

Evaluating Door-to-Needle Time for the Fibrinolytic Treatment of Acute Ischemic Stroke in the Emergency Department of a Canadian Hospital



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Background

- Functional benefits of tissue-plasminogen activator (tPA) for acute ischemic stroke (AIS) are time-dependent
- Every 15-minute reduction in onset-to-treatment time is associated with 4% greater odds of independent ambulation at discharge, discharge to home, and 4% lower odds of symptomatic intracranial hemorrhage
- Guidelines suggest a target median door-to-needle time (DNT) of 30 minutes or less for tPA administration
- At the time of this study acute stroke patients were routinely seen in the Emergency Department (ED) at Surrey Memorial Hospital (SMH), as no stroke bypass process was in place
- Purpose of the study:**
 - To evaluate the efficiency of tPA administration for AIS in the ED at SMH by quantifying the DNT
 - Perform a detailed review of the DNT to help identify any possible barriers to timely tPA administration

Table 1: Patient Characteristics (N = 62)

Variable	n (%)
Median Age, Years (IQR)	74.5 (62 - 82.5)
Male	29 (46.8)
Stroke Risk Factors	
Prior ischemic stroke	14 (22.6)
Hypertension	48 (77.4)
Dyslipidemia	38 (61.3)
Prior myocardial infarction	11 (17.7)
Heart failure	14 (22.6)
Diabetes mellitus	18 (29)
Atrial fibrillation	21 (33.9)
Smoker	13 (21)
Antiplatelet use	24 (38.7)
Anticoagulant use	2 (3.2)
Mode of Arrival to the ED	
Walk-in	5 (8.1)
Emergency Medical Services (EMS)	57 (91.9)
Time of ED Arrival	
Day shift	45 (72.6)
Night shift	17 (27.4)
Weekday	43 (69.4)
Weekend	19 (30.6)
Initial NIHSS Score	
1-4	5 (8.1)
5-15	27 (43.5)
16-20	14 (22.6)
21-42	6 (9.7)
Not documented	10 (16.1)

Table 2: Suspected major bleed ≤ 36 hr post-tPA

Variable	n (%)
Hb decrease > 20 g/L	4* (6.5%)
Received ≥ 2 units of packed RBC	2* (3.2%)
Hemorrhagic transformation on CT report	6 (9.7%)

*1 patient fell into both of these categories

Table 3: Subgroups of Median DNT in minutes

Subgroup (N=62)	Median DNT (IQR)
Initial NIHSS score, (n = 52)	
< 16	99.5 (70.5 - 109)
≥ 16	64.5 (52.3 - 91)
Mode of Arrival to the ED	
Walk-in	96 (78 - 139.5)
EMS	81 (62.5 - 107)
Time of ED arrival	
Day shift	83 (64.5 - 107.5)
Night shift	81 (54 - 107)
Weekday	81 (62 - 105)
Weekend	82 (71 - 109)
Discharge location	
Home	76 (64.75 - 103)
Residential care	107 (58 - 113.5)
Rehab	105 (81 - 134.5)
Another hospital	118.5 (61.8 - 152.8)
Died	67.5 (64.3 - 84.3)
Suspected major bleed	
Yes	80 (56 - 105)
No	86 (64 - 108)

Results

- 11 (17.7%) pts had a suspected major bleed; their median NIHSS score was 20 and 5 (8%) were on an antiplatelet at home
- 56 (90.3%) pts received an accurate weight-based dose of tPA
- 52 (83.9%) pts had a documented NIHSS score (median score = 10)
- Discharge location: 30 (48.4%) home, 5 (8.1%) residential care, 13 (21.0%) rehab facility, 4 (6.5%) another hospital

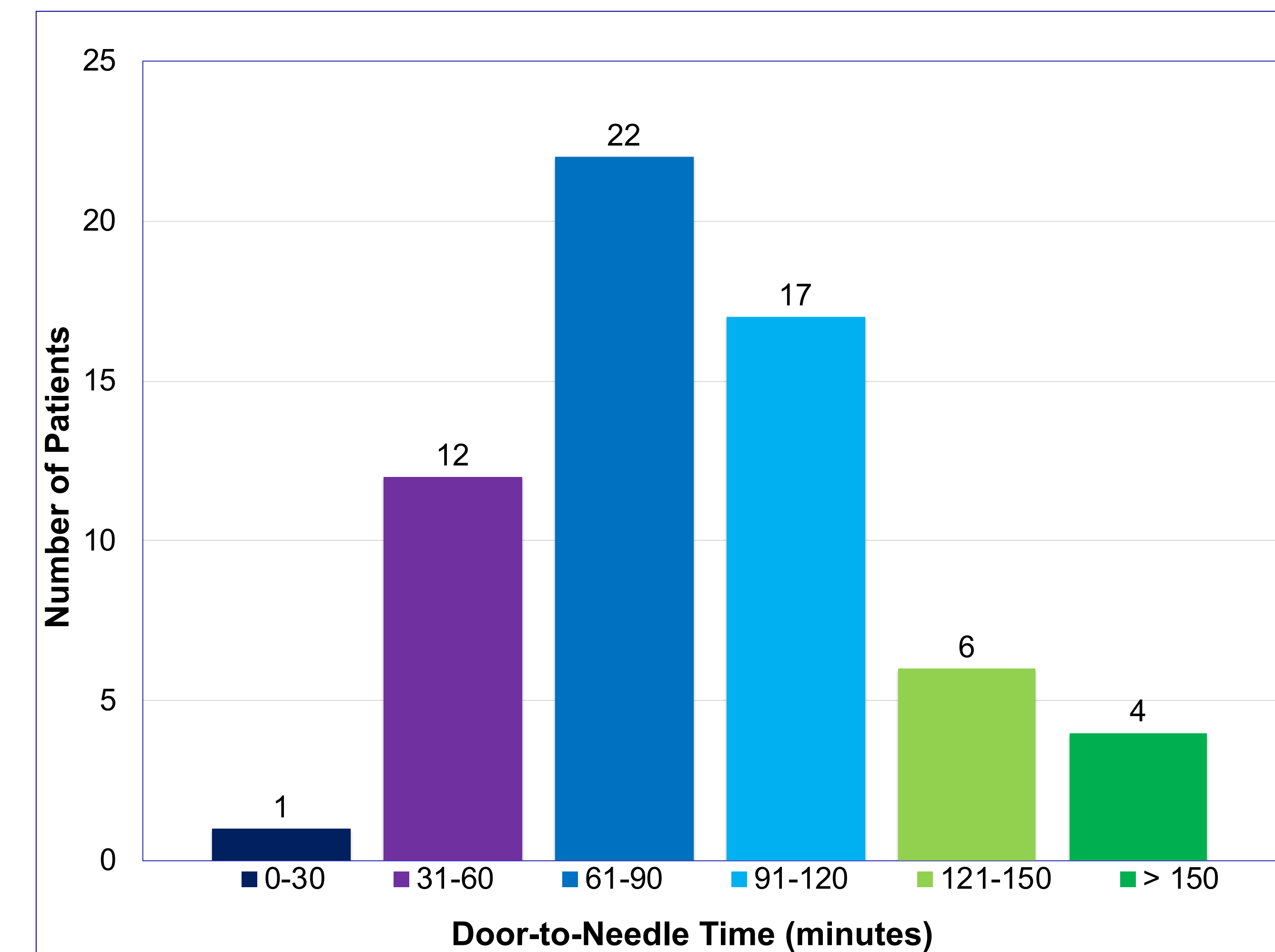


Figure 2: Distribution of DNT within specified timeframes

Limitations

- Unable to determine the exact reasons for prolonged DNT due to the retrospective nature of the study
- Undocumented factors (e.g. inability to determine symptom onset) could have played a role in prolonging DNT in some cases
- Inconsistent documentation of when tPA was ordered
- Suspected major bleeds identified from radiology reports; unable to differentiate between symptomatic vs. asymptomatic hemorrhagic transformation

Conclusions

- The median DNT was greater than the target of 30 minutes. The longest timeframe occurred between the head CT and tPA administration
- Quality improvement initiatives, including early communication between departmental staff, use of patient specific target time sheets, staff education and feedback strategies may help improve efficiency
- Regional stroke bypass process now implemented; follow-up analysis may provide further opportunity for identifying areas of improvement.

Methods

- Study Design:** Retrospective chart review
- Inclusion:** Adults (≥ 18 years) presenting to the SMH ED with AIS and administered tPA from January 1, 2017 to December 31, 2018
- Primary Objectives:**
 - Establish the median DNT (ED arrival to tPA administration time)
 - Determine the number of patients that received tPA within 30 minutes of ED arrival
- Secondary Objectives:**
 - Establish the median triage time, door-to-ED physician time, door-to-computed tomography (CT) time, CT-to-tPA administration time, and tPA order-to-administration time, if available
 - Qualitatively describe differences in characteristics between patients that met the target DNT vs. those that did not
 - Determine the number of patients that experienced a major bleed (Hb decrease > 20 g/L, received ≥ 2 units of packed RBC, or hemorrhagic transformation) within 36 hours of tPA administration
 - Determine the number of patients that received an accurate dose of tPA based on their documented weight
 - Determine the number of patients with a documented National Institutes of Health Stroke Scale (NIHSS) score and the median NIHSS score
 - Determine the number of patients that were discharged to residential care, rehab, another hospital, or directly home
 - Identify possible factors associated with prolonged DNT

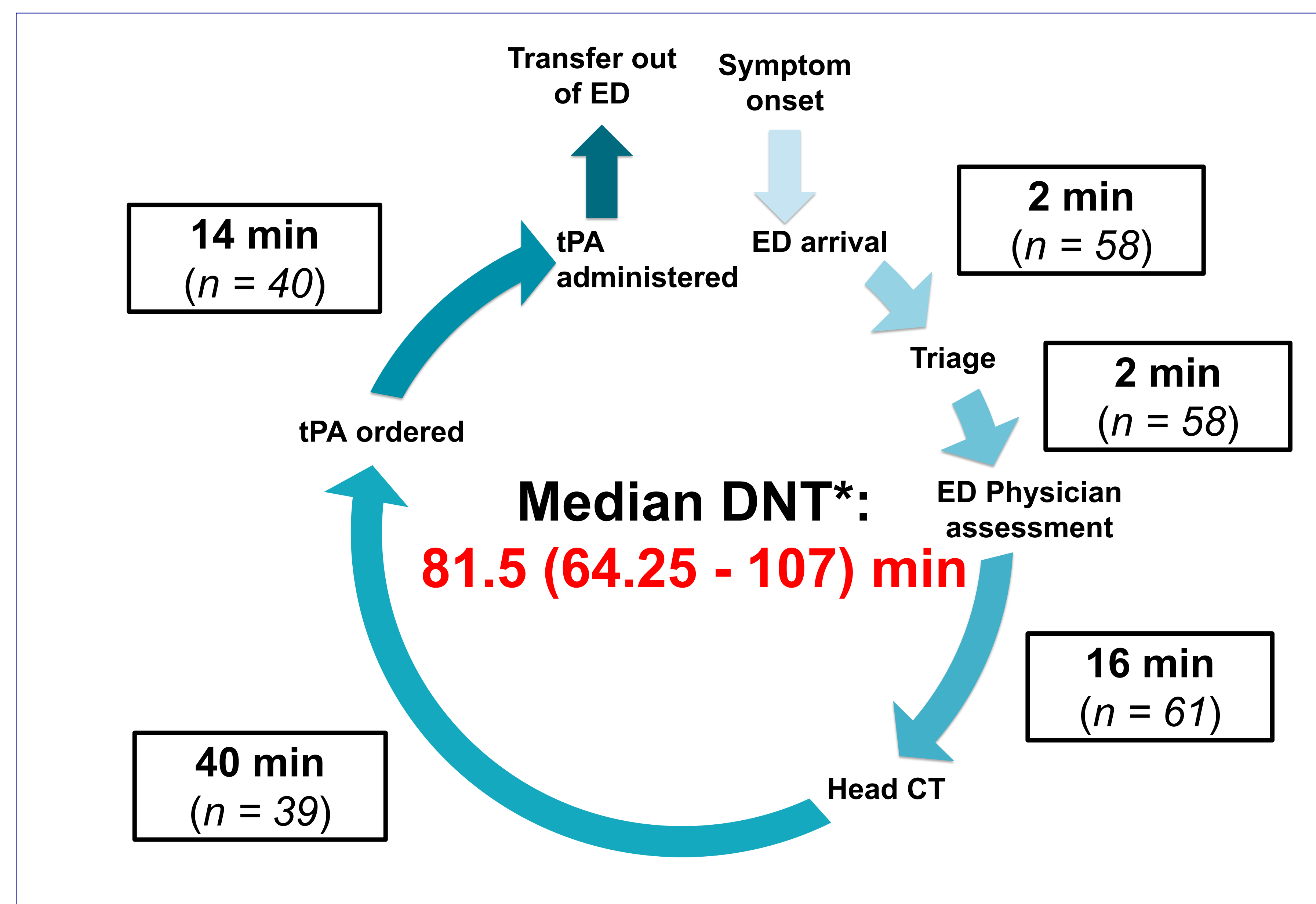


Figure 1: Median DNT with the individual time components from ED arrival to tPA administration
Individual median times do not add up to the median DNT as some patients didn't have documented times for the individual components
*DNT expressed as median (IQR), minutes