DR GRETA ATTARD, DR LUANA FORMOSA

Door-to-Imaging Time for Acute Stroke Patients at the Emergency Department in Mater Dei Hospital

ABSTRACT

Acute stroke requires timely intervention, with guidelines recommending CT imaging within 20 minutes of Emergency Department (ED) arrival. This audit assessed the door-to-CT times for acute stroke patients from January to June 2022. Data from hospital systems showed a mean time of 1 hour and 5 minutes, with only 4.4% meeting the 20-minute target. Delays were attributed to factors like incorrect triage and ED overcrowding. This audit concludes that our ED practice does not meet international standards, necessitating further audits to identify and address these delays to improve stroke patient care.

KEYWORDS

Stroke, Door-to-imaging time, Emergency

INTRODUCTION

Stroke is a leading cause of death and long-term morbidity worldwide. Timely intervention in acute ischemic stroke is critical, with local guidelines calling for intravenous administration of recombinant tissue-type plasminogen activator (rtPA) within 4.5 hours of symptom onset.

Imaging plays a critical role in evaluating patients presenting with symptoms of an acute stroke, prior to treatment initiation. Owing to its speed, accurate depiction of acute intracranial disease, and availability, CT stroke protocol is the first-line imaging modality used in the emergency setting to rapidly diagnose and quantify patients presenting with probable ischemic strokes and to enable appropriate urgent management.[1,2]

Local guidelines dictate that an immediate CT Stroke protocol ('immediate' is interpreted to mean that this should be done immediately upon patient presentation), consisting of a CT Brain and CT Angiography (CTA), for patients presenting within 6 hours of symptom onset is required.

The current NICE Pathway for acute stroke states that immediate brain imaging should be performed for patients presenting with acute strokes fulfilling any one of the following criteria: (i) candidates for thrombolysis or early anticoagulation treatment; (ii) on anticoagulant treatment; (iii) a known bleeding tendency; (iv) a depressed level of consciousness (Glasgow Coma Score (GCS) <13); (v) unexplained progressive or fluctuating symptoms; (vi) papilloedema, neck stiffness or fever; (vii) severe headache at onset of stroke symptoms. The term immediate, with regards to brain imaging, is defined as ideally the next slot but definitely within 1 hour, whichever is sooner. For all patients presenting with acute stroke not fulfilling the above criteria, scanning should be performed as soon as possible and within a maximum of 24 hours from the onset of symptoms.[3]

Of note is the UK's NHS National Stroke Service Model guidance which further narrows down the recommendation i.e. an optimal stroke imaging pathway should have stroke imaging, interpretation and transfer decisions within 20 minutes of the patient's arrival to the ED.[4]

The revised American Heart Association/American Stroke Association (AHA/ASA) guidelines recommend that all patients admitted to hospital with suspected acute stroke should receive brain imaging evaluation on arrival to hospital. Patients who may be candidates for thrombolysis or thrombectomy should also have a brain imaging performed within 20 minutes of arrival in the ED.[5]

AIM

The aims are twofold:

- To calculate the time elapsed between patient registration at the ED and performance of brain CT (door-to-CT time).
- To evaluate whether the 20-minute target was met, as recommended by both the AHA/ASA and the UK's NHS Improvement National Stroke Service Model.

METHOD

This is a retrospective analysis of patients presenting to the ED with symptoms of acute stroke, who fulfilled the criteria for a CT Stroke, between the period of January to June 2022.

The inclusion criteria were that patients had to be above the age of 16 years and presented with acute stroke symptoms, with any one of the following conditions:

i. indications for thrombolysis or early anticoagulation treatment
ii. currently on anticoagulant treatment
iii. known bleeding tendency
iv. depressed level of consciousness (GCS <13)
v. unexplained progressive or fluctuating symptoms
iv. presence of papilloedema, neck stiffness, or fever
vii. severe headache at onset of stroke symptoms.

Data collection involved filtering through the Picture Archiving and Communication System (PACS) and reviewing CT Strokes ordered from the ED to gather patient information. Subsequently, this information was utilized to collect the registration time and Emergency Severity Index (ESI) from Clinical Patient Administration System (CPAS), as well as the time of CT Stroke performance from the iSoft Clinical Manager (iCM) programs at Mater Dei Hospital. Following the data collection, the door-to-CT time (from ED arrival to performance of CT Stroke) was calculated.

RESULTS

Overall, 137 patients had a CT Stroke performed over 6 months at the ED. 65 (47.4%) were female while 72 (52.6%) were male. 21 (15.3%) were registered as ESI 1 (most urgent), 113 (82.5%) as ESI 2, 2 (1.5%) as ESI 3 and 1 (0.7%) patient was registered as ESI 4.

The mean door-to-CT time over the 6 months was 65 minutes whilst the median door-to-CT time was 56 minutes. The shortest door-to-CT time was 7 minutes whilst the longest was 6 hours and 59 minutes. Figure 1 illustrates the door-to-CT time for all patients.

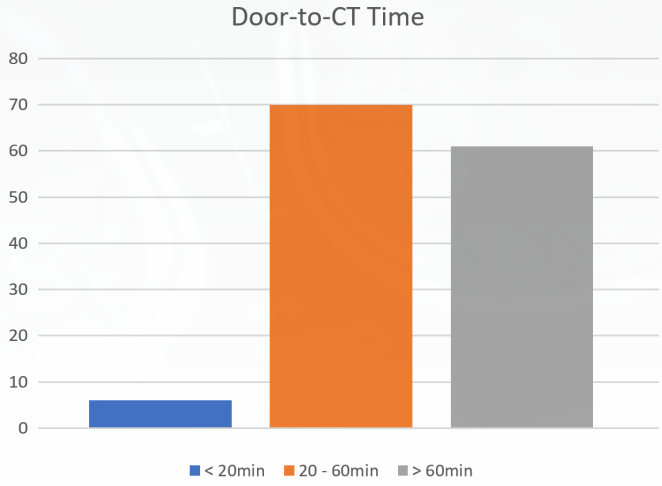
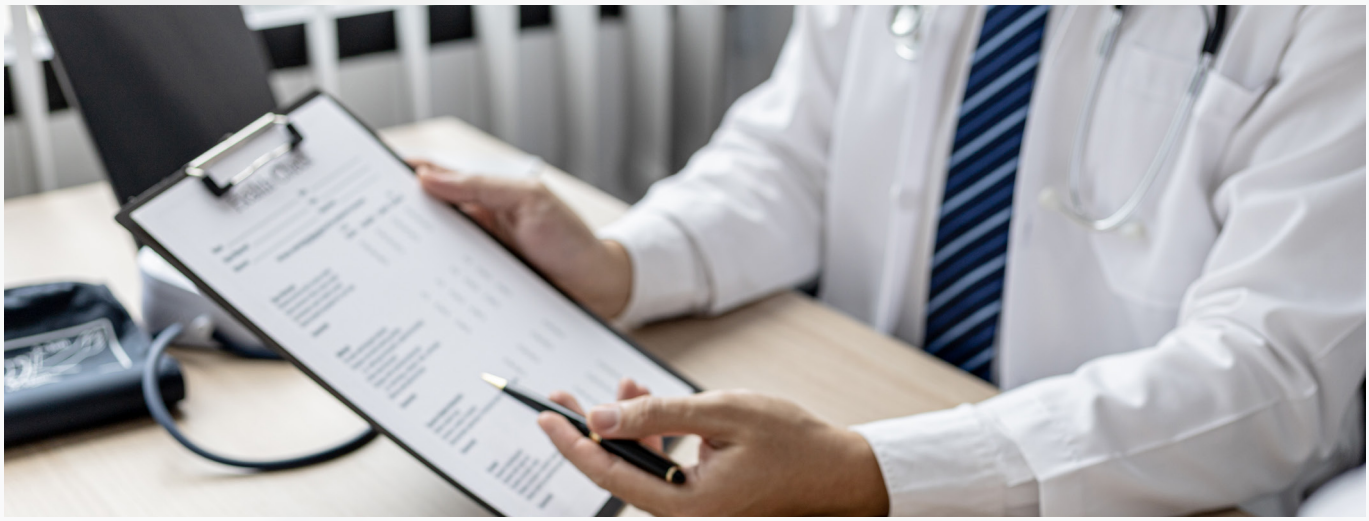


Figure 1. Only 6 patients (4.4%) had a CT performed within 20 mins, whilst 70 patients (51.1%) within 1 hour, and 61 patients (44.5%) over 1 hour.



DISCUSSION

The benefit of both thrombolysis and thrombectomy is highly time-dependent. Providing treatment within the therapeutic window improves the functional outcomes post-stroke.[6,7]

The results obtained show that the ED at Mater Dei Hospital is currently not in-line with international guidelines. Various factors might explain such a delayed CT imaging namely: incorrect triage, ED overcrowding, uncontrolled blood pressure and fluctuating neurological deficit.[8,9] Arriving by own transport can cause delays in the triage process. Patients must first register at the door upon arrival, after which they must wait to be triaged and identified as stroke patients before doctors are notified. Additionally, any uncertainty regarding the onset time of symptoms may lead to uncertainty of the patient's eligibility for intervention, potentially delaying the urgent CT scan.

Previous studies[5,7,10] have shown the effect of different interventions on reducing in-hospital delay for patients with acute ischemic stroke. Interventions shown to reduce such delay include increased healthcare education about recognizing possible stroke symptoms, hospital prenotification by Emergency Medical Services, having an organised 'code stroke' protocol and a specialized stroke team, and the use of a severity stroke scale preferably the NIH Stroke Scale/Score.[4,11,12] Better communication between ED and radiology staff is also recommended in order to prioritise stroke patients and to reduce delays, i.e., if a CT scan for a suspected stroke is anticipated, reserving a time slot in advance can significantly reduce wait times for imaging.[10]

LIMITATIONS AND FURTHER STUDIES

In keeping with the above, a limitation of this audit is the fact that delays due to patient stabilisation prior to CT stroke transfer may have affected door-to-imaging times. Further studies to investigate this, with a view to establish specific protocols, are recommended.

It is also recommended that an analysis of door-to-imaging times in other regions of specific countries is undertaken; this could then be used to track and compare the prognosis of stroke patients.

CONCLUSION

This audit reveals that our current local practice is not in line with international guidelines. Our recommendations are for further audits to be carried out to evaluate the reason for such delays, with a view to reduce precious investigation and treatment time and improve prognosis.

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