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 for  
 The Hong Kong  
 Neurological Society and  
 Hong Kong Stroke Society

# Consensus statement on ischaemic stroke care in Hong Kong

## 香港缺血性中風護理的結論綜述

**Objective.** To issue guidelines for the care of acute stroke in Hong Kong, with the target audience of all health care professionals who are involved in acute stroke care.

**Participants.** The Hong Kong Neurological Society and the Hong Kong Stroke Society.

**Evidence.** The panel applied the 'rule of evidence' used by the United States Agency for Health Care Policy and Research. When there is insufficient evidence, the recommendation was based on customary practice and was circulated among the members and fellows of the two societies before coming to a consensus.

**Consensus process.** Group meetings were held in 2002 to review the literature about acute care for patients with ischaemic stroke and to issue a consensus statement with reference to the local health care system. Participants of the meetings were appointed by the councils of The Hong Kong Neurological Society and the Hong Kong Stroke Society. The draft statement was circulated among the members and fellows of the two societies for comments before it was finalised.

**Conclusions.** Ischaemic stroke is a heavy health care burden to Hong Kong. The current consensus statement provides a framework to establish a multidisciplinary approach towards its acute management.

**目的：**以所有參與照顧急性中風病人的專業醫護人員為對象，就香港急性中風的護理發出指引。

**參與者：**香港腦科學會及香港中風學會。

**證據：**專責小組應用 United States Agency for Health Care Policy and Research 的「實證法則」。如未有足夠證據，則基於慣常做法作出建議，並由兩個學會的所有成員及院士傳閱，然後才達致共識。

**綜述過程：**所有會議於 2002 年內舉行，回顧有關治理急性缺血性中風病人的文獻，並制訂基於本地醫護體制的結論綜述。參與會議的專責小組由香港腦科學會及香港中風學會委任。理事會文件初稿在經過兩個學會的所有成員及院士傳閱及討論後才定案。

**結論：**缺血性中風是香港醫療的沉重負擔。本結論綜述提供了框架，以建立跨學科的急救方式。

**Key words:**

Brain ischemia;  
 Cerebrovascular accident;  
 Hong Kong;  
 Platelet aggregation inhibitors

**關鍵詞：**

腦部缺血；  
 腦血管意外；  
 香港；  
 血小板凝固抑制劑

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### Introduction

Stroke is the second most common cause of mortality worldwide and is the major cause of permanent disability. In Hong Kong, despite a drop in the standardised mortality rate from 8.72 per 1000 in 1961 to 4.05 per 1000 in 2000, the total stroke mortality remained high because of the ageing population. For example, in 2001, there were 3130 deaths from stroke, accounting for 9.4% of all deaths in Hong Kong.<sup>1</sup>

Stroke is a heterogeneous condition, and the care of each patient should be tailored to the individual's needs. These guidelines focus only on ischaemic stroke, which is responsible for more than 70% of the local incidence of stroke. Although the management of haemorrhagic stroke requires a different treatment strategy, some of the principles of patient care still apply. The guidelines are based on current evidence<sup>2-4</sup> available in the following areas: organisation of stroke services, assessment for the patients with acute stroke, treatment for acute ischaemic stroke, and strategies for secondary prevention. The evidence ratings

**Table. Ratings used to classify evidence about stroke care**

Level	Type of evidence
Ia	Evidence obtained from meta-analyses of randomised controlled trials
Ib	Evidence obtained from at least one randomised controlled trial
IIa	Evidence obtained from at least one well-designed controlled study without randomisation
IIb	Evidence obtained from at least one other type of well-designed quasi-experimental study
III	Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies, and case studies
IV	Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities

used are shown in the Table and, where appropriate, in parentheses below.

**(A) Organisation of stroke services**

The stroke unit is an essential part of an organised stroke service. Admission and management of patients with stroke into an acute stroke unit have been proven to save lives, increase the number of independent survivors, and reduce institutionalisation among survivors in a cost-effective manner (level Ia).<sup>5-7</sup> All patients with a clinical diagnosis of stroke should be triaged at the accident and emergency department and admitted to an acute stroke unit to receive rapid investigation and treatment. For patients with transient ischaemic attack (TIA), rapid referral to a specialised clinic with a concerted programme and relevant investigations (eg blood tests, computed tomography [CT] of the brain, and Doppler studies) is recommended (level IV).<sup>8</sup>

The acute stroke unit should comprise the following:

- A geographically identified unit to provide adequate in-patient service to patients with acute stroke;
- A coordinated multidisciplinary team;
- Staff with specialist expertise and interest in stroke care;
- An agreed integrated pathway or protocol for acute stroke care that allows flexibility to address any unique conditions of individual patients;
- An education programme for professionals, patients, and their carers;
- Regular audit to achieve the best model of stroke care practice; and
- Integration with the community and domiciliary rehabilitation programme to facilitate patients returning home.

**Recommendations**

- Patients with acute stroke should be admitted to a designated acute stroke unit that has a multidisciplinary stroke service under the leadership of a stroke specialist.
- Patients with TIAs should be referred for fast-track assessment in a specialised clinic for early evaluation and intervention.

**(B) Acute assessment**

For all patients with stroke, multidisciplinary assessments should be made as soon as possible to achieve the following:

- To confirm the diagnosis of stroke;
- To define the pathology of stroke and the site of involvement;
- To assess the functional impairment and avoid complications;
- To recognise the disabilities and allow prediction of the prognosis; and
- To identify the underlying risk factors (Box 1) and determine the strategies for secondary prevention.

The following points should be considered when deciding which assessments are needed:

- (1) Clinical scoring systems are unreliable in differentiating cerebral haemorrhage or infarction. The findings from CT of the brain are important in guiding therapy for acute stroke, and all patients with acute stroke should have a CT scan of the brain performed as soon as possible (preferably within 24 hours of presentation). The requirement for an emergency CT study (within 3-4 hours, and the sooner the better) is indicated in the following situations:
  - Clinical suspicion of subarachnoid haemorrhage or a traumatic cause;
  - Depressed consciousness;
  - Doubtful diagnosis because of other atypical features;
  - Suspected or known bleeding tendency;
  - Unexplained progressive or fluctuating symptoms; and
  - Consideration of thrombolytic therapy.
- (2) Magnetic resonance imaging (MRI) is more sensitive than CT in the detection of small infarctions or brain stem lesions, but it is more expensive and less widely available.

**Box 1. Risk factors for ischaemic stroke**

<i>Uncontrollable</i>
Age
Sex
Race
Family history
<i>Modifiable</i>
Hypertension
Diabetes mellitus
Hypercholesterolaemia
Coronary heart disease
History of stroke or transient ischaemic attack
Atrial fibrillation
Obesity
Smoking
Valvular heart diseases
Hypercoagulable states
Homocysteinaemia
Severe carotid stenosis
Intracranial arterial stenosis

- (3) The use of a clinical stroke score, such as the National Institutes of Health Stroke Score, is helpful in assessing the impairment of patients and may be useful in the prediction of the prognosis.
  - (4) All patients with acute stroke should be examined for swallowing difficulty by trained staff, and dysphagic patients should be referred to a speech therapist for further management.
  - (5) All patients with acute stroke should be assessed by nursing staff and allied professionals (eg a physiotherapist, occupational therapist, and speech therapist) to identify the degree of social, psychological, and physical disability, thereby allowing triage into different rehabilitation programmes.
  - (6) All patients with stroke should be tested for their complete blood picture, coagulation profile (international normalised ratio [INR], activated partial thromboplastin time), serum levels of urea and electrolytes, random and fasting blood glucose levels, and fasting lipid level; they should also have a chest X-ray and electrocardiogram performed. Close monitoring of the patient's level of consciousness, vital signs, and neurological condition is important for the early detection of clinical deterioration and complications. Suitable patients should undergo carotid duplex and transcranial Doppler examinations. Additional investigations (eg screening for hypercoagulable states, bleeding diatheses, transthoracic or transoesophageal echocardiography, and MRI) should be considered for selected patients.
- (2) The use of recombinant tissue plasminogen activator as thrombolytic therapy has been shown by the NINDS (National Institute of Neurological Disorders and Stroke) study to be beneficial in highly selected patients within 3 hours of onset of acute ischaemic stroke (level Ib).<sup>12</sup> Strict adherence to the selection criteria is critical, however, to ensure a good outcome.<sup>13</sup> Thrombolytic therapy may cause catastrophic cerebral haemorrhage, which raises local concern because haemorrhagic stroke is much more prevalent among the Chinese population than among Caucasians. Hence, thrombolytic therapy for Chinese patients with acute ischaemic stroke should be carried out only as part of a strictly controlled and monitored protocol by stroke specialists until either the safety of its use in Chinese patients is proven or the health delivery system can facilitate early identification of appropriate candidates.
  - (3) Low-molecular-weight (LMW) heparin as anticoagulation therapy within 48 hours of the onset of stroke has been shown by the FISS (Fraxiparine in Ischaemic Stroke) study to result in a significant improvement in 6 month's outcome among local patients with cerebral infarction (level Ib).<sup>14</sup> This result, however, could not be reproduced in other studies.<sup>15,16</sup> The FISS-Tris study, a multicentre trial, is currently ongoing in Hong Kong and Singapore, and the results will clarify the role of LMW heparin in treating Asian patients with acute cerebral infarction. The use of anticoagulation therapy in patients with acute ischaemic stroke plus atrial fibrillation has not been shown to be better than aspirin therapy.<sup>17</sup>

### Recommendations

- All patients with acute stroke should receive full medical assessment and other multidisciplinary assessments as soon as possible.
- In addition to routine investigations, the clinical condition may warrant more specialised investigations.
- Computed tomography of the brain should be performed for all patients with acute stroke within 24 hours of presentation, or sooner if indicated.

### (C) Acute treatment

The following is a summary of the current evidence for various treatments modalities:

- (1) Aspirin treatment has been proven to have a small benefit in reducing the death and recurrent stroke rate—namely, it results in a net decrease of 9 (standard deviation, 3) deaths or occurrences of further stroke per 1000 patients (level Ia).<sup>9-11</sup> For example, the CAST (Chinese Acute Stroke Trial) study confirmed the benefit of aspirin therapy among Chinese patients with acute ischaemic stroke. Aspirin at a dosage of 75 mg to 325 mg daily should be started within 48 hours of the onset of stroke but only after the exclusion of intracranial bleeding and when there are no other contra-indications. There has so far been no evidence that other antiplatelet agents have similar benefits in treating acute ischaemic stroke.
- (4) Although nimodipine is used in patients with subarachnoid haemorrhage to lessen ischaemic complications, its effectiveness has not been proven in treating acute cerebral infarction. Clinical trials involving several neuroprotective agents have failed to reproduce the positive outcomes seen in experimental studies.<sup>18</sup> No neuroprotectant is currently available for acute ischaemic stroke.
- (5) High blood pressure is common after cerebral infarction and often settles down gradually with conservative treatment. The rapid lowering of a patient's blood pressure in the acute phase of stroke may be detrimental. The blood pressure should not be lowered unless the systolic blood pressure is 220 mm Hg or higher, or the diastolic blood pressure is 120 mm Hg or higher, according to repeated measurements taken 20 minutes apart; or unless there are associated hypertensive emergencies, dissecting aortic aneurysm, encephalopathy, or heart failure.
- (6) Fever and hyperglycaemia may lead to a poor outcome for patients with stroke, and their causes should be sought and treated accordingly. Fever may be lowered with paracetamol.
- (7) Neurosurgical intervention may be considered in selected patients, such as those with large infarctions and mass effects (with midline shift or compression of the basal cisterns) or hydrocephalus.

### Recommendations

- Aspirin (75-325 mg/d) should be started within 48 hours of the onset of stroke and after intracranial bleeding and other contra-indications have been excluded.
- Anticoagulation treatment should not be considered as standard treatment until further clinical data are available for the local population.
- Thrombolytic therapy should not be considered as standard treatment until its safety for use in the local population has been shown.
- High blood pressure in the acute phase of disease should not be actively lowered unless there is a hypertensive emergency.
- Hyperglycaemia (blood glucose level >10 mmol/L), dehydration, pyrexia (and its cause) should be treated actively.
- Neurosurgical interventions may be considered in selected patients.

### (D) Secondary prevention

The annual stroke recurrence rate ranges from about 5% to 10%, and patients with recurrent stroke also carry an increased risk of myocardial infarction and other vascular events. Appropriate use of antithrombotic agents can reduce the risk of recurrent ischaemic stroke and is associated with an acceptable risk of complications. Major risk factors (Box 1) should be controlled aggressively as follows:

- (1) Patients with ischaemic stroke who experience atrial fibrillation (valvular or non-valvular) should be given anticoagulation therapy unless contra-indicated.<sup>19</sup> Warfarin is expected to reduce the risk of a further ischaemic stroke to the same extent as primary prevention. The INR level should be kept between 2.0 and 3.0 (and higher for prosthetic valves); however, whether this INR range is also optimal for the Asian population remains to be proven. Patients who are not suitable for anticoagulation should be considered for aspirin prophylaxis.
- (2) Aspirin therapy after an ischaemic stroke can reduce the risk of serious vascular events by one fourth. Low-dose aspirin (75-325 mg/d) is at least as effective as higher-dose treatment and causes fewer gastrointestinal side-effects.<sup>20</sup> The absolute reduction in the risk was 36 (standard error, 6) cases per 1000 patients treated for 2 years among those with previous stroke or TIA. Other antiplatelet agents may have some additional effects but are much more expensive and should not be considered as first-line treatments.
- (3) The prevalence of carotid stenosis among the local population is lower than that among Caucasians; significant intracranial stenosis is more common in the Chinese population. Suitable candidates (with symptomatic moderate or severe carotid stenosis of >50% to 99%) should be referred to carotid surgery centres that have suitable experience and expertise in carotid endarterectomy. Carotid angioplasty with stenting is a

new mode of intervention currently under evaluation, and it is not a standard treatment until further clinical data are available.

- (4) Control of blood pressure lowers the risk of first or recurrent stroke. This is true for various forms of hypertension and across different age-groups. It may also hold true in patients who have a blood pressure within the normal range. The blood pressure should be kept below 130/85 mm Hg. However, there is no lower threshold for the benefit of blood pressure treatment regarding stroke prevention. Recent studies have indicated that angiotensin-converting enzyme inhibitors may offer additional advantages other than the lowering of blood pressure.<sup>21,22</sup>
- (5) Diabetes mellitus is a major vascular risk factor, and the blood glucose level needs to be controlled aggressively with dietary restriction, oral hypoglycaemic agents, or insulin. The Heart Protection Study<sup>23</sup> has demonstrated the benefit of lipid-lowering therapy among patients with ischaemic stroke, and aggressive lowering of lipid levels is recommended. All patients should be advised to adopt a healthy lifestyle (such as stopping smoking, maintaining an optimal body mass index of <23, exercising regularly, and having a low salt intake).

### Recommendations

- Aspirin therapy should be started as soon as possible for the secondary prevention of recurrent ischaemic stroke and other vascular risk events.
- Anticoagulation should be considered for cardioembolic stroke if this is not contra-indicated.
- Suitable candidates should be identified and referred to experienced carotid surgery centres for consideration of carotid endarterectomy.
- Hypertension, diabetes mellitus, and hypercholesterolaemia should be controlled, and every patient should be strongly encouraged to stop smoking and adopt a healthy lifestyle.

The summary of the guidelines for the care of acute stroke is shown in Box 2.

### Conclusion

Improving the quality of stroke care can be achieved by reorganising services as follows:

- Set up a geographically designated acute stroke unit;
- Create an effective multidisciplinary team;
- Reorganise the health delivery system to facilitate patient-oriented service;
- Provide training for staff; and
- Enhance good collaboration among various specialties and the community health system.

This consensus statement focuses on the acute-phase management of ischaemic stroke, but other important areas in stroke services, such as primary stroke preven-

**Box 2. Summary of the consensus statements on ischaemic stroke care****Stroke unit**

1. Patients with acute stroke should be admitted to a designated acute stroke unit that has a multidisciplinary stroke service under the leadership of a stroke specialist.
2. Patients with TIAs should be referred for fast-track assessment in a specialised clinic.

**Acute assessment**

3. All patients with acute stroke should receive full medical assessment and other multidisciplinary assessments as soon as possible. In addition to routine investigations, the clinical condition may warrant more specialised investigations. Computed tomography scan of the brain should be performed for all patients with acute stroke within 24 hours of presentation, or sooner if indicated.

**Acute treatment**

4. Aspirin (75-325 mg/d) should be started within 48 hours of the onset of stroke and after intracranial bleeding and other contra-indications have been excluded.
5. Anticoagulation treatment should not be considered as standard treatment until further clinical data are available for the local population.
6. Thrombolytic therapy should not be considered as standard treatment until its safety for use in the local population has been shown.
7. High blood pressure in the acute phase of the disease should not be actively lowered unless there is a hypertensive emergency.
8. Hyperglycaemia, dehydration, pyrexia (and its cause) should be treated actively.
9. Neurosurgical interventions may be considered in selected patients.

**Secondary prevention**

10. Aspirin therapy should be started as soon as possible for the secondary prevention of recurrent ischaemic stroke and other vascular risk events.
11. Anticoagulation should be considered for cardio-embolic stroke if this is not contra-indicated.
12. Suitable candidates should be identified and referred to experienced carotid surgery centres for consideration of carotid endarterectomy.
13. Hypertension, diabetes mellitus, and hypercholesterolaemia should be controlled, and every patient should be strongly encouraged to stop smoking and adopt a healthy life style.

tion, rehabilitation, and community services, should not be ignored. Recent studies have pointed to the efficacy of stroke rehabilitation in altering outcomes and the overall durability of gains from rehabilitation. Rehabilitation should commence as soon as the patient's medical and neurological conditions permit, and should be formulated according to the individual's need. The comprehensive care of patients with stroke requires concerted efforts from all aspects of health care. Strategies should be developed to promote education at the levels of health care providers and community to improve the various aspects of stroke care.

New evidence about stroke care is emerging at a fast pace, and current consensus statement should be reviewed regularly to update the evidence-based approaches to stroke management.

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