A Prototype Worldwide Survey of Diagnostic and Treatment Modalities for Stroke

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Stroke is a global health problem. However, very little is known about stroke care in low- to middle-income countries. Obtaining country-specific information could enable us to develop targeted programs to improve stroke care. We surveyed neurologists from 12 countries (Chile, Georgia, Nigeria, Qatar, India, Lithuania, Kazakhstan, Indonesia, Denmark, Brazil, Belgium, and Bangladesh) using a web-based survey tool. Data were analyzed both for individual countries and by income classification (low income, lower middle income, upper middle income, and high income). Six percent (n = 200) of 3123 targeted physicians completed the survey. There was a significant correlation between income classification and access and affordability of head computed tomography scan ($\rho = .215$, $P = .002$), transthoracic echocardiogram ($\rho = .181$, $P = .012$), extracranial carotid Doppler ultrasound ($\rho = .312$, $P \le .000$), cardiac telemetry ($\rho = .353$, $P \le .000$), and stroke treatments such as intravenous thrombolysis ($\rho = .276$, $P \le .001$), and carotid endarterectomy ($\rho = .214$, $P \le .004$); stroke quality measures such as venous thromboembolism prophylaxis during hospital stay ($\rho = .163$, $P \le .022$), discharge from hospital on antithrombotic therapy ($\rho = .266$, $P \le .000$), consideration for acute thrombolytic therapy ($\rho = .358$, $P \le .000$), and antithrombotic therapy prescribed by end of hospital day 2 ($\rho = .334$, $P \le .000$). However, there was no significant correlation between income classification and the access and affordability of antiplatelet agents, vitamin K antagonists and statins, anticoagulation for atrial fibrillation/flutter, statin medication, stroke education, and assessment for rehabilitation. Our study shows that it is possible to get an overview of stroke treatment measures in different countries by conducting an internet-based survey. The generalizability of the findings may be limited by the low survey response rate. **Key Words:** Stroke—health care surveys—clinical protocols—acute treatment of stroke—stroke prevention.
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Introduction

Worldwide, stroke is the second most common cause of mortality and a leading cause of disability.[1] Previously, stroke was considered to be a problem mainly affecting the high-income countries. It is now clear that stroke is a global health problem, and geographic variations in the incidence of stroke are small.[2] Furthermore, stroke appears to have a disproportionately higher effect on the populations of low-income countries. Of all stroke deaths worldwide, 85.5% occur in developing countries, and national income is strongly associated with stroke mortality and loss of disability adjusted life years.[3,4] Data from the World Health Organization Multinational Monitoring of Determinants and Trends in Cardiovascular Disease Project have revealed that the quality of stroke care, rather than a change in stroke incidence, has a greater effect on stroke mortality.[5] In high-income countries, interventions have lead to a 4% annual decline in stroke mortality in the 60-69–year age group, and it has been estimated that a 2% worldwide reduction in stroke mortality would result in 6.4 million fewer deaths from stroke between 2005 and 2015, with most lives saved in low- and middle-income countries.[6]

However, there is paucity of information about stroke care in developing countries. Some of the notable challenges in this group include poor recognition of stroke symptoms, delay in presentation to the hospital, lack of imaging modalities such as computed tomography (CT) scan, low rates of thrombolysis, scarcity of stroke units, and limited access to rehabilitation.[7] Furthermore, among the developing countries, there is a marked heterogeneity in the availability and affordability of resources and each country is likely to face a different set of challenges.[7,8] Although some of the advances in stroke care could be applied throughout the world with good results, limitations posed by regional factors such geography, access to health care, availability of imaging and medications, national priorities, and cultural beliefs need to be taken into account when deploying a strategy for reduction of stroke mortality. An attempt to assess stroke care throughout the world is a daunting task requiring a significant investment of capital, time, and manpower. With the recent expansion in access to the worldwide web, a possible first step towards accomplishing this goal at a low cost could be a survey of health care providers throughout the world with questions directed to local availability of resources for the care of stroke patients.

Aims

The aim of this study was to develop and assess the feasibility of a worldwide internet-based survey of neurologists to determine the availability and affordability of resources for the management of stroke patients in countries across the world. The results of the study would help identify specific areas where there was an opportunity for improvement. The results of the study would then be shared with local stroke experts, and in collaboration with them; a country-specific plan could be developed to attempt to correct some of the specific deficiencies.

Methods

An internet-based survey was developed after obtaining input from stroke specialists from Chile (Dr. Claudio Sacks), Nigeria (Dr. Olubunmi Ogunrin and Dr. Yomi Ogun), Georgia (Dr. Alexander Tsiskaridze), Qatar (Basim Uthman), and the United States (Dr. Dilip Pandey, Dr. Fernado Testai, and Dr. Rebbeca Gryseiwicz). The survey was designed to be completed within 10-15 minutes. Survey questions (listed in Appendix 1) included the following: (1) Physician characteristics such as training, experience, and number of patients seen each month; (2) hospital characteristics and infrastructure such as size, availability of diagnostic, and treatment modalities; (3) access and affordability of stroke treatments including diagnostic tools such as laboratory and imaging resources and specific and supportive stroke treatment modalities; and (4) stroke quality indicators. The data collection tool was a web-based application hosted on a password-protected secured website. Four pilot countries (Chile, Georgia, Nigeria, and Qatar), representative of different developing regions of the world (South America, Eastern Europe, Africa, and the Middle-East) were chosen for the initial survey. A local "expert" from each of these countries provided e-mail addresses of neurologists in the respective countries who might participate in the survey. E-mails were sent to the neurologists in the 4 pilot countries inviting them to participate in the survey and help us with the pretesting of the survey.

Based on our initial experience with the 4 pilot countries, the questions in Section II of Appendix 1 (Hospital characteristics and infrastructure) were made optional to decrease the time to perform the survey. In May 2012, e-mails were sent out to World Federation of Neurology (WFN) delegates of the WFN affiliate neurologic organizations in 111 countries. Consequent to this, we received e-mail lists of neurologists from some countries (Table 1). A few countries (Denmark and Brazil) contacted their members directly and asked them to contact us. E-mails were then sent out to members from 8 additional countries requesting them to participate in the survey. Those who consented were sent a link to the survey and asked to complete it within 14 days. Three reminders were sent to those who consented to participate but did not complete the survey on days 7, 10, and 14.

The results were analyzed using IBM SPSS Statistics (IBM Corporation, Armonk, NY), version 22.0. Descriptive analysis was performed for country-specific data. Countries were then classified by the gross national income