

Epidemiology of Stroke in Costa Rica: A 7-Year Hospital-Based Acute Stroke Registry of 1319 Consecutive Patients

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Background: Limited data on stroke exist for Costa Rica. Therefore, we created a stroke registry out of patients with stroke seen in the Acute Stroke Unit of the Hospital Calderon Guardia. *Methods:* We analyzed 1319 patients enrolled over a 7-year period, which incorporated demographic, clinical, laboratory, and neuroimaging data. *Results:* The mean age of patients with stroke was 68.0 ± 15.5 years. Seven hundred twenty-five were men and the age range was 13-104 years. The most prevalent risk factors were hypertension (78.8%), dyslipidemia (36.3%), and diabetes (31.9%). Fifteen percent had atrial fibrillation and 24.7% had a previous stroke or transient ischemic attack. Prevalence of hypertension and atrial fibrillation increased with age; however, younger patients were more associated with thrombophilia. We documented 962 (72.9%) ischemic and 270 (20.5%) hemorrhagic strokes. Of the ischemic strokes, 174 (18.1%) were considered secondary to large-artery atherothrombosis, 175 (18.2%) were due to cardiac embolism, 19 (2.0%) were due to lacunar infarcts, and 25 (2.6%) were due to other determined causes. Five hundred sixty-nine (59.1%) remained undetermined. Atherothrombotic strokes were mostly associated with dyslipidemia, diabetes, metabolic syndrome, and obesity, whereas lacunar infarcts were associated with hypertension, smoking, sedentary lifestyle, and previous stroke or transient ischemic attack. Of our patients, 69.9% scored between 0 and 9 in the initial National Institutes of Health Stroke Scale (NIHSS). *Conclusions:* We found differences in sociodemographic features, risk factors, and stroke severity among stroke subtypes. Risk factor prevalence was similar to other registries involving Hispanic populations. **Key Words:** Epidemiology—ischemic stroke—hemorrhagic stroke—stroke classification—risk factors—Costa Rica—stroke registry.

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Introduction

Cerebrovascular disease remains one of the leading causes of death and disability in Costa Rica.¹ It is essential to establish stroke registries and data banks to gather important epidemiological stroke information.² Stroke data banks help clinicians to describe the clinical course of the disease, identify prognostic factors, and provide knowledge for future clinical trials.²

Costa Rica currently has a total population of 4,947,490 inhabitants, distributed among 7 provinces. San José is the capital province and the largest city, housing 32.7% of the country population. Of the total population, 22.4% is under 15 years of age, 69.7% is between 15 and 65 years, and 7.9% is over 65 years. We have a high life expectancy at birth of 80 years (population data statistics, INEC, Costa Rica Web site, <https://www.inec.go.cr>; accessed October 4, 2017). We have a public, socialized, and universal health system (Caja Costarricense de Seguro Social [CCSS]) that covers 94% of the total population. The CCSS provides health insurance through 29 hospitals and more than 1000 primary and secondary health-care centers allocated across the whole country. Of these 29 public hospitals, only 3 are considered to be tertiary health-care centers, and the three of them are located in San José. One of these third-level hospitals, Hospital Calderón Guardia, was the first in the country that established an acute stroke unit in January 2009 and started with intravenous thrombolysis therapy after December 2011. This unit is a referral center for 3 main hospitals, serving approximately 1.5 million patients (population ascribed to Hospital Calderón Guardia, CCSS Web site, <https://www.ccss.sa.cr>; accessed July 2, 2017).

In our country, population-based epidemiological registries do not provide information that could be used for the evaluation and management of these patients. Therefore, we created a stroke registry with data from the Acute Stroke Unit of the Hospital Calderón Guardia. We present our first report in which stroke patient profiles, risk factors, stroke subtypes, and severity are evaluated.

Methods

Data were derived from the Costa Rican Stroke Registry Program (CSRP). The CSRP, established in April 2009, is the first hospital-based stroke registry in Costa Rica. The CSRP is a prospective observational registry of patients with acute stroke. This registry incorporates detailed demographic, clinical, laboratory, and neuroimaging data and has 4 main goals: (1) the analysis of causes and mechanisms of stroke, (2) the description of clinical and radiological presentations, (3) the comparison of geographic and ethnic factors, and (4) the design of prevention and interventional studies.

See online supplementary material for stroke and risk factor definitions, as well as diagnostic evaluations

performed. Three sets of National Institutes of Health Stroke Scale (NIHSS) scores were registered daily for each patient: the initial NIHSS score on admission to the unit, the highest NIHSS score during the whole hospitalization, and the discharge NIHSS score obtained on the last day before leaving the hospital. We also subtracted the discharge NIHSS score from the highest NIHSS score to assess for improvement or deterioration of patients during their stay.

We classified the subtypes of stroke according to the Trial of ORG 10172 in Acute Stroke Treatment (TOAST) criteria as large-artery atherothrombosis, cardiac embolism, lacunar stroke, and other determined and undetermined causes.³ Undetermined causes were classified if they were due to an incomplete evaluation or because of negative results.

The present study was approved by the Ethics Committee of Hospital Calderón Guardia, CCSS.

Statistics

We used Stata (version 13) (StataCorp LP, Texas, USA) for the statistical analysis. Normally distributed variables were reported as mean with 95% confidence intervals (CIs) or standard deviations, whereas continuous but non-normally distributed variables were reported as median with 25th and 75th percentile values (Q1-Q3). Normally distributed variables were compared with paired or unpaired *t* tests and analysis of variance, whereas non-normally distributed variables were compared with the Mann-Whitney *U* test, the Wilcoxon match-paired signed-rank test, or the Kruskal-Wallis test. Frequencies were compared with χ^2 and Fisher exact tests. Clinical outcome scales were modeled using multiple linear or logistic regression, where we report their significance and goodness of fit (r^2); tests were 2-tailed, and the significance was .05.

Results

General Population Characteristics

From April 4, 2009, until October 27, 2016, we registered 1319 events. Seven hundred twenty-five (55.0%) were men and the mean age of the whole sample was 68.0 ± 15.5 years (range 13-104 years). The mean ages were significantly different between men and women, 66.4 (95% CI: 65.3-67.5) and 69.9 (95% CI: 68.6-71.2), respectively; 13% of our patients were under 50 years and 28.1% were over 80 years of age. Of the total number of patients, 84.7% came from the metropolitan area and 24.7% were full- or part-time employed during the event. More men were employed (34.6%) than women (12.6%) ($P < .001$), and less patients were employed as age increased ($P < .001$). Among the patients, 70.8% did not complete high school and increasing age correlated with an incomplete high school education (odds ratio [OR] 1.03, 95% CI: 1.02-1.04, $P < .001$) (Table 1).

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