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**Canberra Health
Services**

Pre-hospital notification of suspected stroke patients to stroke team improves access to reperfusion therapies

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Background

- Code stroke improves time to assessment, imaging and treatment
- Local data supports the evidence base, as demonstrated a previous local audit

Jones, B. and Lueck, C. *Stroke Nurse led triage of stroke calls improves timely diagnostics, treatment and stroke unit access.* in *Stroke 2018 Conference, 7-10 August 2018.* 2018. Sydney, Australia: SAGE Publications.



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Previous local data

	Stroke Calls	95% CI or (IQR)	Missed Stroke Calls	95% CI or (IQR)	Out of Hours	95% CI or (IQR)	P Value
Total Presentations (%)	280 (27.5)		180 (17.7)		557 (54.8)		
Ischaemic (%)	164 (58.6)	52.8 - 64.3%	80 (44.4)	37.2 - 51.7%	269 (48.3)	44.1 - 52.4%	0.003
Haemorrhagic (%)	13 (4.6)	2.2 - 7.1%	9 (5.0)	1.8 - 8.25	32 (5.7)	3.8 - 7.7%	0.861
TIA (%)	67 (23.9)	18.9 - 28.9%	37 (20.6)	14.6 - 26.4%	109 (19.6)	16.3 - 22.9%	0.399
Mimic (%)	36 (12.9)	8.9 - 16.8%	54 (30.0)	23.3 - 36.7%	147 (26.4)	22.7 - 30.1%	>0.0001
Door to CT - median	60 min	(38 min – 1 hr 46min)	2 hr 40.5 min	(1 hr 41 min – 3 hr 52 min)	1 hr 33.5 min	(53 min – 2 hr 39.5 min)	>0.0001
Door to SU - median	3 hr 32 min	(2 hr 36 min – 5 hr 23 min)	6 hr 53 min	(5 hr 5 min – 9 hr 27 min)	5 hr 54 min	(4 hr 4 min – 8 hr 38 min)	>0.0001
Thrombolysis %	14.6%	8.9 - 20.2%	0.0%		8.0%	4.7 - 11.3%	0.037
TPA Door to CT - median	29 min	(25 min – 39 min)	N/A		33 min	(26 min – 43 min)	0.094
TPA Door to Needle -median	78 min	(62 min – 1 hr 35 min)	N/A		1 hr 35.5 min	(1 hr 21.5 min – 2 hr 4.5 min)	0.013

Canberra pRE-hospital Stroke Screening Tool (CRESST)

Inclusion criteria:

1. Age \geq 18 years of age
2. Clear symptom onset time \leq 4.5 hours
3. A minimum score of Score \geq 4 BUT must score a 1 on acute or sudden onset of symptoms

Exclusion criteria:

1. Unclear symptom onset or symptom onset $>$ 4.5 hours
2. High level nursing home residents
3. Terminally ill or bed ridden patients
4. BSL $<$ 4mmols

Canberra Prehospital Stroke Screening Tool (CRESST)

ACUTE OR SUDDEN ONSET OF SYMPTOMS		
Yes		1
No		0
LEVEL OF CONSCIOUSNESS		
Alert		0
Drowsy		1
Stuporous/Comatose		3
SPEECH & LANGUAGE		
Normal		0
Slurred speech		1
Word finding difficulty and/or jumbled speech and/or unable to follow commands		3
FACIAL DROOP		
Absent		0
Present		2
ARM & LEG WEAKNESS		
	ARM	LEG
Absent	0	0
Drifts down slowly	1	1
Falls down rapidly or no movement	3	3
VERTIGO		
Absent		0
Present with head movement		1
Present with no head movement		3
DIPLOPIA		
Absent		0
Present		2

Min Score – 0
Max Score – 15

Strongly suspect stroke – Score \geq 4 **BUT** must score a 1 on acute or sudden onset of symptoms

CRESST

Zhai et al (2018) demonstrated

- Improved identification of stroke
- Facilitated pre-hospital notification
- Improvement in thrombolysis metrics

- During trial some pre- hospital notification relayed by ED to activate code team

Aim

- What was the impact of pre-notification locally?

Zhai, S. Validation of the Canberra pREhospital Stroke Screening Tool (CRESST) – Preliminary results from the first six months data. in Stroke 2018 Conference, 7-10 August 2018. 2018. Sydney, Australia: SAGE Publications.

Methods

- Retrospective stroke call data audit (July 2017-February 2019)
- Inclusion
 - Patients referred to the stroke service
 - Had CRESST completed by paramedics
 - Sub group analysis of patients who had pre-notification relayed to stroke team by ED
- Time metrics compared to baseline data for door to CT (DTCT) and door to needle (DTN).

Results

Positive CRESST Score	Number	%
Positive CRESST Score	82	-
Positive CRESST (Mimics)	24	29%
Positive CRESST (Stroke)	58	71%
TIA	10	17%
Haemorrhagic	8	14%
Ischaemic	40	69%
Reperfusion Therapy	15	37%
TPA	9	
ECR	2	
TPA + ECR	4	

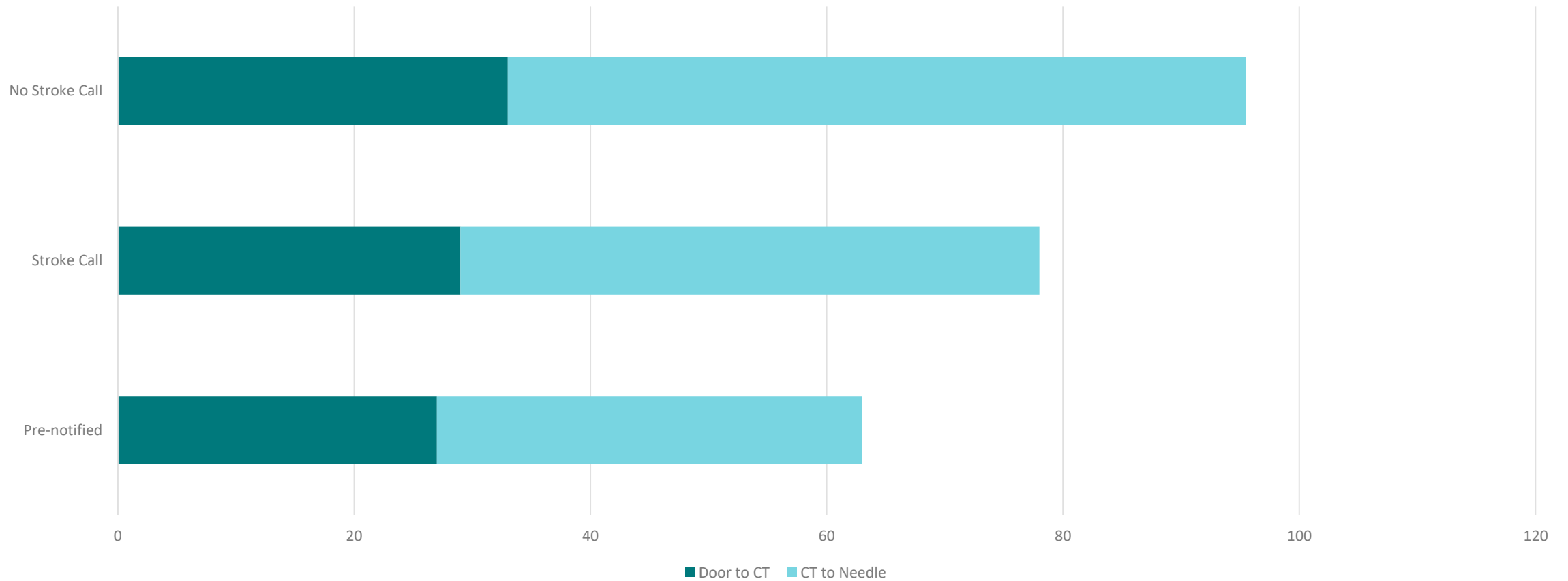
Results

	No Stroke Call	Stroke Call	Pre-notified	P Value
TPA % Ischaemic	8%	15%	32%	<0.001
TPA Door to CT (median)	33 mins	29 mins	27 mins	NS
TPA Door to Needle (median)	95.5 mins	78 mins	63 mins	NS



Improved Door to Needle (Median)

Door to Thrombolysis by Subgroup



Save a minute, save a day

- Every minute that ticks by in a patient with a large vessel occlusion stroke, a patient loses:

- 1.8 days of healthy life

(Meretoja et al, 2014)

- 1.9 million neurons
- 13.8 billion synapses
- 12km of axon fibres

(Saver, 2006)

- For a 32.5 minute saving:
 - Up to 58.5 days of healthy life
 - 61.7 million neurons
 - 448.5 billion synapses
 - 390 km of axon fibres



Discussion

- Limitations:
 - Retrospective
 - Small numbers
 - Selection bias ?most obvious strokes pre-notified
 - Did all patients with a CRESST score get referred?
 - Did not examine the tool

Discussion

- 15% of CRESST +ve patients received TPA, compared with 6% of total ED referrals
- Proportion of mimics 29%, again lower than numbers referred by ED
- Pre-notification results in trend to door to needle time savings
- Results support implementation of formalised pathway

Conclusion

- Pre-notification by ambulance improves door to needle times for thrombolysis
- Mimics will trigger pre-notification (29%)
- However % of ischaemic strokes for reperfusion high (37%)