Significant Reduction in Prehospital Evaluation and Door-to-Treatment Times with a Mobile Stroke Unit

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Background

The University of Colorado Mobile Stroke Unit (UC MSU) provides ambulance-mounted CT scanning and tele-stroke neurologic assessment in the Denver, CO, metropolitan area. As one of the first U.S. medical centers to utilize a mobile stroke protocol we sought to compare operational characteristics of the MSU during its first year with standard management (SM) of prehospital stroke alerts at a Comprehensive Stroke Center.

Methods

The study compared patient and stroke characteristics, ambulance response, neurologic evaluation, and treatment between the MSU, and SM patients for the same ambulance service area. Variables included time from stroke alert (MSU or ambulance dispatch) to tPA administration, as well as time from arrival at the door of MSU or ED to first brain CT and to IV tPA administration. Patients were dichotomized into those with time from door to needle greater and less than the American Stroke Association "Target" study goal of 45 minutes.

Figure 1. Median times to administration of tPA

Source Other Hospital Centers: Neurology, 2017;88:1305-1312

Results

Between Jan. 15, 2016 and Jan. 9, 2017, 47 patients received prehospital management with the UC MSU, and 73 received standard management. Median age was 66 years (IQR 57-77), and 45% were female, with no difference between MSU and SM patients. Thirteen (28%) of patients were treated with IV tPA on the MSU, compared with 16 (22%) through SM. Median time was significantly shorter from door to first CT on the MSU than SM [4 minutes (IQR 4-5) MSU vs. 9 minutes (IQR 6-15) SM, p<0.001]. Median time from dispatch to IV tPA administration was shorter on the MSU [39 minutes (IQR 35-45) MSU vs. 65 minutes (IQR 49-96) SM, p<0.001], and for door to IV tPA [26 minutes (IQR 20-29) MSU vs. 37 minutes (IQR 24-65) SM, p=0.022]. MSU patients were more likely to have door-to-needle times meeting the ASA goal of <45 minutes [13 (100%) MSU vs. 11 (69%) SM, p=0.048].

Table 1. Patient Characteristics

Patient Characteristics	All Patients (N=120)	MSU (n=47)	Standard Management (n=73)	P	OR	95% CI
Age (years at stroke onset)	66.0 ±14.7	64.5 ± 15.8	66.9 ± 14.0	NS		
Sex (female)	54 (45)	23 (49)	31 (42)	NS	1.298	0.622, 2.712
Race						
White	71 (59)	30 (64)	41 (56)	NS		
Black	29 (24)	10 (21)	19 (26)			
Asian/Pacific Islander	2 (2)	0 (0)	2 (3)			
Native American	0 (0)	0 (0)	0 (0)			
Hispanic	10 (8)	5 (11)	5 (7)			
Other/Unknown	6 (5)	2 (4)	4 (5)			

Table 2. Operational Characteristics of Patients Administered tPA

Operational Characteristics	All Patients (N=29)	MSU (n=13)	Standard Management (n=16)*	P
Response times (minutes)				
Dispatch to door[†]	22 (4-59)	6 (5-7)	29 (25-39)	<0.001
Dispatch to tPA bolus	47 (39-71)	39 (35-45)	65 (50-95)	<0.001
Door to first CT	6 (4-10)	4 (4-5)	9 (6-15)	<0.001
Door to tPA bolus	29 (23-38)	26 (20-29)	37 (24-65)	0.022
Door to tPA bolus <45 minutes	24 (83)	13 (100)	11 (69)	0.027

Data are median (IQR), N (%)

*For standard management patients with full operational data.

[†]For MSU, Door is arrival on scene. For standard management door is arrival at ED.
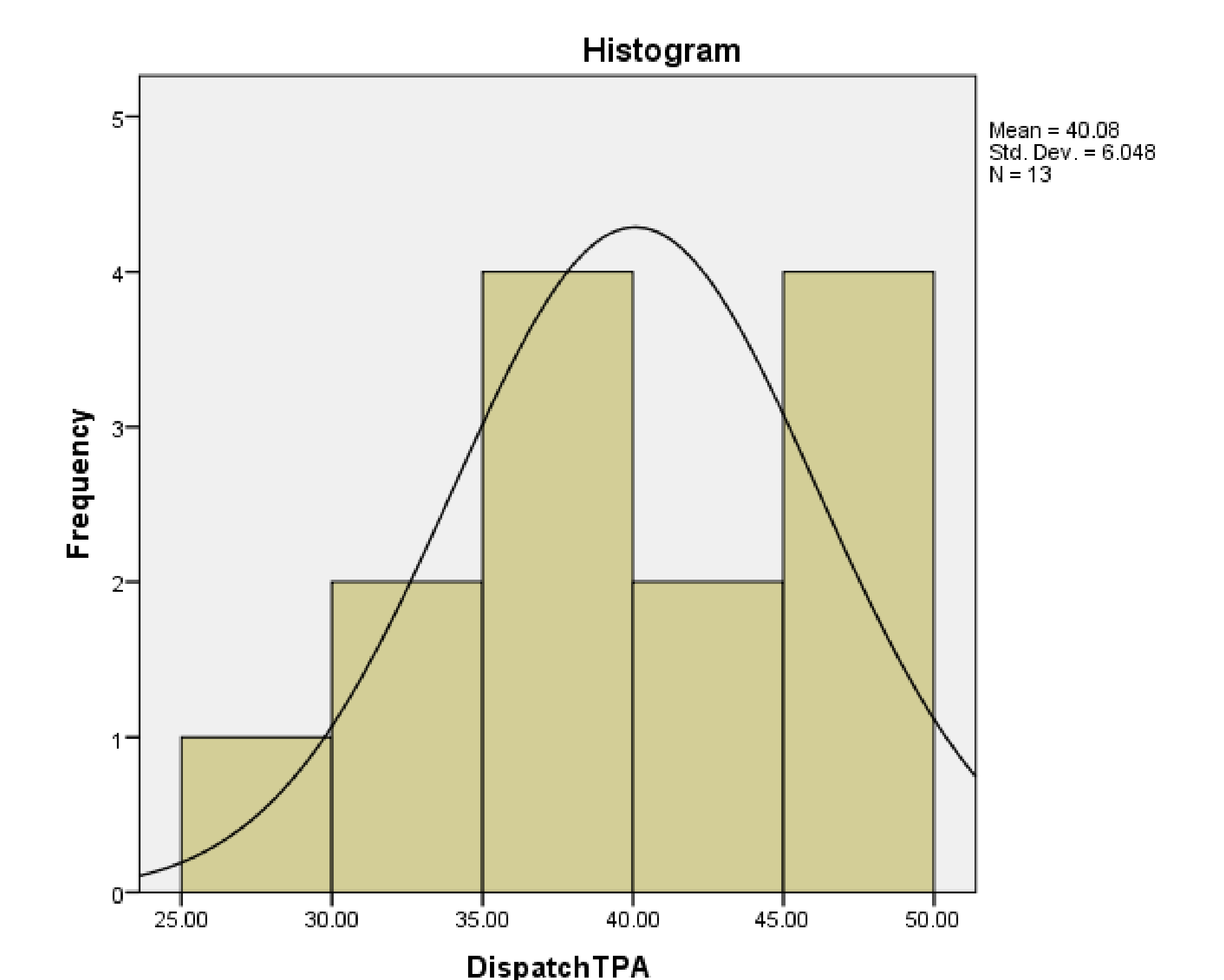
Figure 2. Time from dispatch to tPA (MSU)

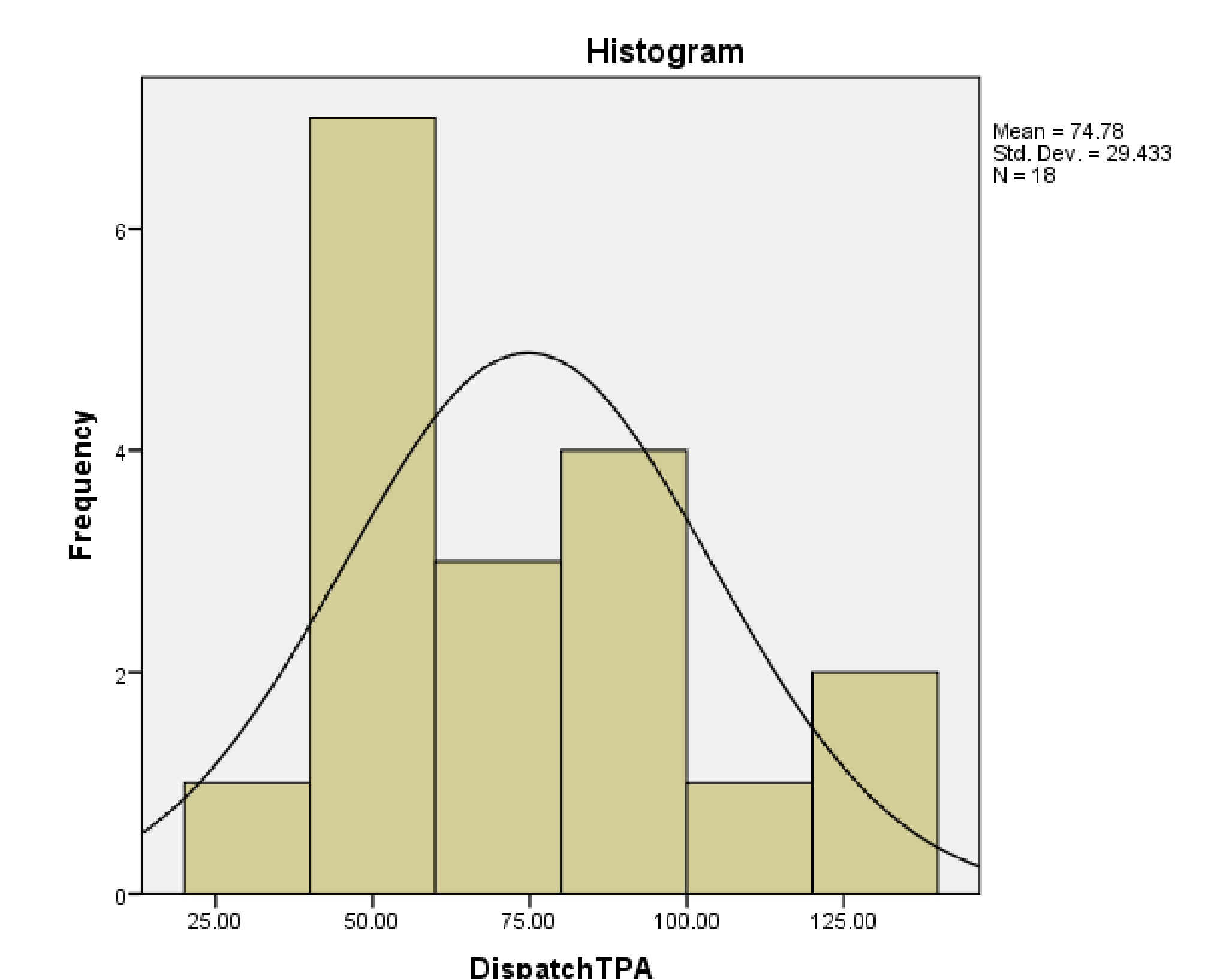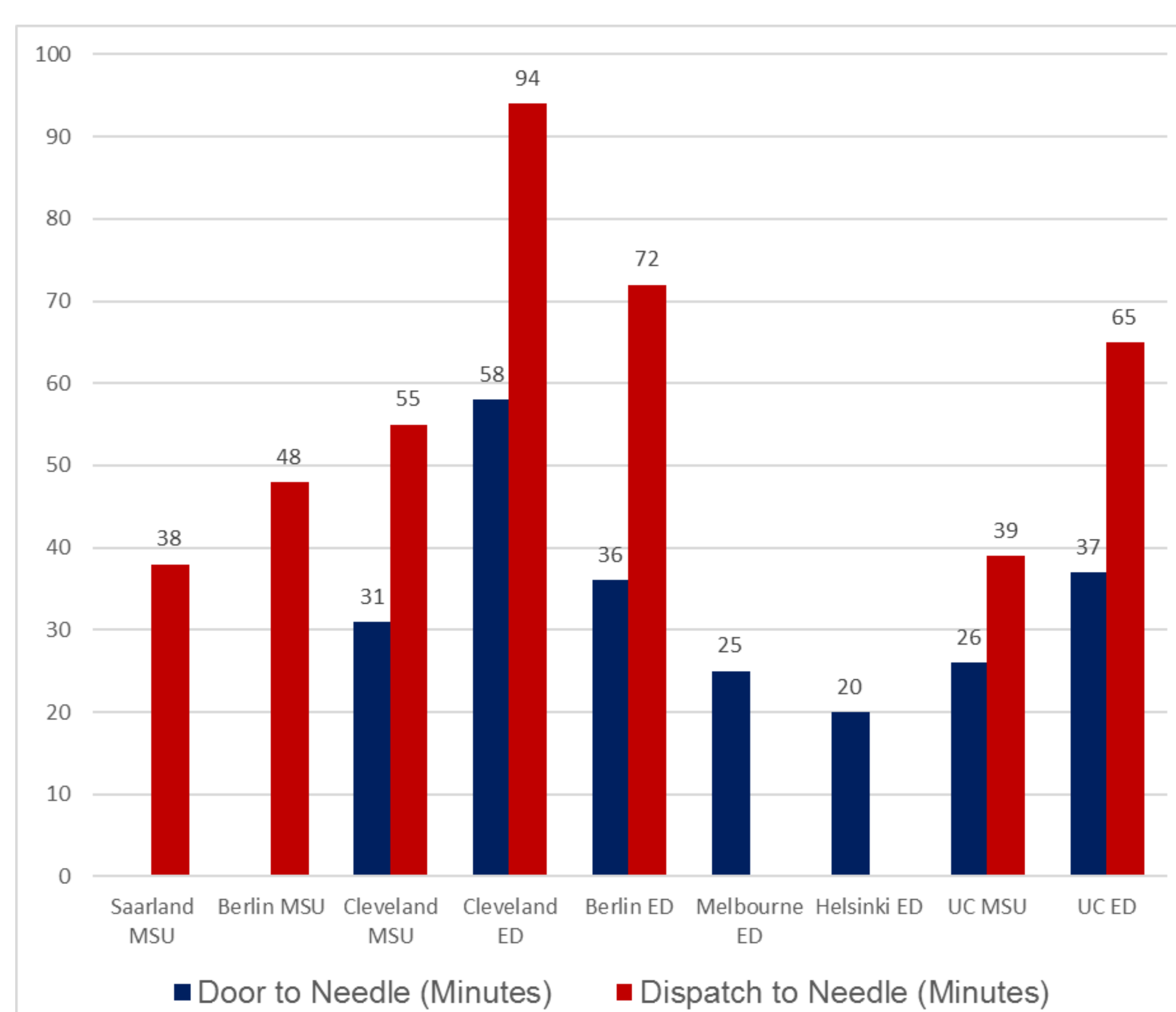
Figure 3. Time from dispatch to tPA (ED)

Conclusions

Patients treated via the MSU benefited from quicker time to CT, neurologic evaluation, and, critically, significantly shorter time from dispatch to tPA administration, compared with pre-hospital stroke alerts arriving from the same service area. These results suggest prehospital management with an MSU has potential to aid the goal of earlier thrombolysis after ischemic stroke symptom onset.