

Quality of Acute Ischemic Stroke Care in Thailand: A Prospective Multicenter Countrywide Cohort Study

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Background: Data concerning quality of acute stroke care and outcome are scarce in developing countries. *Objective:* This study aimed to evaluate quality of acute stroke care and stroke outcomes in Thailand. *Methods:* We performed a multicenter countrywide prospective cohort study. Consecutive patients with an acute ischemic stroke admitted to the participating institutions between June 2008 and November 2010 were included. Baseline characteristics, process measures including thrombolysis use, acute stroke unit admission, initiation of aspirin within 48 hours, and antithrombotic and/or anticoagulation medication at discharge were recorded. Main outcome measures were death and disability at discharge as well as in-hospital complications. *Results:* A total of 1222 patients were included with a mean (\pm SD) age of 65.0 ± 13 years, and 55.0% were men. Median National Institutes of Health Stroke Scale score was 6.5. Patients were given aspirin within 48 hours, admitted to acute stroke unit, and given thrombolytic therapy in 71.1%, 24.6%, and 3.8%, respectively. Good recovery at discharge (modified Rankin scale score 0-1) was found in 26.1%, and 3.2% of patients died during hospitalization. The median length of stay was 4 days. Factors predicting poor outcome (modified Rankin scale score 5-6) at discharge included: age (by 10-year increments: adjusted odds ratio [OR] 1.23; 95% confidence interval [CI], 1.06-1.43), female sex (adjusted OR 1.52; 95% CI, 1.05-2.19), initial National Institutes of Health Stroke Scale score (adjusted OR 1.35; 95% CI, 1.27-1.43), and in-hospital complications (adjusted OR 3.16; 95% CI, 1.58-6.35). *Conclusions:* Limited access to acute ischemic stroke care interventions were observed in many domains especially thrombolysis and stroke unit admission. These findings emphasize an urgent need for strategies to improve standard acute stroke care among developing countries. **Key Words:** Stroke registry—acute stroke care—quality of stroke care—stroke outcome—Thailand.

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Received November 18, 2012; accepted December 4, 2012.

Funding for the Thai Stroke Registry was provided by the National Research Council of Thailand. Dr Saposnik receives salary support from the Clinician-Scientist Award from the Heart and Stroke Foundation of Ontario.

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1052-3057/\$ - see front matter

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<http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2012.12.001>

Stroke is a leading cause of death and disability throughout the world. Statistics from the world health report 2004 from World Health Organization (WHO) revealed that stroke caused approximately 10% of global deaths (≈ 5 million deaths worldwide) with more than 75% of these arising from underdeveloped and developing countries.¹ The number of global stroke deaths will reach 6.5 million in 2015 and 7.8 million in 2030 if no strategic initiatives are implemented.² Although the epidemiology of stroke in developed countries is well established, little is known about stroke in the developing world.^{3,4}

In Thailand, public health statistics show that stroke burden is increasing. For example, the death rate among the elderly with cerebrovascular disease was 54.9/100,000 in 1996, rising to 79.7/100,000 in 2000, and to 166.3/100,000 in 2004.⁵ Data from a previous population-based survey including medium-size communities in Bangkok showed a prevalence rate of cerebrovascular disease among those aged 20 years and over to be 690/100,000.⁶ A higher prevalence of 1120/100,000 was found in those aged 60 years or older in another study.⁷ The Thai Epidemiologic Stroke Study reported the prevalence of stroke in individuals aged 45-80 years to be 1880/100,000.⁸ When disease burden attributable to stroke expressed as disability-adjusted life years⁹ was measured, stroke was found to be the most important source of disability-adjusted life years in women and the third among men.^{5,10} Although Thailand is one of the few developing countries where thrombolysis therapy and acute stroke unit admission are available, the accessibility to acute stroke fast-track protocol and thrombolytic medication is still limited.^{11,12} In addition, there are no data available regarding clinical features, stroke subtypes, and—most importantly—process measures that reflect quality of stroke care. In the present study, we report process measures and outcomes in the first 1200 patients since starting the First National Stroke Registry in Thailand.

Methods

Study Design

The Thai Stroke Registry was established in 2008 as an initiative of the Thai Stroke Society and the Clinical Research Collaboration Network. The goals were to monitor and assess acute stroke care and outcomes in Thailand. This study was a prospective multicenter countrywide hospital-based cohort design involving all levels of health care providers in rural and urban areas. To reduce variability among participating centers, a consensus for standardized definitions of each variable was developed. Initially, a standardized operating procedure of the protocol was tested in a pilot study among university hospitals (UHs) to explore the feasibility. Shortly after, workshops were organized in different regions where local investigators were invited to participate and complete their training sessions.

Overall, 76 hospitals across the country agreed to participate, including 10 UHs, 27 regional hospitals (RHs), and 39 community hospitals (CHs).

The Health Care System in Thailand

Thailand is situated in Southeast Asia with an area of about 514,000 km². It is the third largest country among the Southeast Asian nations, after Indonesia and Myanmar, with a population of 62.83 million (2007). Its health insurance system comprises 4 main categories: the universal coverage scheme intended for the poor and uninsured people funded by the government (74%); the civil servants medical benefits scheme for civil servants, state enterprise employees, and family members (9%); the social security scheme for private workers and employee (12%); and the private health insurance scheme for those who can pay the premiums (2%).⁵ The rest are those without any health insurance (3%).

Patients' Eligibility

All consecutive patients aged 18 years or older admitted with acute ischemic stroke to the participating institutions were included in the registry. Stroke was defined according to the WHO criteria¹³ and was confirmed by neuroimaging studies. Patients with transient ischemic attack and hemorrhagic strokes were excluded from this study.

Data Collection

Patient demographics, stroke risk factors, type of health insurance plan, and initial stroke severity as measured by the National Institutes of Health Stroke Scale (NIHSS), Thai version¹⁴ were recorded. Quality of acute stroke care indicators¹⁵⁻¹⁷ were collected including tissue plasminogen activator (t-PA) used; acute stroke unit admission; aspirin given within 48 hours; carotid ultrasound performed prior to discharge; the use of antihypertensive, antithrombotic, and statin medications; the use of anticoagulant for patients with atrial fibrillation (AF); length of stay; and complications. All completed case report forms (CRFs) were reviewed and signed by site investigators after patients' discharge.

Data Quality

One copy of the CRFs was sent back to the Clinical Research Collaboration Network office. The original copy was kept at local centers for the purpose of site and data quality monitoring visit. Regular site monitoring visits were randomly performed in 61 of 76 centers during the study period. During a visit, 10 CRFs were randomly selected and evaluated by data monitoring team. All variables in the CRF were validated by repeat chart abstraction. Inter-hospital transfers and patients with missing neuroimaging were excluded from this study.

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