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

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Tan Tock Seng HOSPITAL

National Healthcare Group — 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%.[1]

Current Performance of a Process

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

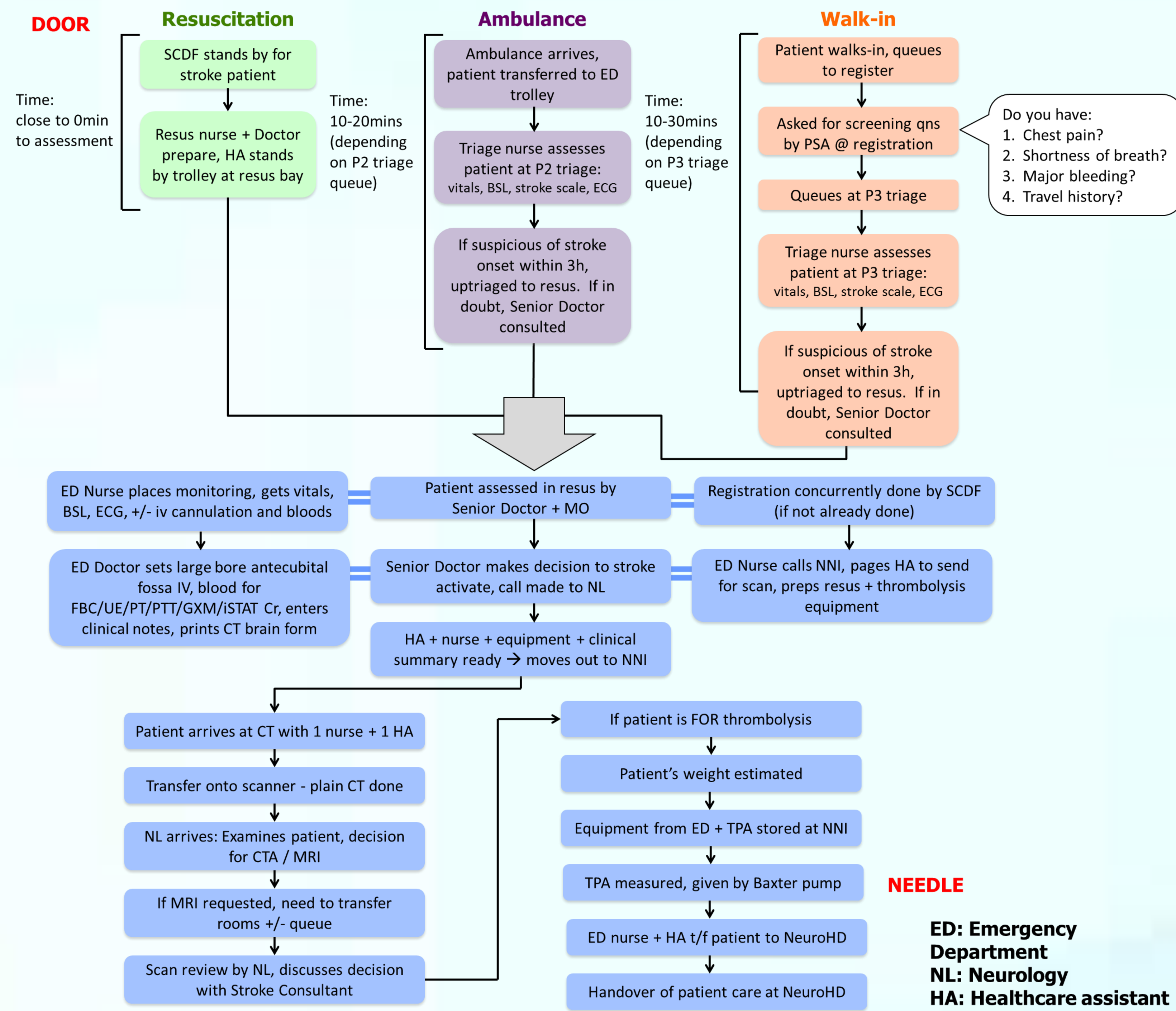
Flow Chart of Process

Macro Flow:

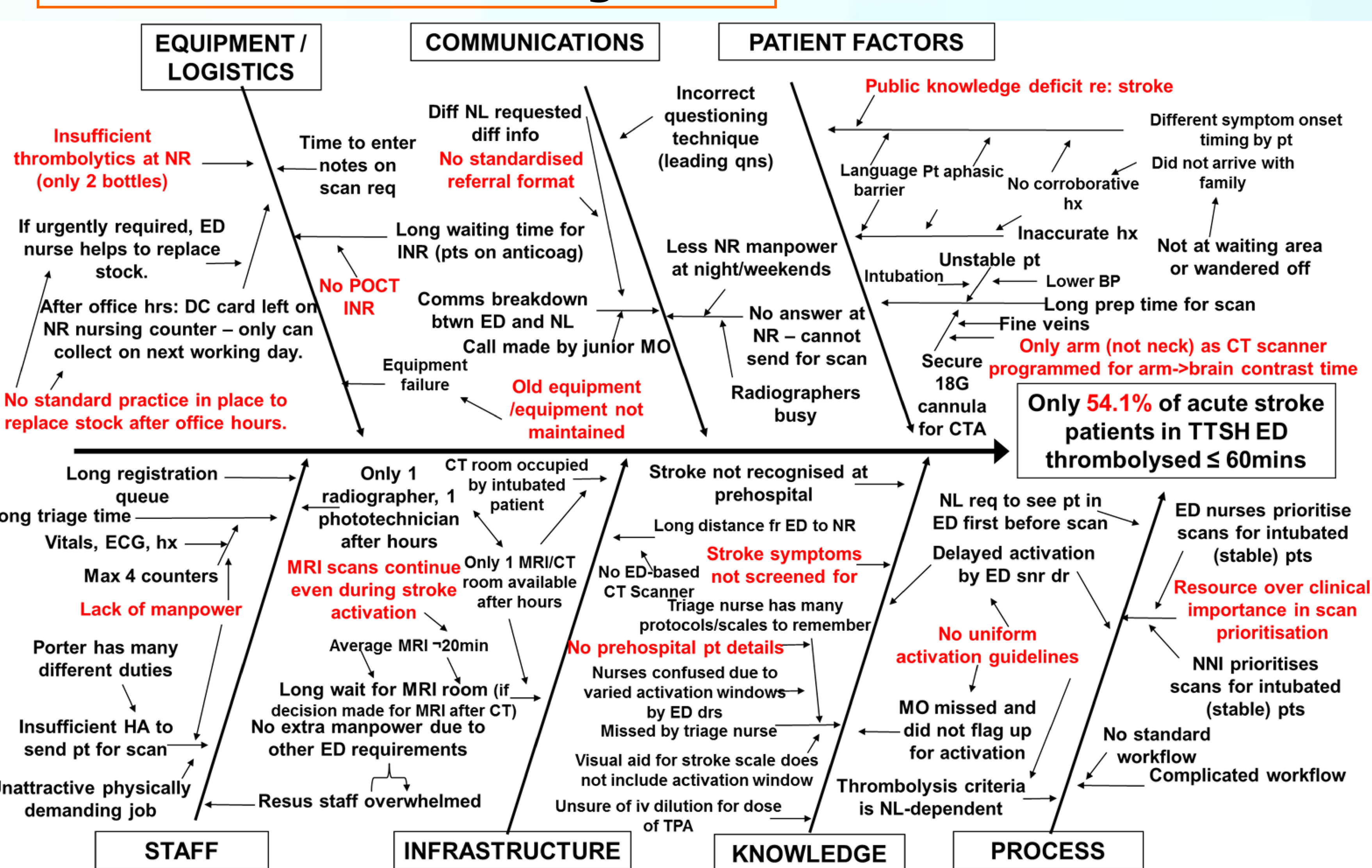
Patient arrival & registration, ED Doctor consult → Neuroimaging, review by neurologist and thrombolysis → Admission to Neurology HD unit

Micro Flow:

Patients may arrive in any one out of THREE ways: Resuscitation, Ambulance, or Walk-in



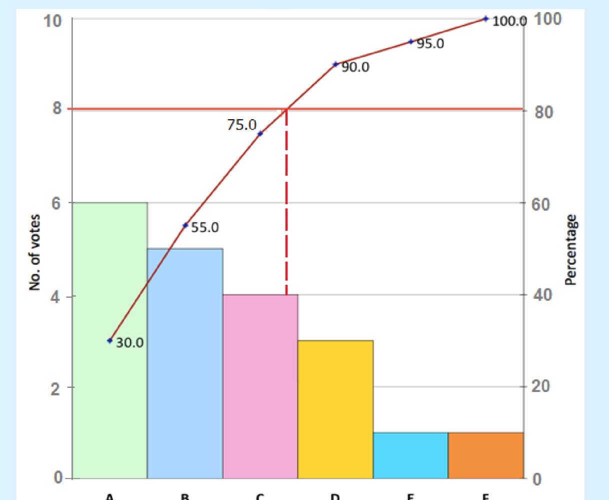
Cause and Effect Diagram



Pareto Chart

No. of Votes per Root Cause for ED acute stroke patients failing to receive Intravenous Thrombolysis ≤60mins

A		No screening for stroke symptoms at registration
B		MRI - a limited resource
C		No standardised activation guidelines
D		Lack of manpower
E		No standardised referral format
F		Resource allocation over clinical importance for imaging prioritisation

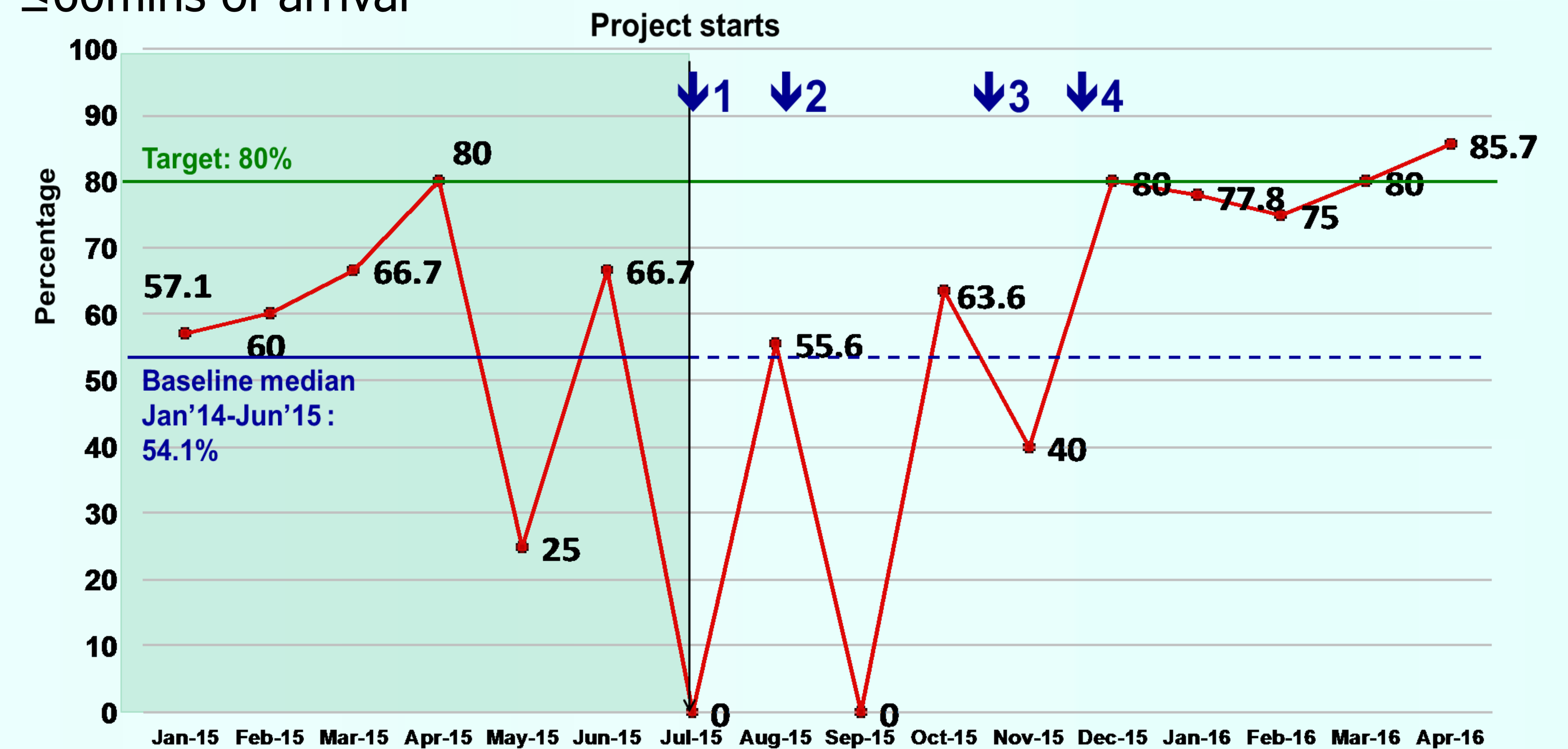


Implementation

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 staff - Audit of walk-in strokes identification

Results

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



Numerator (N): No. of ED acute stroke patients who were thrombolysed <60 mins of arrival
Denominator (D): No. of ED acute stroke patients who required thrombolysis

↓ (no.) Intervention

Mth-Yr	Jan-14	Feb -14	Mar -14	Apr -14	May -14	Jun -14	Jul-14	Aug -14	Sep -14	Oct-14	Nov-14	Dec -14	Jan -15	Feb -15
D	5	7	5	13	4	7	4	6	6	5	9	11	7	9
N	2	2	3	7	2	2	2	4	3	2	5	6	4	5

Mth-Yr	Mar -15	Apr -15	May -15	Jun -15	Jul-15	Aug -15	Sep -15	Oct-15	Nov -15	Dec -15	Jan -15	Feb -15	Mar -15	Apr -15
D	9	10	4	6	3	9	5	11	10	5	9	8	8	6
N	6	8	1	4	0	5	0	7	4	4	7	6	7	7

- 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 population[2], and €3,183 (~SGD$4,800) per additional patient treated[3].

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.