



**For information
on 23.6.2022**

HAB-P324

Hospital Authority

Cluster Presentation Programme – Hong Kong West Cluster Improving the Functional Outcome of Acute Ischaemic Stroke Patients

Advice Sought

Members are invited to note for information the implementation of the comprehensive acute ischemic stroke service with 24-hour Intra-venous thrombolysis (IVT) and Intra-arterial Thrombectomy (IAT) in Hong Kong West Cluster (HKWC).

Background

2. Acute ischemic stroke, caused by the sudden occlusion of blood vessels supplying blood to the brain, can be broadly classified into small vessel occlusion, or large vessel occlusion. Acute treatment in the form of IVT with medication and IAT in the case of large vessel occlusion is necessary for re-opening the blocked vessel and thus restoring cerebral blood flow of patients in a timely manner.

3. 24-hour IVT service was first implemented in Queen Mary Hospital (QMH) in 2011, and is now available in all acute hospitals of the Hospital Authority (HA). As for IAT, it is a standard treatment for acute ischemic stroke in accordance with international guidelines, and is time-sensitive and labor-intensive. For IAT treatment, various departments, including Neurosurgery, Neurology, Accident & Emergency (A&E), Medicine, Radiology, Anesthesiology, Operating Theatre Service, collaborate to implement 24-hour IAT service at QMH, providing the gold standard on the comprehensive care for acute ischemic stroke patients. The steps taken to develop and improve the acute stroke pathway over the years is outlined below.

Essence of Acute Ischaemic Stroke Treatment

4. For acute ischemic stroke treatment, the shorter the time taken to restore the brain perfusion, the better the patient's outcome (i.e. "Time is brain" and every minute counts). As such, the development of the gold standard and planning for service improvement are based on the following five key areas along the treatment pathway:

- (a) patient education and stroke awareness;
- (b) pre-hospital stroke screening and alert;
- (c) radiological imaging;
- (d) in-hospital logistics; and
- (e) resources for thrombectomy procedure.

The smooth and efficient transition amongst these steps is helpful in ensuring that patients with acute ischemic stroke are detected, diagnosed, and treated in a timely manner.

Development and Service Enhancement Progress

Patient education

5. The Departments of Medicine, Neurology and Neurosurgery of QMH actively promote stroke awareness in the community in collaboration with the Faculty of Medicine of The University of Hong Kong. Since 2015, the team has delivered regular radio and television programmes, started a social media campaign, produced animation videos, and organised various health talks to educate the public on the acute symptoms of stroke (i.e. FAST: Face, Arm, Speech test¹) and promulgated the improved outcomes with IAT for patients suffered from large vessel occlusion stroke in recent years. Through joint efforts of various professionals and their teams, public awareness on the importance of timely recognition the onset of stroke by patients and their family is enhanced, and the concept that acute stroke is treatable and potentially reversible with early detection and medical attention and appropriate treatment, is reinforced.

Pre-hospital stroke alert

6. In 2018, HKWC began a pilot project with the Fire Services Department to develop pre-hospital stroke screening and alert for residents on the ambulance within the catchment area of HKWC. Representatives from various departments led educational workshops for ambulance officers to introduce tools for stroke detection and provide training for activation of the stroke notification protocol. If a patient with suspected acute stroke is picked up by the “999” emergency hotline, the ambulance officer will notify the A&E department of QMH for alerting the stroke team ahead of patient’s arrival to the hospital to make advance preparation on patient triage and radiological imaging so that investigation and treatment can be expedited. The success of this pilot project is demonstrated by a remarkable reduction of door-to-treatment time by 34 minutes. With the experience gained, the stroke alert protocol has been refined and recently implemented in other Clusters in late 2021.

Radiological imaging for stroke

7. Modern management of acute stroke relies heavily on accurate radiological imaging for diagnosis. With the support of the Diagnostic Radiology Department, brain

¹ A stroke identification tool that examines facial weakness, arm weakness, and speech disturbance, which is used by many renowned healthcare institutions, including the National Stroke Association and American Heart Association.

Computer Tomography (CT) and CT angiogram are arranged for stroke patients in a protocol-driven manner to ensure early diagnosis of patients. Recently, an automated and artificial-intelligence (AI) assisted programme is rolled out in QMH with an aim to providing initial interpretation of CT brain imaging for stroke patients around the clock, with the results be generated within minutes and provided to the on-site treating physicians or off-site colleagues. This further improves the workflow of stroke diagnosis and speeds up the treatment decision-making process.

In-hospital logistics

8. Time is the most important factor in the treatment of acute ischemic stroke. In the past, the waiting time for several processes before eventually receiving IAT treatment, such as preparation of admission documents, ward admission procedures, reservation and allocation of angiosuite, as well as the in-hospital transportation, indirectly impacted on treatment outcomes for patients. As such, the logistics of admitting stroke patients and subsequent arrangement of IAT procedure are streamlined through the collaborative effort of the hospital admission office and various teams of clinical departments. With the streamlined workflow, the time taken from admission of patient to beginning of IAT surgery was reduced from 3.5 hours in 2015-16 to around 2 hours in 2019-20. With further improvements in imaging service, and the opening of the new dedicated angiosuite next to A&E department in QMH, we aim to further improve the time metrics.

Resources for IAT procedure

9. Through organised and cross-department training plan to augment the supply of skillful professionals for IAT, IAT service has been enhanced since 2016-17, and in 2018, IAT was eventually operated on a 24-hour-a-day basis by using the then resources allocated for acute ischemic stroke service in HKWC. This has been made possible by the concerted, and voluntary efforts of the QMH neuro-intervention team, comprising of interventional radiologists, endovascular neurosurgeons, and endovascular stroke physicians, to provide 24/7 on-call coverage.

10. The intervention team strives to improve the operative techniques and patient selection process in order to improve the surgical outcome. For example, a portion of patients with delayed presentation or uncertain stroke onset time who were previously excluded from IAT was included with the help of advanced CT perfusion imaging. The successful recanalisation rate steadily improved from 78% in 2015-16 to over 95% in 2020-21 and the proportion of stroke patients regaining functional independence also improved from 35% to 48%. Correspondingly, a reduction of the complication rate from 13% to 9% was observed. As the only 24-hour IAT hospital on Hong Kong Island, QMH also supported acute stroke referrals from other HA hospitals. Where necessary, patients from Ruttonjee Hospital and Pamela Youde Nethersole Eastern Hospital could be referred to QMH for treatment after office hours. Currently these non-HKWC patients accounted for around half of the IAT volume in QMH.

Way Forward

11. Contemporary acute ischemic stroke treatment requires comprehensive and timely intervention to ensure the stroke patients' "chain of survival". The QMH experience demonstrated that staff dedication, departmental flexibility and cross-discipline collaboration are the keys to successful implementation of enhanced service. In anticipation of additional resource injection to strengthen the surgical capacity and the opening of a new dedicated neuro-angiosuite in HKWC, we hope to provide a sustainable, efficient and comprehensive acute stroke service to patients. Looking ahead, in view of the time-sensitive and resource-intensive nature of acute ischemic stroke service, feasibility of service transformation by providing IVT and IAT in designated centers coupled with a diversion system for stroke patients could be explored to optimise the use of resources and expertise.