

# Differences between Japan and Canada in Emergency Transport Systems for Relatively Young Stroke Patients

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## KEY WORDS

stroke, functional outcome, emergency medical services, Japan, Canada

## 1. Relatively Young Stroke Patients

Stroke in relatively young people is rare, accounting for 10-15% of all strokes. In recent years, however, the weight of young and middle-aged people in Japan has polarized into thin and obese, and the proportion of people in their 40s to 60s with stroke risk factors such as hypertension and metabolic syndrome has increased, leading to an increase in the number of young stroke patients<sup>1)</sup>. Reports from other countries have also recently shown an increase in strokes among young adults due to an increase in traditional stroke risk factors<sup>2)</sup>. Compared to stroke in older adults, stroke in young adults has a disproportionately large economic impact because the disability occurs at the most productive age<sup>3)</sup>. A paper on emergency transport systems for relatively young stroke patients in Canada reported a decrease in ambulance use and access to emergency care among relatively young female patients compared to older patients<sup>4)</sup>. Therefore, an education campaign on stroke symptoms is needed first for relatively young female patients. In Japan, as in Canada, relatively young stroke patients are taking longer to access stroke centers. However, the Japanese health care system differs from that of Canada, and the reasons why it takes longer to access stroke centers may be different. Therefore, we interviewed relatively young stroke patients in the rehabilitation phase who had completed acute treatment.

## 2. Transport Time to a Stroke Center in a Regional City in Japan

The study was conducted in a medical area with a population of approximately 200,000 and one stroke center and five secondary emergency hospitals, which is the average regional core city in Japan. Thirty-five patients under the age of 60 years with residual functional disability of 3 or more on the modified rankin scale (mRS) and undergoing functional restoration training at a rehabilitation center were included in the study, of whom 32 patients cooperated. Thirty-two patients (24 males and 8 females, mean age 48.4 years) participated in the study and gave written consent. Ambulances were requested by 32 patients (100%), and all were transported to a secondary emergency hospital. Transport time from symptom onset to hospital arrival at a secondary emergency hospital ranged from 30 minutes to 12 hours, with an average of 3.5 hours for men and 6.3 hours for women, and 4.2 hours for women. Of the 32 patients, only 14 were transported from secondary emergency hospitals to stroke centers. Arrival time at the stroke center ranged from 1.5 to 24 hours after onset of stroke symptoms, with a mean arrival time of 7.4 hours. Thrombolytic therapy was indicated in only 4 patients, and endovascular therapy was used in only 1 patient. Less than half of the

patients, 14 (43.8%), suspected stroke when symptoms appeared; by gender, 12 (50%) were male and 2 (25%) were female. Women were less likely to first suspect a stroke based on symptoms and took longer to get to the emergency room than men, a trend similar to Canada. In Japan, unlike Canada, all patients requested an ambulance and accessed some form of emergency care. However, access to stroke centers was not provided in all cases, and stroke center visits were often not transported in time for thrombolytic therapy or endovascular treatment.

## 3. Differences in Ambulance Use between Japan and Canada

In both Japan and Canada, young stroke patients may be unaware of their stroke symptoms, and this is more common in women. Despite public health messaging, many young adults consider stroke as a disease of older people. Meta-analysis of stroke campaigns in non-elderly populations shows improved stroke symptom recognition and willingness to contact emergency medical services<sup>5)</sup>. In Canada, while ambulance transports for the elderly are increasing, those for young women are not, and young female stroke patients take the longest time to get to a stroke center<sup>6)</sup>. Therefore, an educational campaign for young people in Canada would increase the number of appropriate ambulance calls and allow for earlier treatment of young stroke patients.

However, unlike Canada, Japan already has a high rate of ambulance calls, so an educational intervention campaign alone will not be enough to successfully treat stroke in young people<sup>6)</sup>. The biggest problem in Japan is that even if an ambulance is called, patients are rarely transported to a stroke center attached to a tertiary emergency medical institution. Despite the high use of ambulances in Japan, some cases do not reach the stroke center, and the arrival time is slower than in Canada, where the arrival time is not as high as in Japan.

## 4. Differences between the Japanese and Canadian Insurance Systems

This may be related to differences in the background health care system. The Canadian and Japanese health care systems are similar in that both have universal health insurance. The differences between Japan and Canada are insurance premiums and ambulance fees. In Canada, there is no charge for medical treatment, but there is a charge for some ambulance services. On the other hand, in Japan, there is a charge for medical treatment, but ambulance service is free. Japan's medical insurance system is a universal health insurance system with a

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certain burden at the time of use<sup>7</sup>). Private insurance can be purchased at the discretion of the individual, and the percentage of coverage varies among insurance companies. Availability of user fees may influence ambulance requests. In Canada, ambulance calls are an important part of stroke care because once a patient is transported by ambulance to the emergency room, triage is performed and treatment is initiated as soon as possible for stroke patients. In Japan, however, while requesting an ambulance is free and easy, there is an emergency medical system and direct transport to a tertiary emergency hospital with a stroke center is not provided.

## 5. Japan's Emergency Medical System Delays Stroke Transport Times

Emergency medical care in Japan is divided into three levels: primary, secondary, and tertiary. Primary medical care is provided by clinics, which provide outpatient care. Secondary emergency medical care is provided by hospitals that provide initial treatment for emergency patients requiring hospitalization or surgery. Tertiary emergency care is provided by hospitals that accept severely ill patients and special diseases that cannot be handled by secondary emergency care. In Japan, anyone can call an ambulance, and the emergency medical team searches for the destination of the patient, depending on the degree of injury or illness, through a telephone connection with emergency hospitals. Therefore, acute stroke patients who are conscious and require hospitalization are often transported to secondary emergency hospitals. Once an acute stroke patient is transported to a secondary emergency hospital, the secondary emergency hospital contacts the stroke center by a hospital physician, and the stroke center decides whether or not to bring the patient in, which is where the time lag occurs. Once the decision is made to transport the patient, the secondary emergency hospital will call for an ambulance and transport the patient by ambulance. However, although it is possible for the emergency medical team to contact the

stroke center directly, currently, as with other diseases, transport is based on the distinction of severity, so most young stroke patients are transported to a secondary emergency medical center. Ironically, compliance with the hierarchical functions of the emergency medical system in Japan delays the transport of stroke patients to stroke centers. Currently, there is limited direct communication between ambulances and stroke centers where thrombolytic therapy and endovascular treatment are available in Japan. The barrier to early treatment in Japan is not access to ambulances, but access to stroke centers. In the current situation in Japan, late endovascular treatment might also be considered for young stroke patients<sup>8</sup>).

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