

TIME EQUALS BRAIN

Retrospective analysis of thrombolysis in regional Australia to determine factors which influence door to needle time

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INTRODUCTION

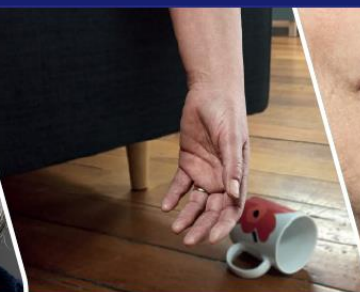
Treatments for stroke have rapidly progressed with intravenous thrombolysis (IVT) and endovascular clot retrieval (ECR) being mainstays of current acute therapy.

Acute treatment of stroke is time dependent with IVT considered when patients present within 4.5 hours of symptom onset and ECR considered up to 24 hours.

Recognise **STROKE** Think **F.A.S.T.**



F
Has their
FACE
drooped?



A
Can they lift both
ARMS?



S
Is their
SPEECH
slurred and do they
understand you?



T
Call 000,
TIME
is critical

If you see any of
these symptoms
Act FAST
call 000

PURPOSE OF STUDY

National Stroke Foundation Guidelines for 2017

- Thrombolysis should be initiated within 60 minutes of patient arrival
 - i.e. Door to Needle time should be <60 minutes
- Currently Australia wide, 30% of thrombolysis admissions meet guidelines
- In the US – 57% of cases are thrombolysed within 60 minutes
- In the UK – 60% of cases are thrombolysed within 60 minutes

In Wollongong, no formal audit completed to assess DTN times.

The purpose of this study is to outline barriers to timely thrombolysis and thrombectomy in regional Australia and determine factors that influence door to needle time (DTN).



METHODS

Based on local protocol, all patients admitted to the stroke unit at Wollongong Hospital have de-identified data collected and stored on centralised databases that include diagnosis, treatment and outcomes.

A manual search through this database for all patients with ischemic strokes was performed for all patients admitted over a period between March 2016 and October 2018.

METHODS

Baseline patient demographics

Thrombolysed Patients (n=50)

Mean Age: 62.9 years

Male: 27 (54%)

Mean NIHSS Score: 8.9 (1 – 21)

Mean Post-Thrombolysis NIHSS Score: 4.8 (0 – 31)

Endovascular Thrombectomy Patients (n=47)

Mean Age: 68.7 years

Male: 26 (55%)

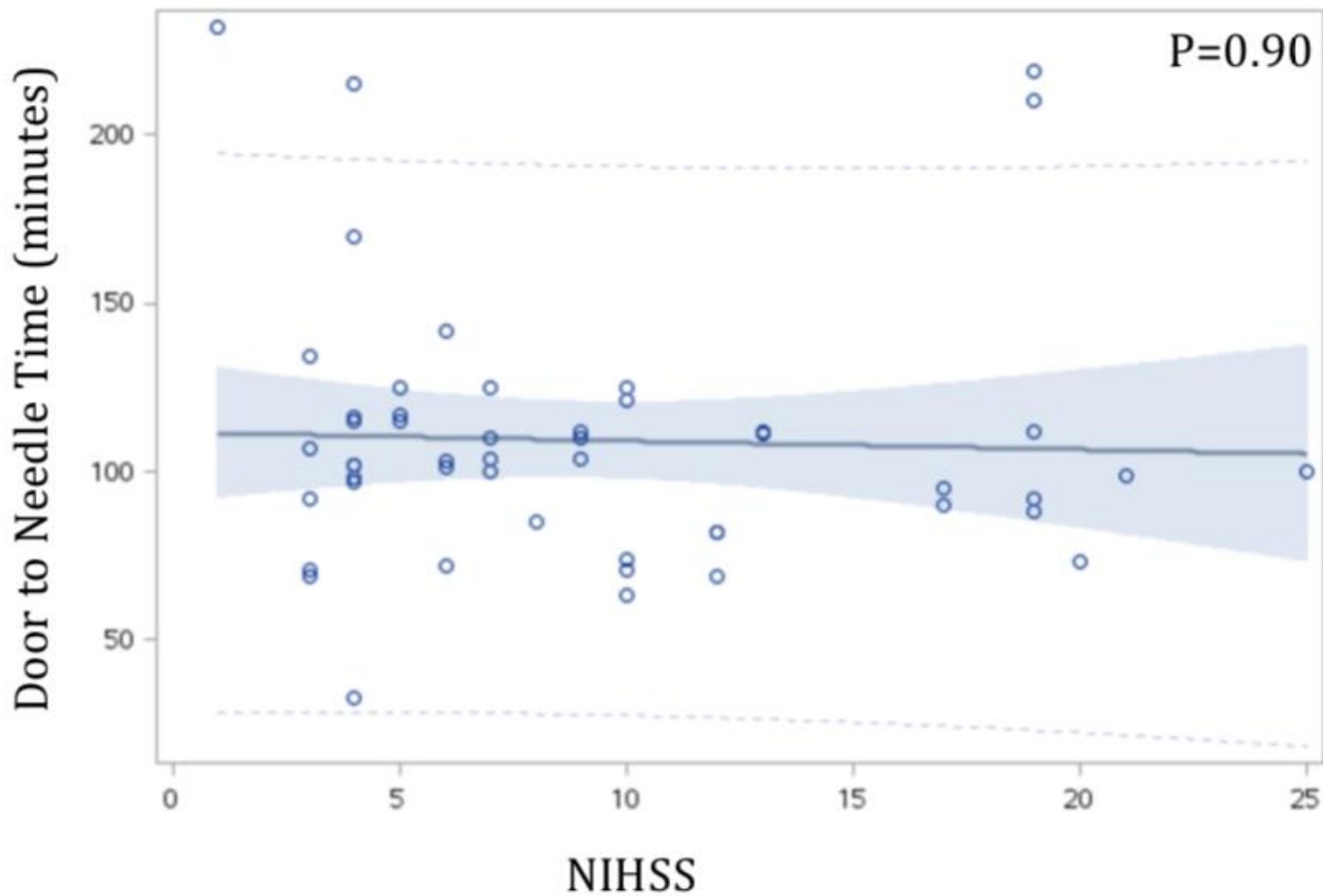
Mean NIHSS Score: 12.6 (1 - 29)

Mean Post-Thrombectomy NIHSS Score: 3.6 (0 – 16)

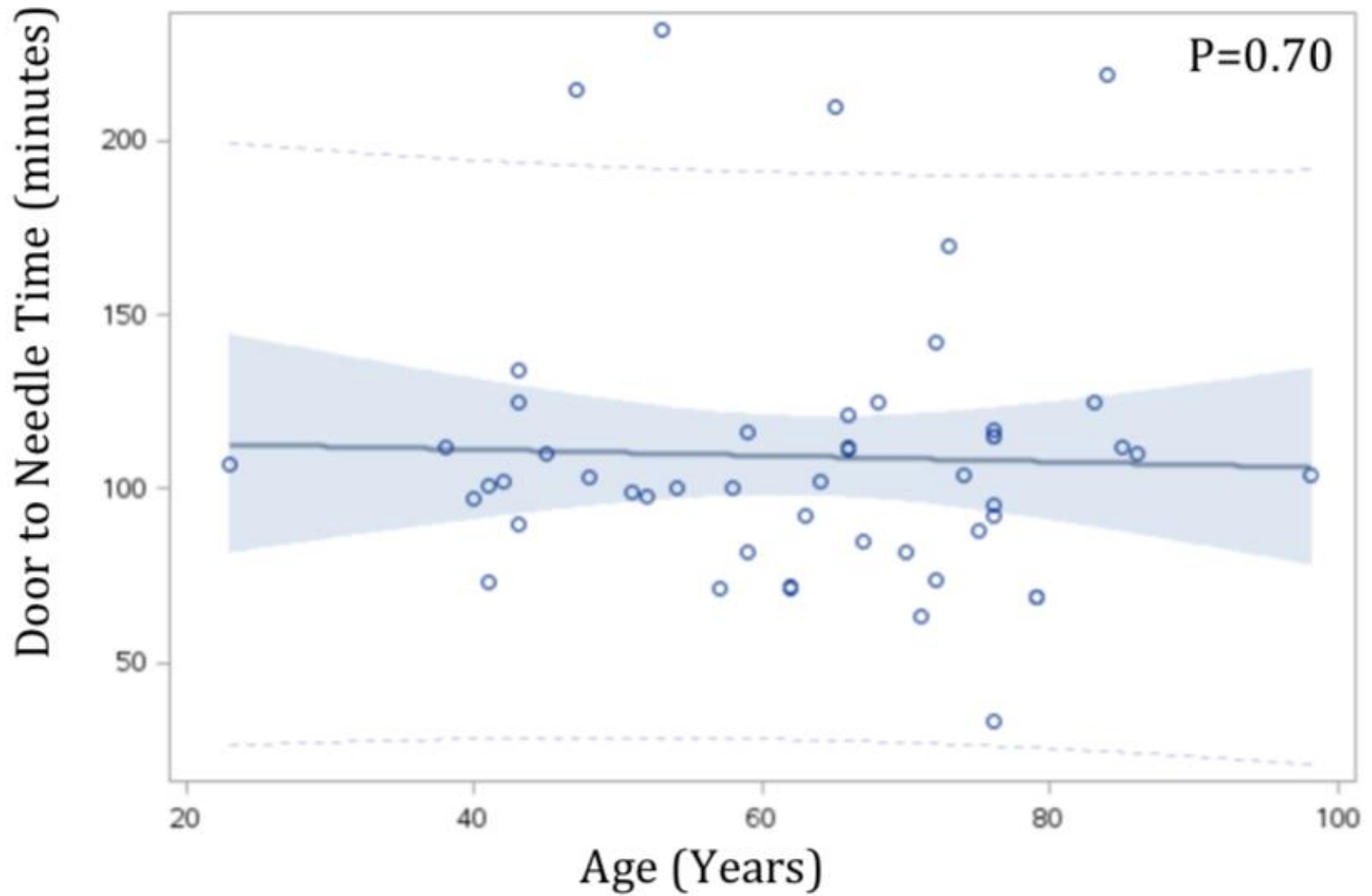
KEY RESULTS

- The mean time for intravenous thrombolysis was 3 hours 13 minutes from onset (range between 2 to 4.5 hours).
- No thrombolysis attempts were made outside the 4.5-hour time window.
- The mean onset to arrival time was 85 minutes followed by a mean DTN of 109 minutes.
- During this period, the mean arrival to CT completion time was 31 minutes.
- Univariate analysis was completed between DTN and confounders such as baseline NIHSS core, age (as both continuous and categorical groups), gender, arrival to CT time and onset to arrival time.

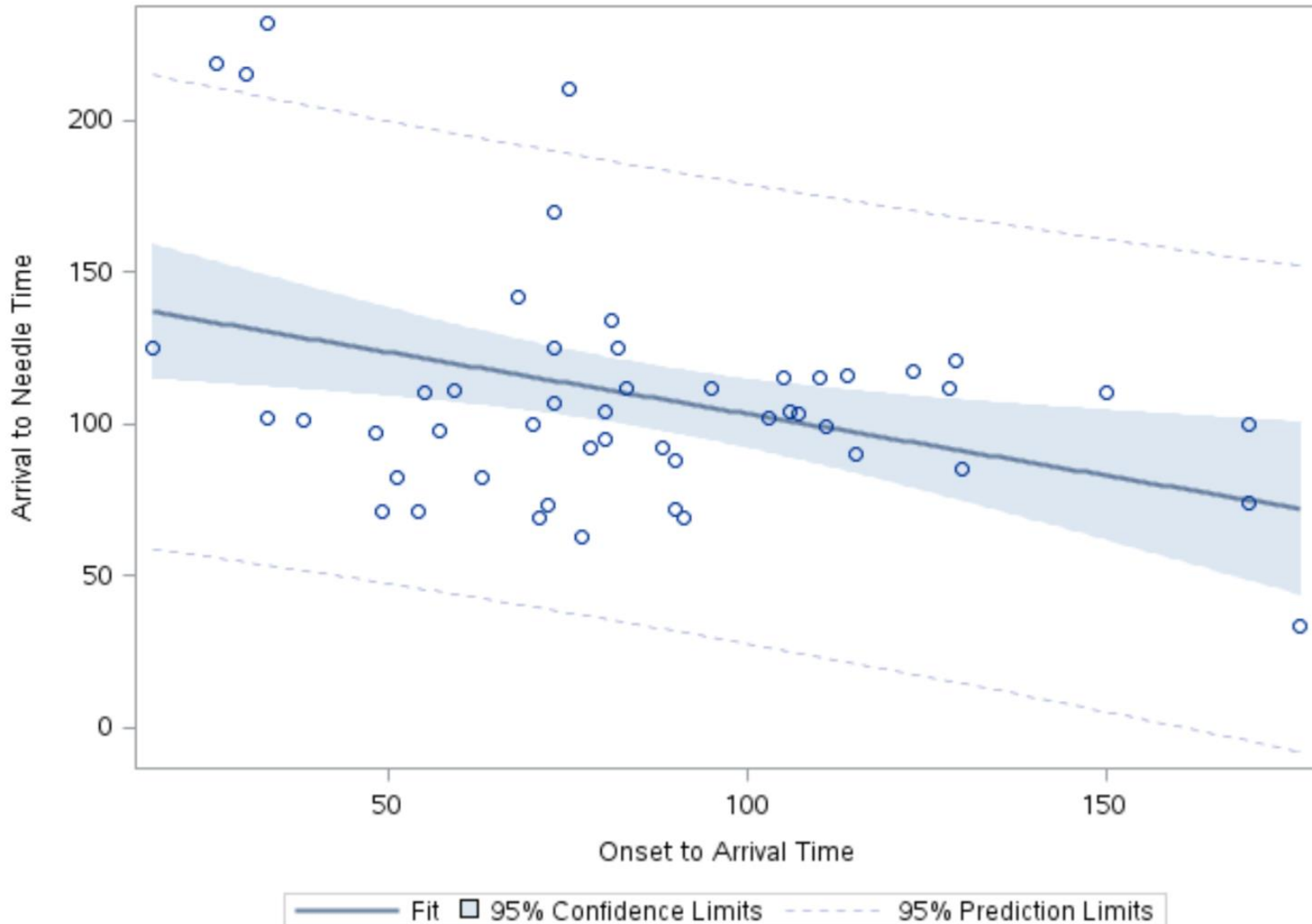
DTN versus NIHSS



DTN versus Age



DTN versus Onset to Arrival Time



RESULTS

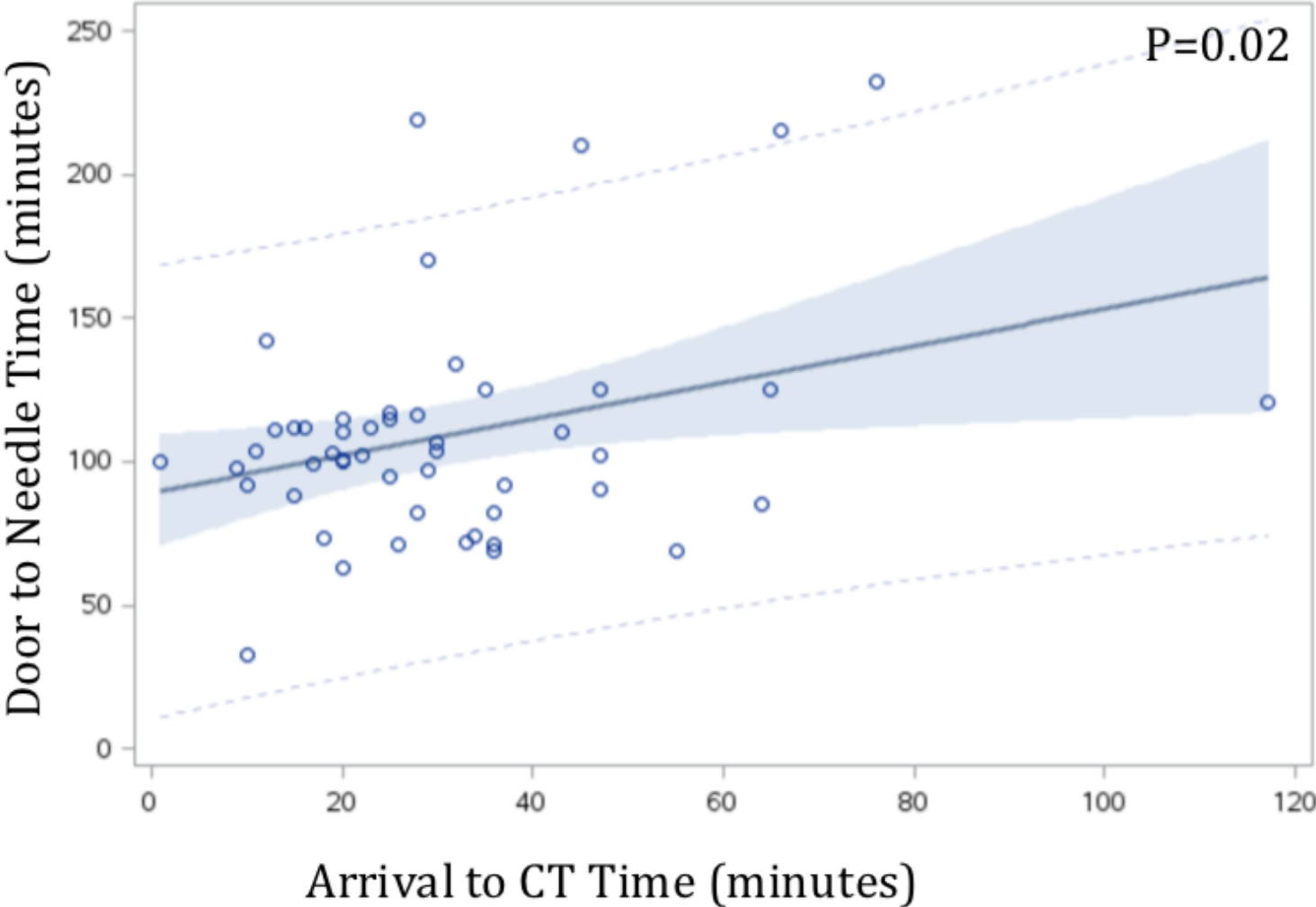
From Figures 1 through 3, it can be seen that there was no correlation between DTN and baseline NIHSS or Age.

However, a statistically significant and clinically important association was outlined between DTN and onset to arrival (OTA) time.

From the data collected, a multivariate regression analysis was then used. In doing so, it was found that there was very strong evidence that OTA had a negative linear correlation with DTN ($F=7.68$, $p<0.01$).

For every 30-minute delay in onset to arrival time, there was a 13-minute decrease in the door to needle time for thrombolysis

DTN versus Arrival to CT Time



RESULTS

From the prior figure, a statistically significant and clinically important association was outlined between DTN and arrival to CT (ACT) time.

From the data collected, a multivariate regression analysis showed that there was strong evidence that ACT had a positive linear correlation with DTN ($F=5.08$, $p=0.02$).

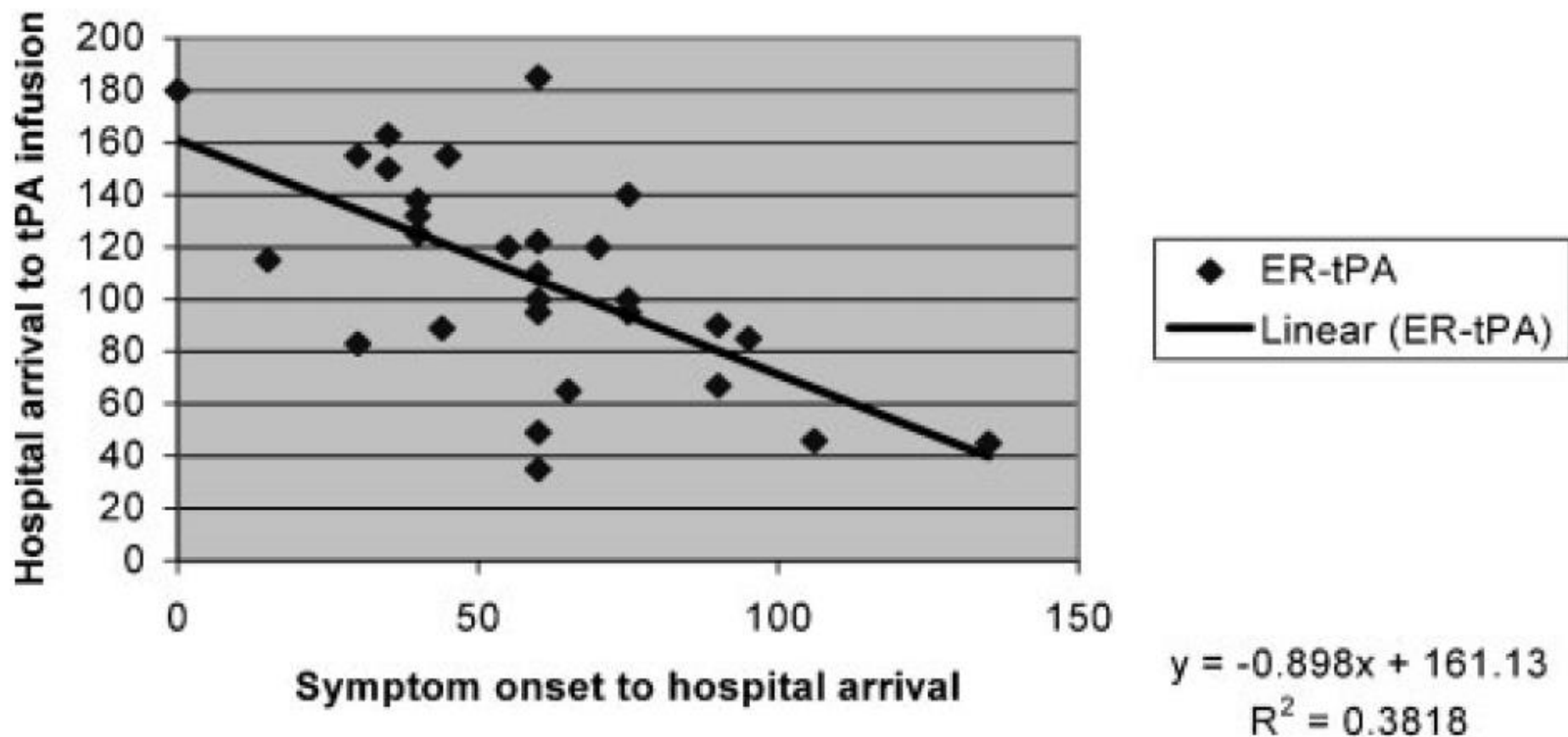
For every 10 minute delay in CT imaging, there was a corresponding 6 minute delay in door to needle time

DISCUSSION

Our results are the first documented evidence of such association between DTN & OAT within Australia but similar results have been noted in other countries.

For example, the STARS study, which was a prospective, multicentre trial involving nearly 400 patients showed that for every 30 minute delay between the onset of stroke and arrival to hospital, there was an associated 15 minute decrease in the time taken to initiation intravenous thrombolysis.

A further study completed in Miami also commented on this paradoxical nature of delay in thrombolysis but was not able to accurately delineate the cause for such.



DISCUSSION

So the question is... why?

One theory was that there was an subjective lack of urgency created by the NIHSS guidelines for a 4.5 hour thrombolysis window.

This meant that that those patients who present earlier, were less urgently managed due to a perception that the decision needed to be made within such window.

FUTURE DIRECTION



CONCLUSIONS

- Paradoxical effect of DNT based on onset to arrival time as determined by both univariate and multivariate analysis.
 - The cause for this remains unclear
 - Similar to previous studies
 - How to best approach this?
- Statistically significant positive association between arrival to CT time which is an expected result.

REFERENCES

1. Froehler, M.T. (2017). Interhospital Transfer Before Thrombectomy Is Associated with Delayed Treatment and Worse Outcomes in the STRATIS Registry. *Circulation*. 136(24).
2. Goyal, M. et al. (2016). Effects on Outcome in Endovascular Treatment of Acute Ischemic stroke: Results from the SWIFT PRIME Randomized Controlled Trial. *Radiology*. 279(3).
3. Romano, J.G., Muller, N., Merino, J.G., Forteza, A.M., Koch, S. and Rabinstein, A.A. (2007). In-hospital delays to stroke thrombolysis: paradoxical effect of early arrival. *Neurological Research*. 29:664-666
4. Robison, T., Zaheer, Z. Mistri, A.K. (2011). Thrombolysis in Acute Ischemic Stroke: An Update. *Therapeutic Advances in Chronic Disease*. 2(2):119-131
5. Hacke, W., Donnan, G., Fieschi, C., Kaste, M., von Kummer, R., Broderick, J.P. (2004). Association of outcome with early stroke treatment: Pooled analysis of ATLANTIS, ECASS and NINDS rt-PA stroke trials. *Lancet*. 363:768-774