270	21.0 to 31.6
Total	325 (75.1%)	108 (24.9%)	433	
Missing data			17	

side of stroke with more females presenting with stroke on the left side of the brain (P = 0.011). Haemorrhagic stroke was reported in 225/417 (54.0%) while 192 (46.0%) had ischaemic stroke but only 180 had history of CT scan taken, confirming diagnosis was therefore not done.

Comorbid conditions

Two hundred sixty-three (58.4%) patients were known hypertensives or were on treatment for hypertension. Sixty-eight patients were tested for HIV and among these 63/68 (14.0% of 450) were HIV positive. Mean age of the 63 HIV positive patients was 46 ± 15.1 years compared to the group mean age of 61.7 ± 16.8 years. Eighty-nine patients were tested for diabetes mellitus (DM) and 18.0% had diabetes. Approximately 6.0% (n = 25) had a history of some heart disease. Aspiration pneumonia was diagnosed in 9.0% (Table 4).

Mortality rates

There were 108 (25%) in-hospital deaths. About one-third of males (30.3%; 95% confidence interval, CI = 22.9 to 37.6) and 22% of females (95% CI = 17.1 to 26.9) died in hospital; this difference was not statistically significant (P = 0.059). Eighteen (44.0%) patients with aspiration pneumonia died in hospital. Fifteen (23.8%) HIV-positive patients died in-hospital. Using Fisher's exact test, there was no difference in mortality between HIV-positive and HIV-negative patients (P = 1.000). Thirty-five percent of the patients died in hospital at CCH. There was a statistically significant association between admitting hospital and mortality, with more patients dying at CCH (P < 0.001) (Table 5). When type of stroke was tabulated against mortality, 49 out of 187 patients (26.2%; 95% CI = 19.8 to 32.6) with ischaemic stroke died, while 51/214 (23.8%; 95% CI = 18.1 to 29.6) died among those with haemorrhagic stroke. No statistically significant difference in mortality was found between patients with haemorrhagic and ischaemic strokes (P = 0.584).

Length of hospital stay

The mean length of hospital stay was 8.1 ± 5.7 days (95% CI = 7.5 to 8.6). Patients stayed longer at HCH (11.5 ± 4 days; 95% CI = 10.6 to 12.4) and fewer days at CCH (5.7 ± 3 days; 95% CI = 5.1 to 6.4). The length of hospital stay at PGH was 7.8 ± 6.3 days; 95% CI = 7.0 to 8.5). Analysis of variance showed a significant difference in length of stay between hospitals. Patients stayed longer at HCH than at the other hospitals (P < 0.001).

Discussion

This study describes the clinical characteristics and outcomes of patients with stroke admitted at 3 tertiary hospitals in Zimbabwe during the year 2012. The available data did not make it possible to calculate the prevalence or incidence of stroke in Zimbabwe therefore no comparison can be made with other countries because the of the study setting. However, the results provide important information about stroke in Zimbabwe. Of importance is the fact that clinical diagnosis was used,[20] as less than half of the patients had a CT scan done. This is different from other studies,[6] where both CT Scan and MRI were used to confirm diagnosis. The study missed cases that die soon after stroke while at home and those people with mild strokes who do not present to hospitals. It is assumed that many people who suffer strokes do not make it to hospital and Community based studies have therefore been recommended by authors as the study method of choice.[21-25] Stroke patients were mainly elderly females who had no source of monthly income. This matches

studies done elsewhere where 52% to 68% of strokes were women.[18,26-29] However studies in Malawi have reported a lower proportion of females.[7] The mean age was lower than for European studies[30] but higher than for Malawi.[7] Traditionally stroke was a disease of old age, but findings of stroke among the under 20s and the middle aged has led to the conclusion that stroke should no longer be regarded as a disease of old age.[5] The worldwide epidemic of diabetes[31] and increasing prevalence of cardiovascular risk factors in young adults has compounded this.[32] The high prevalence of HIV in younger people and its relationship with stroke[6,11,38] makes stroke a disease of all ages. In this study it seems as if only those who had indications for HIV testing were tested, so an unknown number of HIV positive may have been in those that were not tested. The 14% prevalence of HIV is close to the adult population prevalence of 15% (ZDHS 2010/11)[15] and these had low mean age. The Provider initiated counselling and testing policy for HIV in Zimbabwe should be strengthened in stroke. In higher income countries, 15% of the population is over the age of 65 whereas these are less than 5% in most African countries. Age standardised rates would assist since the gender difference may be due to women surviving longer. Since this was a records review, no information about daily quantity of tobacco smoked or alcohol consumed was available to assess any association with stroke. Other confirmed risk factors for stroke like hypertension, diabetes and heart disease were found.[1,5,6,18,30,35,37] Awareness at Community awareness with regards to stroke prevention from modifiable risk factors is important.

A limitation of our study was the low uptake of CT scans for the majority of patients as they lacked resources or lack of health insurance cover.[22,30] CT scans are important for accurate early diagnosis and classifying of strokes as this has implications on the management and prognosis of stroke.[2] Most strokes were reported as haemorrhagic, mirroring reports by Sagui[2] but contrasting Nigerian,[33] Croatian,[34] and other studies[5,35,36] that reported higher incidences of up to 73%[18,29] ischaemic strokes. More data may be available as haemorrhagic patients are very ill so extra effort to have CT scans is made. Haemorrhagic strokes are associated with hypertension and this was found to be high among these patients and in other studies.[7] The management of ischaemic and haemorrhagic stroke differs substantially, and therefore their differentiation and identification of stroke complications is important in acute stroke. A reliable differentiation is not possible on the basis of clinical examination alone[38] hence need for CT scan . An increase in proportion of hypertension from 1997[1] points towards an increase in vascular disease in Zimbabwe. Studies elsewhere have also reported a higher prevalence of hypertension among patients with ischaemic stroke.[3,4] It is not clear why more females were affected on the left side. There may be genetic or structural differences between the sexes that may warrant further research. The length of hospital stay was higher than for studies done elsewhere.[18,30] In other places patients are discharged as soon as they are stable, to create space for others or due to lack of finances. Longer hospital stay may mean that patients get better management rather than go home early to an unprepared family. However, this may mean higher hospital costs which patients cannot afford. It is important for the centres to balance the length of stay with health benefits for the patients. In developed countries it is higher as medical bills are covered by health and social insurance

unlike in most developing countries.[19,39] Community Based Rehabilitation through the involvement of family caregivers may be a management of choice as a way for continuity of care. This will require educating the caregivers in the care of stroke survivors. Mortality was higher than elsewhere where cumulative mortality to the first 3 months post stroke ranged from 3% to 30%.[7,18,30,33] A 41% mortality rate was reported in Gambia which was higher.[17] The lowest rates were found in USA, probably due to their well-resourced healthcare system. There is a need to understand underlying dynamics of stroke management in Zimbabwe. The researchers postulated weaknesses in the acute care management of stroke patients at the 3 institutions. Less adequate stroke management has been associated with greater case fatality.[5] We also assumed that patients may take longer to present to hospitals and only do so when complications have set in hence the higher mortality. The point at which patients present to hospital may affect outcomes even though scans may be done early. Statistics for those that die at home are never captured hence community based studies are recommended.[21,22] It is also not clear how much HIV is contributing as many had an unknown status. Outcome may be improved by a case review approach as this would include reflection on the duration of symptoms at the point of admission in each of the 3 facilities. The health delivery system in Zimbabwe should make stroke management a priority to reduce mortality reported to be 107/100,000[15] through proper diagnosis and treatment. There is a need for more studies on the contribution of aspiration pneumonia to mortality. Studies elsewhere have pointed towards a relationship between stroke and aspiration pneumonia.[40,41] Elsewhere, stroke units have been found to reduce length of stay and fatality in stroke patients,[42] and this is recommended for this setting.

This was a retrospective records review study and as such there was a lot of missing information from the records and this is likely to cause bias. The medical records are paper based and manually filed leading to incompleteness and a lack of consistency. This made it difficult to obtain important epidemiological data which is necessary to plan for and provide better services for patients. There is therefore a need to identify better ways of recording patients' data at these centres. Poor data keeping may affect both practice and research in that lack of information on the type of stroke may affect timely and appropriate intervention and lack of information affects data needed in research.[20] This is however a common problem with records review studies.[1] As it was a hospital based study, generalisability of the findings is limited. The authors did not use methods that have been used elsewhere such as clinical audit checklist, root cause analysis which could have assisted in assessing contributory factors for each stroke. Records review studies may under estimate the prevalence of stroke in these areas as most patients may not come to hospital.

Conclusions

Although records had some missing information, the results give some insight into the stroke problem in Zimbabwe. We designed this retrospective study to describe the clinical characteristics and outcome of patients admitted for stroke in 3 tertiary hospitals in Zimbabwe. Data management is poor and there is limited capacity in sub-Saharan Africa hospitals to provide optimal stroke care. Prospective studies will give a better picture of the burden of stroke in our setting. The researchers recommended the need to do a full and proper assessment especially for conditions that are associated with stroke to help plan for prevention and rehabilitation strategies such as physiotherapy. Routine testing of HIV in people affected by stroke should be done. There is also need for better funding for stroke care so that patients may stay in hospital until they are more functional.

Competing interests

The authors declare no financial or personal relationships that may have inappropriate effects on the outcomes of this research.

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