

# An Emergency Medical Liaison System for Acute Stroke Care in Japan: An example of the Tokyo Metropolitan Area

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## Abstract

In Japan, Fire Service Act, which was partially amended in 2009, stipulates that each prefectural council is required to create a list of medical institutions (hospitals) by pathophysiological conditions of patients transported by ambulance. The Act also demands that emergency crews and hospitals share the patient's information and that the fire service and hospitals establish policies to deal with the cases when the receiving hospitals cannot be decided promptly. In Tokyo, Committee for Emergency Care Standards (of Tokyo Medical Control Council) and Tokyo Stroke Care Liaison Council (of Tokyo Emergency Medical Council) exchanged information closely and established a liaison system between the emergency service and hospitals. Specifically, lists of hospitals that can deal with stroke and those that cannot were prepared based on the information provided by hospitals. Also, it was decided that the emergency service is to transport patients using the Cincinnati prehospital stroke scale. There are over 100 hospitals listed as stroke ready. Assuming all of them are to handle 30,000 patients per year evenly, the rate per day is 0.8 patient/hospital/day. In the future, an important issue to address would be to promote qualitative improvement of this liaison system through cross-checking the assessments of emergency crews and the definitive diagnoses of the transported patients.



**Key words** Stroke, Medical Control Council, Partial amendment of Fire Service Act

## Introduction

In Japan, the recent partial amendment of Fire Service Act in 2009 stipulates that prefectural governments have to set up “councils,” which discusses rules for the fire service to transport emergency patients and for medical institutions (hospitals) to accept them. This establishment of councils can be understood as an extension of

the previously held discussions on expanding the conventional medical control (MC) council's functions and the enhancement of their positioning.<sup>1</sup> Namely, in addition to the ordinary activities of securing and improving the quality of treatment techniques provided by emergency crews, the responsibilities of MC councils are to be expanded to include recommending the appropriate way of transport (including selecting the

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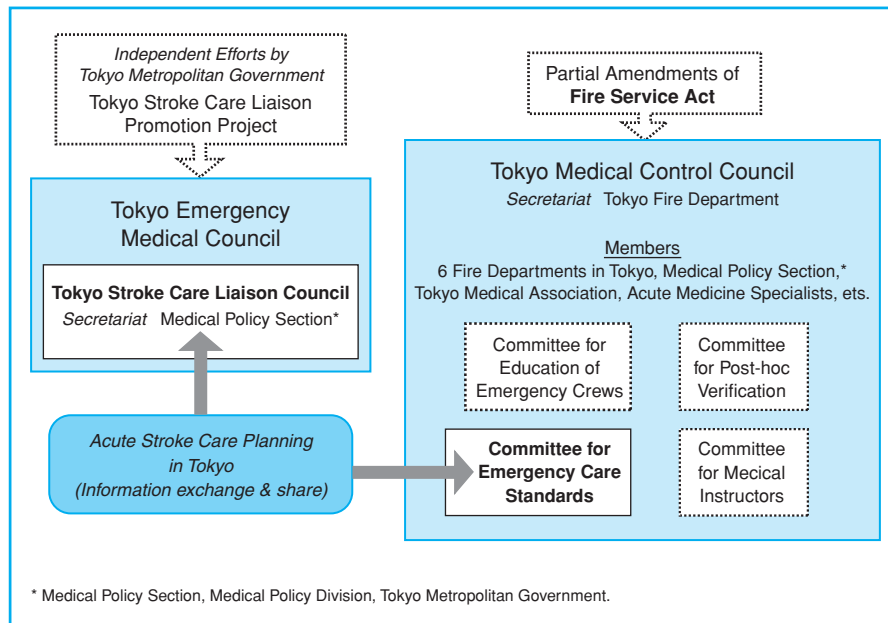


Fig. 1 Acute stroke care planning in Tokyo, Japan

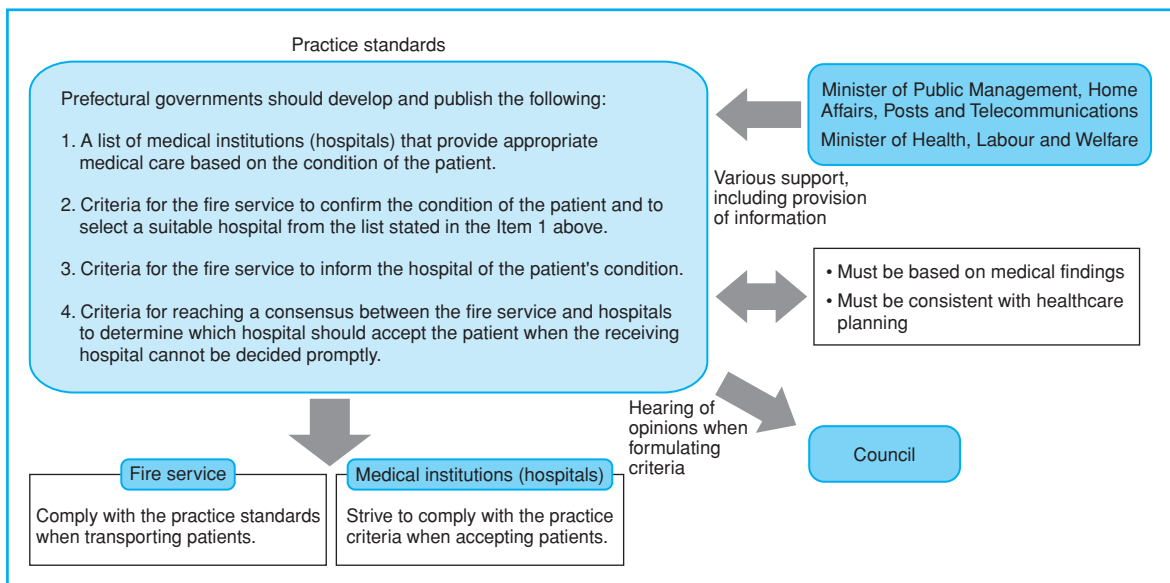


Fig. 2 Explanation of the partial amendment of Fire Service Act of Japan

receiving hospital most suitable for a patient) and making suggestions for the development and improvement of such acceptance systems.

The reason that MC councils take part in the care to be provided by emergency crews is to facilitate an appropriate response to patients at

the site of the emergency. Transporting a patient to an appropriate hospital, which comes as the next step, is also a critical issue. Therefore, in such regard, the recent partial amendment of Fire Service Act deserves high appraisal.

In some prefectures, an MC council is estab-

**Table 1 Accreditation criteria of acute stroke-ready hospitals in Tokyo, Japan: Towards developing a medical liaison system for stroke patients for the entire Tokyo area****1. Concept behind the formulation of the emergency transport system for stroke patients in the entire Tokyo**

Stroke cases can be classified as cerebral infarction, cerebral hemorrhage, or subarachnoid hemorrhage, and effective treatment can vary according to the pathologic condition and the time course, such as intravenous alteplase (t-PA) therapy for the hyper-acute phase of cerebral infarction. Therefore, it is important for every stroke patient to be transported to a hospital as early as possible and to receive appropriate treatment in order to minimize potential physical impediments.

**2. Criteria for accreditation of “acute stroke-ready hospitals”**

A hospital that satisfies the following requirements is designated as the “acute stroke-ready hospital” in the Tokyo Medical Liaison System for Stroke.

Accreditation criteria of acute stroke-ready hospitals in Tokyo		
	Required (Group B)	Required for t-PA ready hospitals for patients with hyper-acute cerebral infarction (Group A)
1 The institution has physicians and paramedical staff who have sufficient knowledge and experience to deal with acute stroke.	○	○
2 The hospital has an in-hospital system in place that allows prompt implementation of imaging tests, such as brain CT and MRI and necessary laboratory examinations.	○	○
3 The hospital has beds/wards specifically designated for acute stroke patients and has full-time physical therapist(s) and/or occupational therapist(s) who can provide acute-phase rehabilitation.	○	○
4 The hospital can provide prompt consultation by a neurosurgeon for a patient who needs neurosurgery. (If there is no neurosurgeon on duty, the patient can be promptly referred to a neurosurgeon on-call or transferred to a cooperating hospital as necessary for consultation.)	○	○
5 To ensure the quality of medical care for stroke patients, the hospital must have at least 1 physician who can prove that he/she has participated in the t-PA therapy course approved by Japan Stroke Society. Intravenous t-PA has to be administered under the guidance of the said physician.		○
6 The hospital is equipped to provide the intravenous t-PA therapy to the applicable patient within 1 hour after the arrival.		○
7 Whenever the t-PA therapy is performed, the institution is able to provide at least 36 hours of continuous observation necessary to promptly deal with any adverse effects for the purpose of patient management.		○

lished in each secondary medical district, whereas some already have an emergency medical council that is involved in healthcare planning. Thus, how an MC council will develop in each community remains to be seen. In Tokyo, acute stroke care is planned by Tokyo Medical Control Council and Tokyo Emergency Medical Council in large (Fig. 1). In any case, at least from the viewpoint of MC councils, the recent partial amendment of Fire Service Act has played an important role in defining the legal and administrative positions of MC councils and in promoting the discussion on the subject of emergency medical liaison for acute stroke care at the community level.

### Methodology for Formulating an Emergency Medical Liaison System for Acute Stroke Care

Figure 2 shows the excerpt from the reference material of the partial amendment of Fire Service Act, published by Fire and Disaster Management Agency of Japan.<sup>2</sup> It states that the prefectural government should formulate and announce a list of hospitals and criteria for choosing an adequate hospital from the list. The Tokyo Metropolitan Government has already published a list of hospitals that can adequately treat acute stroke on the Internet.<sup>3</sup> The details of the development of

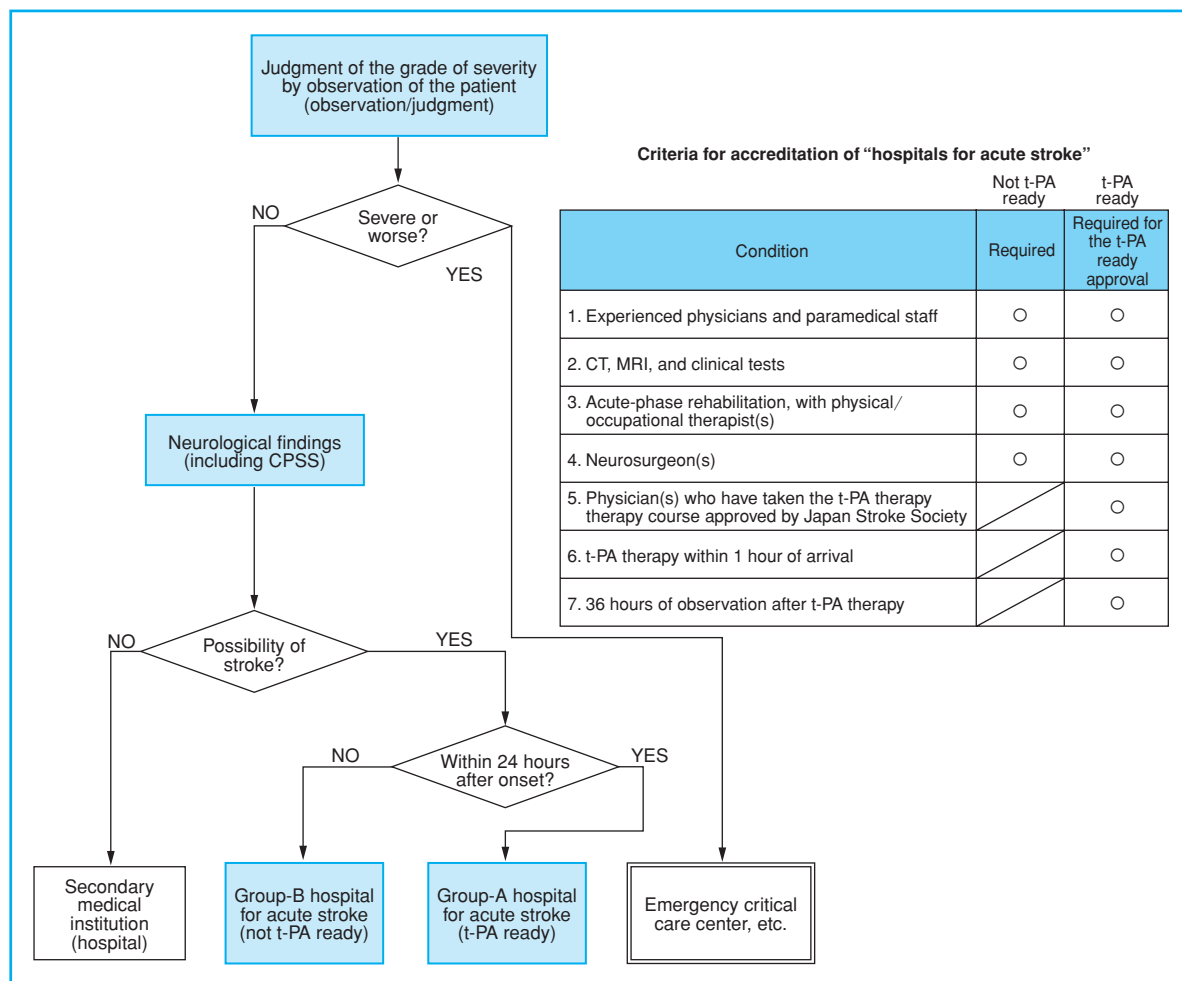


Fig. 3 Protocol for selection of a receiving hospital for an acute stroke patient (Tokyo, Japan)

an emergency medical liaison system for acute stroke care in Tokyo are described below.

In short, as of February 1, 2009, which was just before the full-scale operation of the liaison system started, there were a total of 162 institutions that can deal with acute stroke, and intravenous tissue plasminogen activator (t-PA) therapy was available in 104 of them. Since the beginning of full-scale operation of the system in March 2009, the numbers of such institutions have been increasing gradually. Below the formulation of the medical liaison system in Tokyo will be described, including discussions from the viewpoint of healthcare providers as well as those responsible for the transport of patients.

### Tokyo Stroke Care Liaison Council

In Tokyo, Tokyo Stroke Care Liaison Council, comprised of Tokyo Medical Association, acute care hospitals, members of the fire authorities, and specialists in stroke and emergency medicine, was established, with Medical Policy Section of Tokyo\* serving as the secretariat. The council spent a full year discussing the desirable functions of hospitals that deal with acute stroke and the necessary criteria for accrediting such hospitals. As the designated Chair of Council, I myself participated in the various discussions on wide range of topics. The first issue we discussed was to understand the available medical resources (i.e., how many hospitals could handle the acute phase of stroke, what proportion of such institutions

could offer surgery or administer t-PA therapy, etc.) and to examine their sufficiency.

While attempting to grasp the available resources with the cooperation from Tokyo Medical Association and Tokyo Metropolitan Hospitals Association, our council defined the criteria required for acute stroke-ready hospitals and additional criteria for t-PA therapy-ready hospitals (**Table 1**). There are more than 100 institutions that satisfy both criteria (t-PA ready), while about 60 met the acute stroke criteria only. As mentioned previously, the name of these institutions are published by Tokyo Metropolitan Government.<sup>3</sup>

### Committee for Emergency Care Standards of Tokyo MC Council

Discussions from the side of Tokyo emergency services were as follows. The medical districts of Tokyo consist of 12 secondary medical districts and island regions. There are 6 fire departments serving as headquarters in total; Tokyo Fire Department, Inagi Fire Department, Higashikurume Fire Department, and 3 departments in each island of the Oshima, Hachijo, and Miyake. Tokyo MC Council unites these 6 fire headquarters, in addition to the Medical Policy Section of Tokyo,\* Tokyo Medical Association, and emergency medicine specialists, to cover the entire prefecture. Tokyo Fire Department takes the role of the secretariat of Tokyo MC Council. Tokyo MC Council has four subordinate committees, such as Committee for Post-hoc Verification and Committee for Emergency Care Standards. For the duties described in Items 2 and 3 of **Fig. 2**, Committee for Emergency Care Standards is in charge.

As the chair of Committee for Emergency Care Standards of Tokyo MC Council, I led the movements of developing the rules for identifying stroke patients, determining appropriate emergency care, and selecting the receiving hospitals to transport emergency patients, as well as obtaining approval from the parent organization, Tokyo MC Council. Tokyo Fire Department already had emergency service activity standards, which the other 5 fire departments were observing in principle. Therefore, a part of these standards corresponding to stroke care were checked with the prehospital stroke life support (PSLS) criteria<sup>4</sup> that provides standards for observation and treatment of stroke in prehospital emergency care. Although there were basically no

excess or deficiency in observation items, the criteria of the Cincinnati prehospital stroke scale (CPSS), which suspects stroke whenever any facial paralysis, upper limb paralysis, or speech impairment is present, were added to the protocol with emphasis (**Fig. 3**).

Regardless of the possibility of stroke, a conventional rule for patients with severe or worse is to transport to an emergency critical care center (, which are approved by Ministry of Health, Labour and Welfare of Japan, as tertiary health-care facility equipped to provide advanced acute care). In terms of the level of consciousness, a score of 100 to 300 in Japan Coma Scale (JSC; 3-3-9 system) is regarded as a severe case, and the transport to an emergency critical care center is deemed necessary. Furthermore, most stroke patients within 1 day of onset were transported to hospitals where emergency neurosurgery was available. During the course of our discussions, there was an opinion that patients with stroke-induced coma be included in the transport rule of stroke patients. Some also insisted that patients within a few hours of onset be transported to hospitals where t-PA therapy is available, considering that t-PA must be administered within such limited time frame.

However, t-PA therapy is available at all emergency critical care centers, and they are equivalent to group-A hospitals for acute stroke in **Fig. 3**. In addition, emergency crews may be able to determine a case of stroke but not a cerebral infarction. **Figure 3** illustrates the finalized protocol for emergency crews to select a receiving hospital for an acute stroke patient, which Tokyo MC Council has approved. Emergency crews are provided with roster sheets of Group-A (t-PA ready) and Group-B (not t-PA ready) hospitals for acute stroke (**Fig. 3**), as prepared by Tokyo Stroke Care Liaison Council. Since March 2009, patients who are suspected of stroke are being transported to a hospital based on this protocol (**Fig. 3**).<sup>5</sup>

Although some local cities are progressive and have already addressed an emergency medical liaison system for acute stroke care, medical liaison is reported to be hardly in place in fire departments with smaller jurisdictional population.<sup>6</sup> This example of Tokyo represents rule-making in a large city with “poor interpersonal relationships,” and in a sense reflects a situation where “a simple function or component itself” is being built.

## Future Problems

### Excess or deficiency of stroke-ready hospitals

In comparison with provincial cities, Tokyo is a large city with a large population, and its emergency services operate across the boundaries of wards, municipalities, or secondary medical districts. Therefore, it is necessary to consider the entire Tokyo area (excluding the island regions) as a single district when transporting patients. If we are to assume that 100 Group-A hospitals for acute stroke are to respond equally for the 30,000 acute stroke patients that are estimated to occur in a year for the entire Tokyo, on average a given hospital would be accepting 0.8 patient per day.

However, the geographical distribution of acute care-ready hospitals is not even, and the population distribution is not homogeneous either. Therefore, patients will not likely be evenly assigned among hospitals. For example, the northern portion of North Tama Medical District is rich in rehabilitation hospitals but has insufficient medical resources for acute care despite its large population. For this reason, some advocated integrating northern, western, and southern portions of North Tama into one medical district (, as they used to exist formally as one “North Tama County”) as more rational strategy.

For now, there has been no reported case of unusual delay in selecting a receiving hospital for a stroke patient from the fire authorities. However, we should discuss further from the statistical aspect in the future.

### Medical liaison for acute stroke care and subsequent various issues

As early rehabilitation training at bedside is generally required in acute care hospitals, rehabilitation activities in stroke patients are extremely important. Discussing emergency medicine requires attention to the follow-ups for the accepted patients. In other words, if patients are not properly transferred to rehabilitation facilities (wards or hospitals) for convalescence, patients become stagnated in acute care facilities—which in turn mean that patients in need of emergency transport may not be properly accepted because all beds are full.

From the viewpoint of acute care institutions, there are two types of medical liaison in nature; the forward type, which connects with the emergency medical services, and the backward type,

which connects to rehabilitation facilities. However, patients then must flow from rehabilitation facilities to the next level of recuperation. There, regardless of location—at his/her own home or at an institution, a patient in the maintenance phase requires certain kinds of support for daily activities. Naturally, such support also involves prevention of recurrent stroke. In other words, when we consider a medical liaison system for the acute phase, we must also refer to a comprehensive and continuous recuperation environment for patients at the community level.<sup>7</sup> As mentioned in the example of “old North Tama County,” we must be aware that such viewpoint plays important role in a medical liaison system.

### Case assessment by emergency crews and definitive diagnosis by physicians

According to the data accumulated by the emergency medical services,<sup>6</sup> stroke patients accounts for 9.8% of all transport of acute cases. When the jurisdictional population size per fire headquarter is considered, this proportion shows a declining tendency as the population increases; from 14.6% (for headquarters with jurisdictional population of <50,000), to 13.6% (<100,000), 10.6% (<300,000), and 7.8% ( $\geq 300,000$ ). Aside from the implications of these figures, it is, in fact, unclear whether these patients who were assessed as stroke were definitively diagnosed as one eventually. Emergency patients initially transported as stroke patients are often found to have diabetes or chronic subdural hematoma, or conversely, received patients who were not suspected of stroke may later be diagnosed with stroke.

The survey conducted in the Nagasaki area (Nagasaki Prefecture) is well known as an example that matched emergency transport cases and definitive diagnoses.<sup>8</sup> However, the report provided no mention of the relationship between the assessment by emergency crews and the subsequent definitive diagnosis by physicians. Recently in Osaka Prefecture, the results of such matching between Kishiwada City Fire Department and hospitals within its jurisdiction have been reported,<sup>9</sup> which possibly marks the first step towards improving in the quality of observation/assessment of stroke made by emergency crews. The primary objective of MC Council is assurance and improvement of the quality of emergency services. In the future, it would be

desirable to sort the data based on the assessment of emergency crews as either stroke or not and investigate their relationship with the definitive diagnosis, in order to build the process of learning for emergency services through checking their assessment with the definitive diagnosis.

## Conclusion

This paper discussed the issue of emergency medical liaison for acute stroke care in Japan, focusing on the efforts made in Tokyo. These

efforts, which preceded the recent partial amendment of Fire Service Act, can be regarded as a good tangible form of the amendment's main purport.

Considering a desirable system of emergency medical liaison for acute stroke care requires discussions of comprehensive and continuous recuperation environment for patients in the community with the flow of patients in mind. From this aspect, and to improve the quality of emergency transport of stroke patients, other related issues were also examined.

\* The official name is; Medical Policy Section, Medical Policy Division, Bureau of Social Welfare and Public Health, Tokyo Metropolitan Government.

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