

One-Year Rates and Determinants of Poststroke Systolic Blood Pressure Control among Ghanaians

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Background and Objective: Elevated systolic blood pressure (SBP) is potentially associated with risk of recurrent strokes. In resource-limited settings, there is a dearth of data on the rates and determinants of uncontrolled SBP among stroke survivors at high risk of recurrent events. The objective of this study is to assess the rates and determinants of uncontrolled SBP over the first year post stroke. *Methods:* This is a retrospective observational study involving stroke survivors who enrolled into an outpatient neurology clinic in Kumasi, Ghana, between January 2012 and June 2014. Baseline demographic features, clinical characteristics, antihypertensive medications prescribed at each clinic visit, treatment modifications, and clinic blood pressure measurements were recorded. Predictors of uncontrolled SBP during follow-up were assessed using a multivariable logistic regression model. *Results:* A total of 602 stroke survivors enrolled for follow-up within the study period of which 89.8% had hypertension. Up to 35% of subjects had an SBP above 140 mmHg during follow-up clinic visits. Among those with uncontrolled SBP, 17% had antihypertensive treatment modifications during follow-up. Predictors of uncontrolled SBP were SBP at enrollment into clinic, with an adjusted odds ratio (OR [95% confidence interval {CI}]) of 1.31 (1.17-1.47)/10 mmHg increase, and average number of antihypertensive medications prescribed, with an adjusted OR (95% CI) of 1.30 (1.06-1.60) for an increase in the number of antihypertensives prescribed. *Conclusion:* A third of stroke survivors had SBP not on target during follow-up possibly due to a combination of therapeutic inertia, apparent treatment resistance, and poor adherence to therapy. Longer-term prospective interventional studies on hypertension control among stroke survivors are warranted in sub-Saharan Africa. **Key Words:** Systolic BP—stroke survivors—Ghana—recurrence—therapeutic inertia—antihypertensive therapy—Resistant hypertension.

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Received June 15, 2016; revision received August 15, 2016; accepted August 23, 2016.

Source of funding: This study was supported by the National Institutes of Health—National Institute of Neurological Disorders and Stroke (R21 NS094033).

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1052-3057/\$ - see front matter

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<http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2016.08.033>

Introduction

Hypertension is the premier modifiable risk factor for index and recurrent ischemic and hemorrhagic strokes.¹⁻³ Among patients with recent noncardioembolic ischemic stroke, a clear association between systolic blood pressure (SBP) and risk for recurrent stroke has been established.⁴ Available evidence suggests that successful reduction of SBP results in significant reductions in the risk of recurrent strokes^{5,6} in developed countries. However, in sub-Saharan Africa, where stroke incidence and prevalence are rapidly rising, achieving and sustaining blood pressure control is particularly challenging⁷⁻¹⁰ due to a myriad of factors including misconceptions about hypertension, low literacy levels, medication access and affordability, nonadherence, inappropriate medication selection, clinical inertia, and resistant hypertension.¹¹⁻¹⁵

There are limited published data on the rates and determinants of control of blood pressure among stroke survivors in sub-Saharan Africa^{16,17} and yet still fewer trials designed¹⁸ to evaluate locally tailored interventions to reduce this potent risk factor within these settings. It is well established that patients who experience a recent stroke are more motivated to adhere to their medications to achieve better risk factor control for secondary prevention. Given that having stroke increases the risk of recurrent strokes^{19,20} and that antihypertensive medications are efficacious at reducing SBP,^{5,6,21} we sought to evaluate the rates of control of SBP among stroke survivors enrolled into a neurology clinic in Kumasi, Ghana. The objectives of this retrospective study were to assess the rates of uncontrolled SBP over the first year after enrolling at the neurology clinic with a diagnosis of stroke, and to document the antihypertensive medications prescribed for stroke patients and the treatment intensifications undertaken for patients not on target for SBP during clinic appointments in a resource-limited setting.

Methods

This retrospective study was approved by the Committee on Human Research Publication and Ethics of the School of Medical Sciences, Kwame Nkrumah University of Science and Technology, and the Komfo Anokye Teaching Hospital (KATH), Kumasi, Ghana. The study was conducted at the neurology clinic of KATH in Kumasi, Ghana. Kumasi is the second largest city in Ghana with an estimated population of 4 million inhabitants. The neurology clinic was established in 2011 by F.S.S. and runs once a week, receiving referrals for adults above 16 years with neurological disorders from 6 out of the 10 administrative regions of Ghana, and serves an estimated population of 10 million as previously described.²²

Stroke survivors were referred to the neurology clinic upon discharge from the ward as inpatients or from surrounding hospitals and clinics for follow-up care mainly

for secondary prevention and rehabilitation. Upon enrollment into the clinic, patient charts of inpatients were used at the neurology clinic for follow-up. Data collected for the present analysis included age, gender, marital status, occupation, religion, type of stroke, blood pressure measurements on admission and discharge as inpatients, and vascular risk factors as well as antihypertensive medications prescribed on discharge. At each clinic visit, patients' systolic and diastolic blood pressures were measured 3 times by a trained nurse using a mercury sphygmomanometer, and the last 2 recordings were averaged by a trained clinic nurse and documented in the patients' charts. Changes made to antihypertensive medications were recorded in the patients' charts and were captured in the present study. Typically, stroke patients were scheduled for follow-up visits on months 1, 3, 6, and 12 with nonscheduled visits where necessary. Stroke types were determined for those with cranial computed tomography scans performed within 10 days post stroke. At the neurology clinic, ischemic strokes were subtyped according to the Oxford Community Stroke Project (OCSP),²³ whereas hemorrhagic strokes were subtyped etiologically into structural, medication-associated amyloid angiopathy, systemic diseases, hypertension, or undetermined disease using the Structural, Medication-associated, Amyloid angiopathy, Systemic diseases, Hypertension, Undetermined (SMASH-U).²⁴ Patients were seldom able to afford the cost of carotid Doppler and echocardiography for etiologic subtypes of ischemic strokes. Adherence to antihypertensive medications was assessed by asking patients if they had missed doses of their blood pressure medications within the last week, but these data were inconsistently documented in patient charts.

Definition of Terms

SBP was deemed to be on target if clinic SBP was below 140 mmHg according to Eighth Joint National Committee (JNC-8) guidelines.²⁵

The present analysis involved 608 stroke survivors who enrolled into the neurology clinic between January 2012 and June 2014, and data were closed for analysis in June 2015.

Statistical Analysis

Means and medians were compared using Student *t*-test or Mann-Whitney *U*-test for paired comparisons and analysis of variance or Kruskal-Wallis tests for more than 2 group comparisons. Proportions were compared using the chi-squared test. A multivariable logistic regression model was employed to assess the determinants of a clinic SBP of 140 mmHg or above during follow-up. In this model, variables such as age, gender, stroke type (ischemic, hemorrhagic, or not typed), SBP at enrollment, and average number of antihypertensive medications prescribed over

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