

Increasing the Percentage of Acute Ischaemic Stroke Patients Receiving Intravenous Thrombolysis at TTSH Emergency Department



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Adding years of healthy life

Mission Statement

To increase the percentage of acute ischaemic stroke patients at Tan Tock Seng Emergency Department receiving intravenous thrombolysis with Door-to-Needle times of ≤60mins from 54.1% to 80% over a period of 6 months

Team Members

	Name	Designation	Department
Team Leader	Dr Chiu Li Qi	Consultant	Emergency Medicine
Team Members	Dr Daniel Quek Yong Jing	Senior Resident	Emergency Medicine
	Dr Lee Chiao Hao	Senior Resident	Emergency Medicine
	Ms Roslin Bte Salihan	Nurse Manager	Emergency Medicine
	Dr Sim Li Ean	Consultant	Neurology
	Ms Rozana Bte Othman	Senior staff nurse	Neuroradiology
	Ms Lim Hsiao Sim	Senior staff nurse	Neurology ICU
Sponsor	Adj A/Prof Tay Seow Yian	Head & Senior Consultant	Emergency Medicine
Facilitator	A/Prof Tay Jam Chin	Senior Consultant	General Medicine

Evidence for a Problem worth solving

 According to AHA/ASA Class 1 recommendation: In the management of acute ischaemic stroke, DTN for thrombolysis should be ≤60mins, with a compliance of >80%.

Current Performance of a Process

 Between Jan 2014 - Jun 2015, 127 patients received thrombolysis but only 54.1% received it ≤60mins.

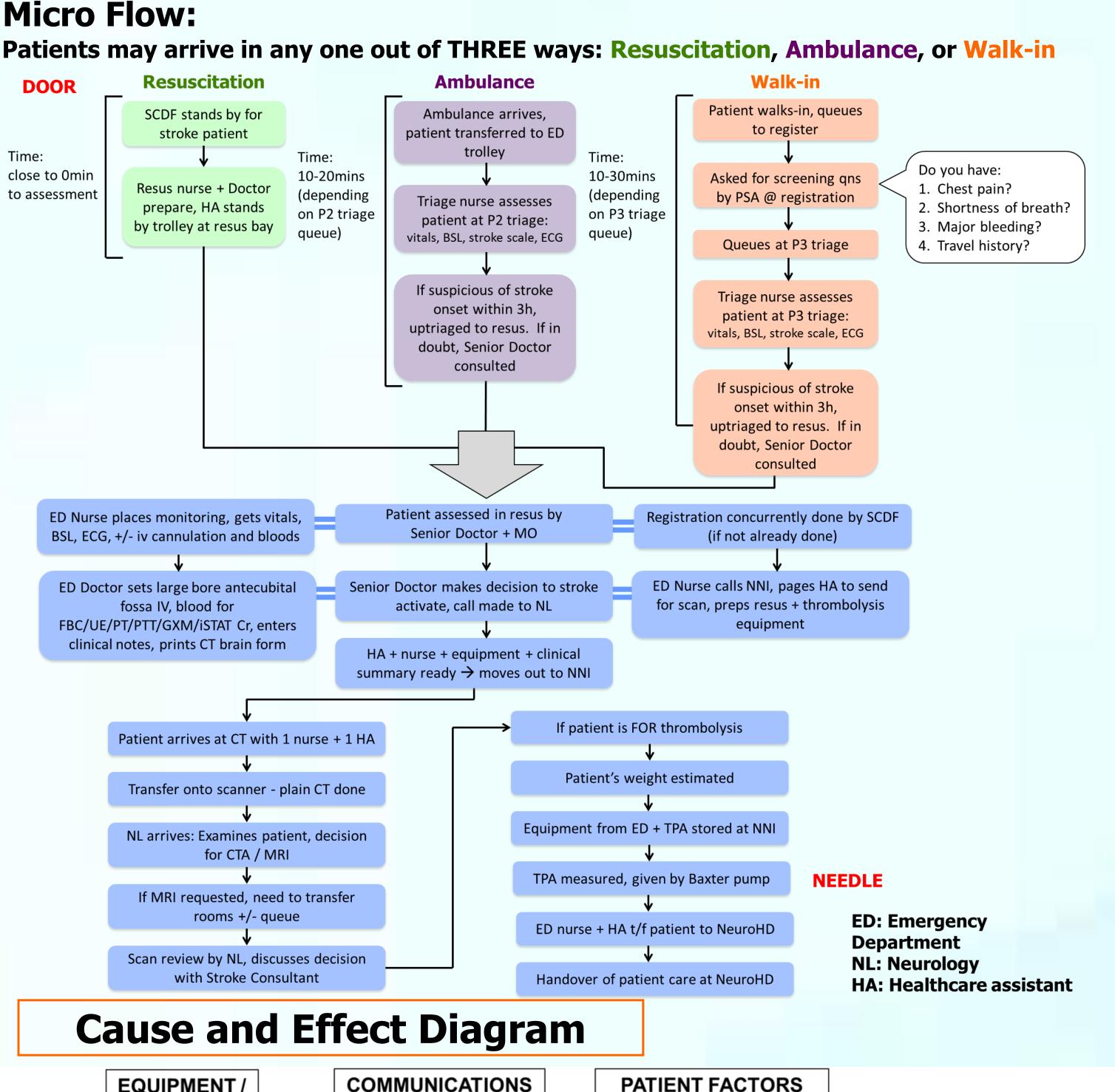
Flow Chart of Process

Macro Flow:

Patient arrival & registration, ED Doctor consult -> Neuroimaging, review by neurologist and thrombolysis \rightarrow Admission to Neurology HD unit

Micro Flow:

STAFF



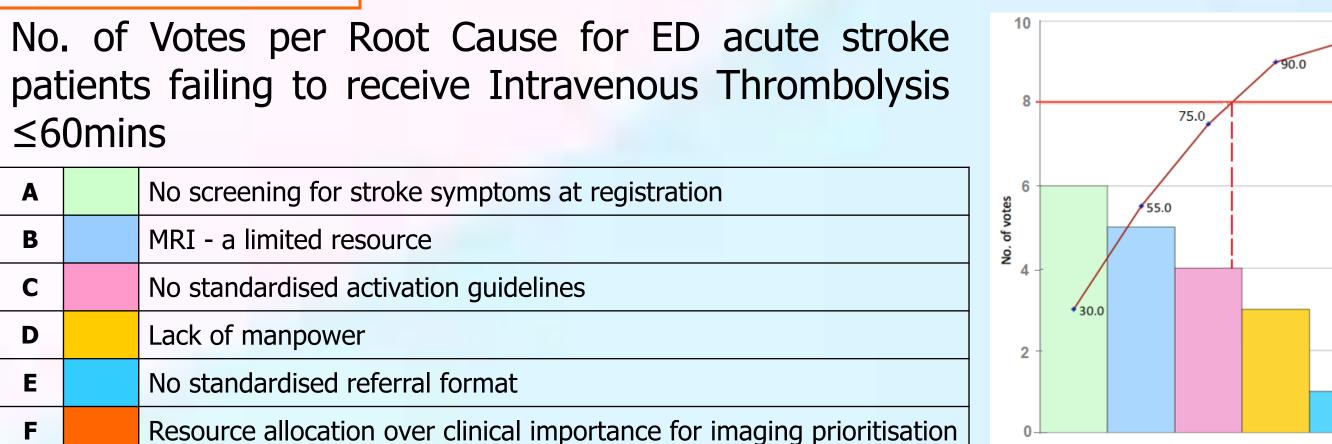
COMMUNICATIONS EQUIPMENT/ PATIENT FACTORS LOGISTICS Public knowledge deficit re: stroke Incorrect Diff NL requested questioning Different symptom onset Insufficient diff info technique Time to enter thrombolytics at NR _____ No standardised (leading qns) notes on Language Pt aphasic (only 2 bottles) No corroborative scan req barrier If urgently required, ED Long waiting time for Less NR manpower nurse helps to replace INR (pts on anticoag) Unstable pt or wandered off at night/weekends stock. Intubation___ No POCT Comms breakdown After office hrs: DC card left on Long prep time for scan No answer at btwn ED and NL NR nursing counter – only can NR – cannot Only arm (not neck) as CT scanner Call made by junior MO\ collect on next working day. send for scan Secure programmed for arm->brain contrast time Equipmen Old equipment Radiographers Only 54.1% of acute stroke No standard practice in place to cannula replace stock after office hours. **♦** for CTA patients in TTSH ED thrombolysed ≤ 60mins CT room occupied Stroke not recognised at Long registration radiographer, 1 prehospital NL req to see pt in ED nurses prioritise Long triage time phototechnician ED first before scan Long distance fr ED to NR scans for intubated Vitals, ECG, hx -**Delayed activation** (stable) pts Only 1 MRI/CT No ED-based not screened for by ED snr dr Max 4 counters room available CT Scanner Triage nurse has many Resource over clinical even during stroke after hours Lack of manpower importance in scan protocols/scales to remember prioritisation No uniform Average MRI ¬20min Porter has many o prehospital pt details 🤿 activation guidelines **NNI** prioritises different duties Nurses confused due to scans for intubated Long wait for MRI room (if_____ varied activation windows → MO missed and (stable) pts decision made for MRI after CT) by ED drs Insufficient HA to No extra manpower due to -did not flag up Missed by triage nurse No standard other ED requirements send pt for scan for activation workflow Visual aid for stroke scale does Complicated workflow not include activation window Thrombolysis criteria Unattractive physically Resus staff overwhelmed Unsure of iv dilution for dose demanding job is NL-dependent

KNOWLEDGE

PROCESS

INFRASTRUCTURE

Pareto Chart

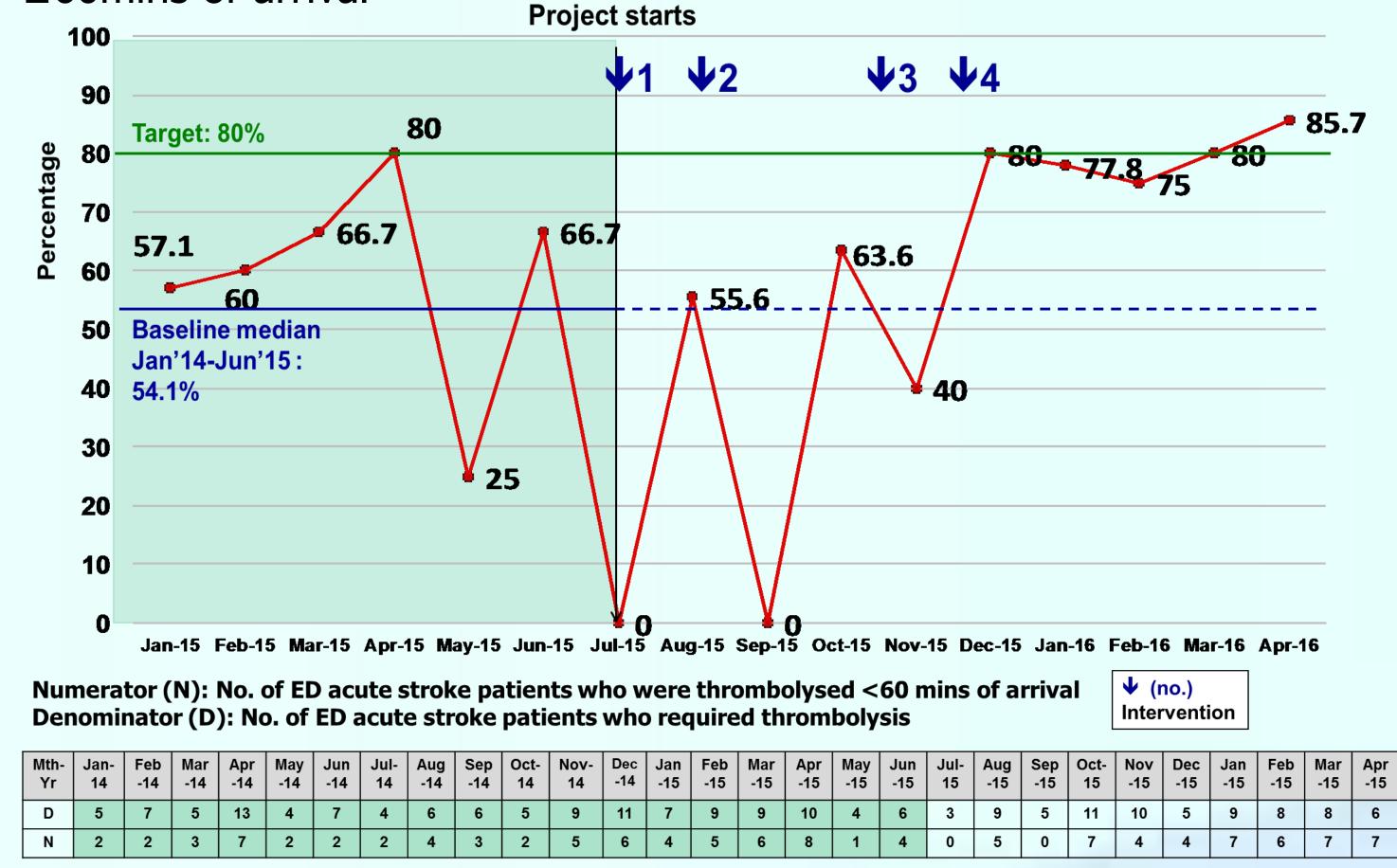


Implementation

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Root Cause	Intervention	PDSA		
No standardised activation guidelines	1. Uniform activation criteria established and implemented	 Auto-generation of reminder in EDWeb Weekly audit of ED notes Nursing roll-call Reminders to ED Doctors 		
No screening for stroke symptoms at walk-in triage	2. Addition of screening symptoms 'one-sided weakness' at registration	 Triage audit of patients EDWeb weekly audit using specific search terms Revision of FAST scale 		
Delays to neuroimaging	3. Pre-hospital centralised stroke activation	- 2-weekly audit of EDWeb crosschecked with manual UHF records		
Public/Patient knowledge deficit on stroke	4. Posters in 4 languages placed at registration & triage	Feedback from staffAudit of walk-in strokes identification		

Results

Percentage of ED acute stroke patients who were thrombolysed ≤60mins of arrival



- 20% increase in % of patients receiving intravenous thrombolysis ≤60mins
- 1 more stroke patient received intravenous thrombolysis per month

Cost Savings

Based on international studies, timely thrombolysis is associated with an additional 3.3 QALY, cost savings of USD\$46,000 (~SGD\$61,000) per 100,000 population², and €3,183 (~SGD\$4,800) per additional patient treated³.

Problems Encountered

- Data collection and audit methods
- Difficulty in culture change 'Time is brain'
- Late adopters and non-believers

Strategies to Sustain

- Established the Acute Stroke Activation Protocol in ED
- Monthly multidisciplinary DTN meetings
- Incorporated into nursing triage course and doctors' orientation
- Quarterly updates in ED

Lessons Learnt

- The use of information technology in data monitoring and audit
- The importance of a multi-disciplinary, mixed subject-matter expert team in problem solving.
- Shaping culture requires continuous audit and tireless efforts
- 1. Jaunch EC, Saver JL, Adams HP Jr, et al. Guidelines for the early management of patients with acute ischemic stroke: A guideline for healthcare professionals from the American Heart Association / American Stroke Association. Stroke 2013;44(3):870-947.
- 2. Penaloza-Ramos MC, Sheppard JP, Jowett S, et al. Cost-effectiveness of optimizing acute stroke care services for thrombolysis. Stroke 2014;45(2):553-62.
- 3. Schimidt A, Heroum C, Caumette D, et al Acute Ischemic Stroke (AIS) patient management in french stroke units and impact estimation of thrombolysis on care pathways and associated costs. Cerebrovasc Dis 2015;39(2):94-101.