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A Comparison of Door-to-Puncture Times in Expedited Management of Acute Ischemic Stroke Patients

Nayan Lamba MD; Alfred P See MD; Priyank Khandelwal MD; Nirav J. Patel MD; Mohammad Ali Aziz-Sultan MD
Department of Neurological Surgery, Brigham and Women's Hospital, Boston, MA, USA

BWH

Introduction

Stroke is the fifth leading cause of death and the leading cause of disability in the United States, killing about 130,000 Americans each year.1,2 When taking into account cost of health care services, medications to treat stroke, and missed days of work, it is estimated that stroke costs the United States $34 billion per year.2 Acute ischemic strokes (AIS) account for the vast majority (85%) of the total number of strokes each year. 3

Numerous randomized-controlled trials have demonstrated that rapid endovascular treatment (EVT), specifically intra-arterial therapy (IA-tPA) combined with traditional IV-rtPA, can improve functional outcomes and reduce mortality in AIS patients over IV-rtPA therapy alone.2 There are several factors that determine clinical outcome in EVT, one of the most prominent of which has been time from last known well (LKW)-to-groin puncture.4,5 Specifically, it has been shown that for each 1-hour increase in stroke onset to revascularization time, odds of good clinical outcome in stroke patients decreased by 38%.4 A different study noted that mean mRS 90 days after revascularization was poorer in patients who presented to the hospital >8 hours after the onset of symptoms.5 These studies underscore the importance of time in achieving good clinical outcomes for AIS patients.

Such differences prompted us to perform the study we describe here. We examined stroke-relevant time differences between AIS patients managed via our traditional workflow in which patients are first taken to the emergency department upon arrival for a CT and then to angiography suite for revascularization, and compared to that to a more direct workflow in which a repeat evaluation in an emergency department room is skipped to either proceed directly to the angiography suite or to CTA scanner. We were especially interested in LKW-to-puncture, DTP, and door-to-revascularization times, as well as mRS at discharge and at >30 days post-operation.

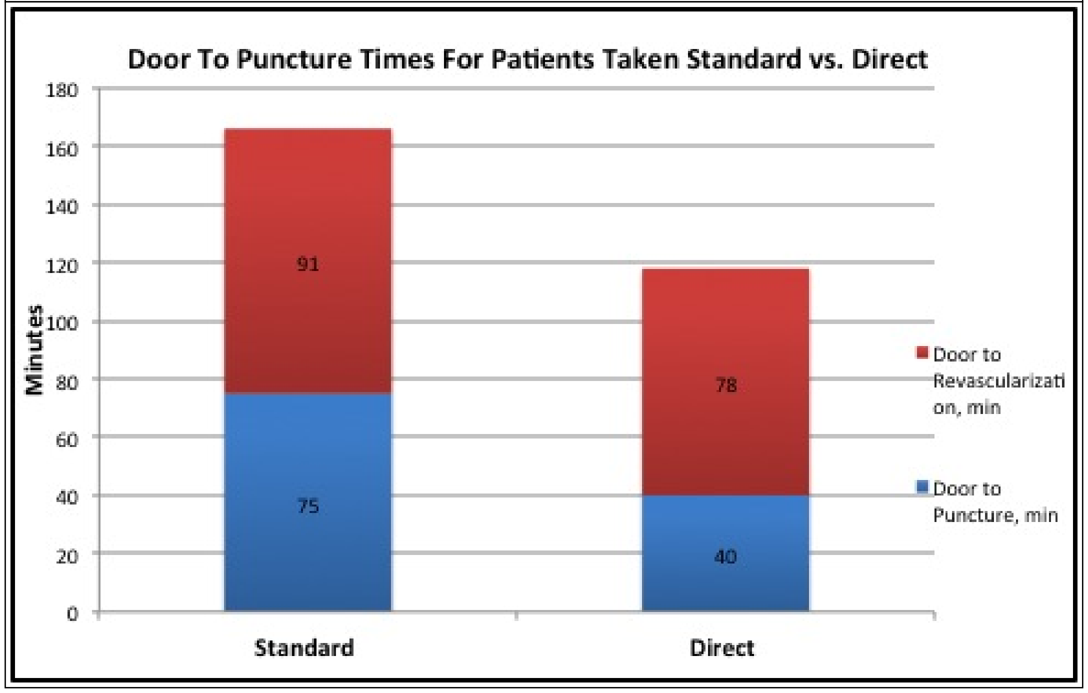
Methods

- Retrospective review of records of patients transferred to Brigham and Woman's Hospital
- Endovascular therapy of acute ischemic stroke
- January 2015 to January 2016
- Compared the existing workflow to either direct transport to the angiography suite or the CT scanner
- Primary outcome: door-to-puncture time
- Secondary outcome: time from door-to-revascularization and modified Rankin score (mRS) at discharge

Results

Table 1. Time Management Information of all patients.

	Overall (N=40)	Transfer standard (N= 26)	Direct (N= 14)	p-value
Door to Room, min (SD)	41.8 [31.4]	54.9 [28.5]	19.6 [22.7]	0.0006*
Last-Known-Well to Puncture, min (SD)	286.3 [77.6]	299.4[63.9]	264.2[95.2]	0.20
Door to Puncture, min (SD)	67.5 [36.7]	83.2 [35.6]	42.9 [22.8]	0.0006*
Door to Revascularization, min (SD)	94.8[42.9]	89.5[33.5]	102.8[42.9]	0.39



*References available upon request.

Conclusions

- Mean door-to-puncture time was 20 versus 55 minutes (p=0.0006) favoring the direct group.
- Differences in workflow were not associated with significantly better revascularization results. Of the 26 standard patients, 3 had a TICI of 2a and 18 had a TICI of 2b or 3. Of the 14 direct patients, 2 had a TICI of 2a and 10 had TICI scores of 2b or 3. The median mRS at discharge for both groups was a score of 4.

We demonstrate that a substantial time difference exists in the treatment of traditional versus direct AIS patients. Transporting stroke patients directly to the angiography suite may result in significant time saving. Theoretically, this may lead to better functional outcomes, which we will continue to evaluate with follow-up and a larger cohort. Understanding the importance of time-to-puncture in clinical outcome for AIS patients may lead to widespread hospital protocol changes in terms of how such patients are managed and how access to care may be optimized. This should be evaluated in larger prospective studies.