

# The Impact and Effectivity of an Inventory Survey for a Stroke Registry in Iwate Prefecture

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*Background:* The accuracy of a stroke registration program in Iwate prefecture was greatly affected by cooperation from medical facilities and doctors in the field. The number of registered cases from noncore hospitals was less, but the accuracy of registration was unknown. This report presents the impact and effectivity of an inventory survey of the stroke registry. *Subjects and Methods:* Details of subjects living in coastal and northern regions of Iwate Prefecture who developed a cerebrovascular attack between 2012 and 2014 were obtained from the Iwate Stroke Registry through an inventory survey. Annual incidence rate from core hospitals and noncore hospitals were compared. To evaluate factors registered from noncore hospitals, multivariate analyses were performed for sex, age, living area, type of stroke, and past history of cerebrovascular diseases. *Results:* Annual crude incidence rate for 100,000 residual populations were 428.8 in men and 351.2 in women from core hospitals and 38.5 in men and 43.7 in women from noncore hospitals. Ratios of noncore hospitals against all the hospitals were 8.3% for men and 11.1% for women. Multivariate analyses for age, ischemic type of stroke, past history of cerebrovascular diseases, and living in areas without a core hospital were significant; however, sex was not a significant factor. *Conclusion:* The inventory survey of the stroke registry program in the Iwate prefecture was useful to prevent missing data of stroke cases from noncore hospitals, including patients who are elderly, with ischemic stroke onset, with a past history of stroke, or living in areas without core hospitals. **Key Words:** Cerebrovascular diseases—registry—inventory survey—population-based.

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## Introduction

Cerebrovascular disease is one of the most serious causes of death in Japan, and Iwate Prefecture has one of the highest mortality rates from cerebrovascular diseases in Japan since 1960. From 1991, a registration program for cerebrovascular diseases intended for all medical facilities has been conducted in Iwate Prefecture to collect information on the occurrence of stroke to be used in developing measures for stroke prevention. Until recently, there were only a few registered cases from noncore hospitals in the registry program in Iwate Prefecture, and the reasons for such few registrations were unclear as to whether they were caused by a low incidence of cases for the registry or because of a low cooperative stance with regard to the registry. From 2002, an inventory survey of cerebrovascular and cardiovascular diseases has been conducted in the northern part of Iwate Prefecture for a

cohort study,<sup>1,2</sup> and after the Great East Japan Earthquake of 2011, the inventory survey was expanded to cover the entire coastal area of Iwate Prefecture.<sup>3,4</sup> Stroke registration programs have been conducted in several prefectures in Japan but have been abandoned in a few prefectures because rough information on the occurrence of stroke is available from data on long-term care, health, and welfare services for the elderly or the diagnostic procedure combination (DPC) payment system for hospitals<sup>5,6</sup> instead of registration programs.<sup>7,8</sup> In Iwate Prefecture, DPC has been introduced in most core hospitals, but hardly in other hospitals. This report presents the impact and effectivity of the inventory survey for the stroke registry at all hospitals that treat patients with acute-stage cerebrovascular diseases.

## Subjects and Methods

Subjects living in the 17 municipalities in the area along the shore and the northern part of Iwate Prefecture who developed cerebral infarction (CI), intracerebral hemorrhage (ICH), or subarachnoid hemorrhage (SAH) between January 1, 2012 and December 31, 2014 were used in this study. Population size in the study area was 316,452 (150,039 men and 166,413 women) at an interim time point of October 1, 2013. Intracranial ischemic or hemorrhagic lesion because of trauma, sinus thrombosis, arteriovenous malformation, moyamoya disease, tumor, and other pathologic lesions were excluded. Information regarding the occurrence of cerebrovascular diseases, including age at onset, sex, date of onset, subtype of stroke, and municipality of residence, were obtained from the Iwate Stroke Registry with this survey.

### *System and Design of the Iwate Stroke Registry*

A stroke registration program has been initiated throughout Iwate Prefecture since January 1, 1991.<sup>2</sup> The government of Iwate Prefecture and the Iwate Medical Association have been coordinating this program with all medical facilities (hospitals, medical offices, and nursing homes) in Iwate Prefecture. Registration forms are submitted to the registration office in the Iwate Medical Association when a stroke patient leaves the medical facility. The registration form comprises the patient's name, address, date of birth, stroke type, date and hour of attack and admission, date of discharge, history of cerebrovascular accidents, usage of computed tomographic and/or magnetic resonance imaging scan for diagnosis, surgical treatment, and the Glasgow Outcome Scale score at the time of discharge. Stroke diagnostic criteria for CI, ICH, and SAH in this registry are based principally on the criteria established for the Monitoring System for Cardiovascular Disease commissioned by the Ministry of Health and Welfare.<sup>9</sup> These criteria correspond to those published by the World Health Organization and define stroke as the sudden onset of neurologic symptoms.<sup>10</sup> All data in the

stroke registry are checked by well-trained staff for defects. The postdischarge life and death outcomes of patients and the residence certificate are not collated in the stroke registry.

### *Inventory Survey for the Iwate Stroke Registry*

To maintain a disease registry with a high degree of accuracy over the long term, a nonvoluntary inventory survey system was conducted for a large cohort study in the northern part of Iwate Prefecture to determine the prevalence of cerebrovascular and cardiovascular diseases and their risk factors from 2002 onward.<sup>1,2</sup> After the Great East Japan Earthquake of 2011, this survey system was expanded to the whole coastal area of Iwate Prefecture to maintain disease registries with a high degree of accuracy even after a catastrophic disaster, and to determine the influence of the disaster on the occurrence of cerebrovascular and cardiovascular diseases in the coastal area.<sup>3,4</sup> For the survey of cerebrovascular diseases, trained research nurses were assigned to core hospitals with neurologists or neurosurgeons, whereas research doctors and trained research nurses were dispatched to the noncore hospitals without neurologists or neurosurgeons. All medical records of inpatients and deceased outpatients who had developed cerebrovascular diseases were checked retrospectively and registered with the stroke registry. The survey system of the stroke registry did not refer to death certification. In this study area, most patients with emergent illness and severe trauma, including cerebrovascular attack, are transported and admitted to hospitals within the region. Almost all patients admitted to hospitals outside the region are transported from a hospital within the region. Details of a cohort study and the influence of disaster on cerebrovascular and cardiovascular diseases were described previously.<sup>1,3,4</sup>

An inventory survey was conducted at 11 hospitals with inpatient facilities that treat patients with an acute presentation of cerebrovascular disease in the study area, including 5 core hospitals with neurologists or neurosurgeons affiliated to the DPC and 6 noncore hospitals without neurologists or neurosurgeons unaffiliated with the DPC. The core hospitals in this study area are all public hospitals with over 200 general beds affiliated with the DPC where full-time stroke physicians, including neurosurgeons and neurologists, are available. The noncore hospitals in this study area are 5 public hospitals and 1 private hospital. These are all unaffiliated with the DPC, with fewer than 120 general beds and general physicians who treat stroke patients but no stroke physicians. In addition, the survey was conducted at 3 core hospitals in Aomori Prefecture adjacent to Iwate Prefecture but was not performed at hospitals in Miyagi Prefecture adjacent to Iwate Prefecture because hospitals in coastal Miyagi Prefecture were extensively damaged by the Great East Japan Earthquake of 2011, and most

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