

Outcomes of patients with pre-existing disability managed by mobile stroke units: A sub-analysis of the BEST-MSU study

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Bianca O Pirlog¹ , Asha P Jacob², Suja S Rajan³, Jose-Miguel Yamal⁴, Stephanie A Parker² , Mengxi Wang⁴, Ritvij Bowry⁵, Alexandra Czap², Patti L Bratina², Michael O Gonzalez⁴, Noopur Singh⁴ , Jinhao Zou⁶, Nicole R Gonzales⁷, William J Jones⁷ , Anne W Alexandrov⁸, Andrei V Alexandrov⁸, Babak B Navi⁹ , May Nour¹⁰, Ilana Spokoiny¹¹ , Jason Mackey¹², Kelly Silnes¹³ , Matthew E Fink⁹, Carla Pizarro Sherman⁹, Josh Willey¹⁴, Jeffrey L Saver¹⁰ , Joey English¹¹, Nobl Barazangi¹¹, David Ornelas⁷, Jay Volpi¹⁵, Chethan PV Rao¹⁶, Laura Griffin¹⁷, David Persse¹⁸ and James C Grotta¹⁹

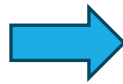
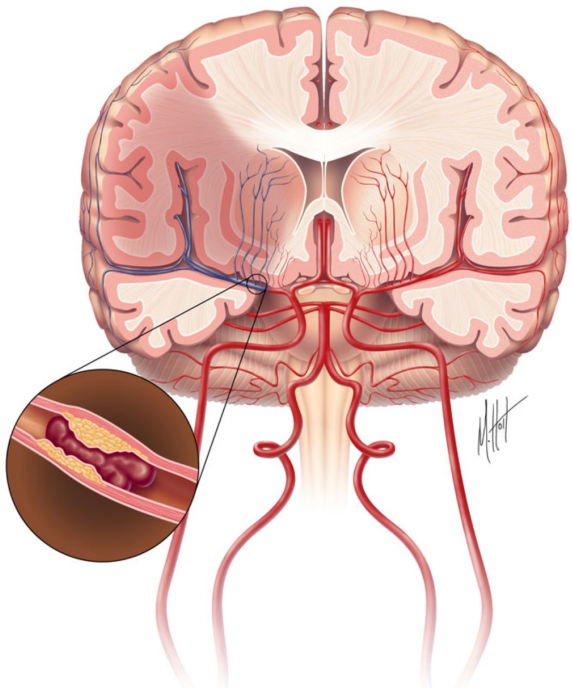
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INTRODUCTION





- Acute ischemic stroke (AIS) is an important cause of disability worldwide
- There are few data on acute stroke treatment in patients with pre-existing disability (PD) since they are usually excluded from clinical trials
- We aimed to describe the baseline demographics, tissue plasminogen activator (tPA) treatment metrics, and outcomes in AIS patients with versus without pre-existing disability
- We sought to compare the outcomes of mobile stroke unit (MSU) versus standard management by emergency medical services (EMS) for tPA-eligible patients with PD

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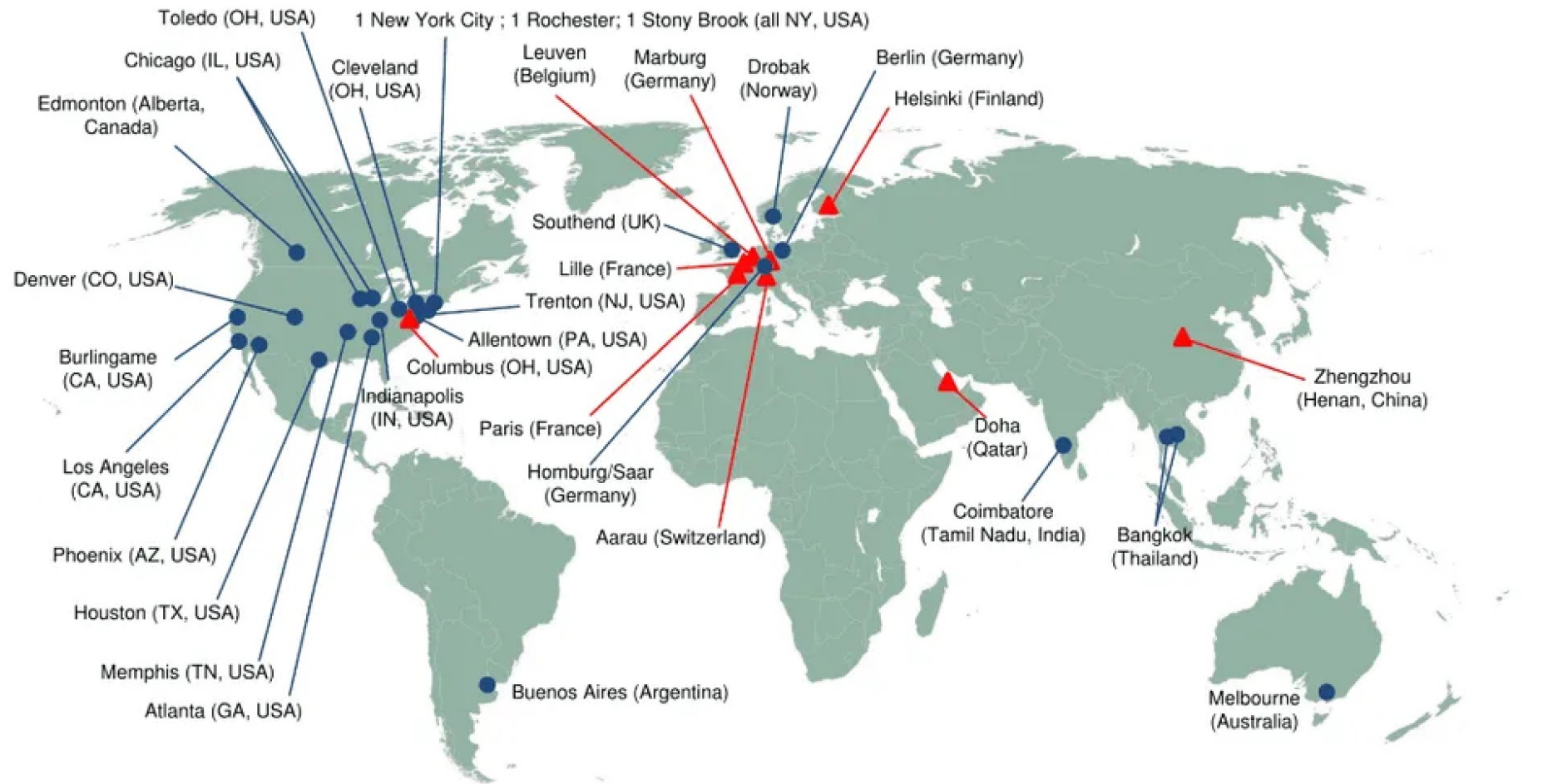
tissue plasminogen activator (tPA)

Endovascular treatment





MOBILE STROKE UNIT



- sites with active mobile stroke units
- ▲ sites with projects in planning or implementation state

Lesmeister/Fassbender 2018

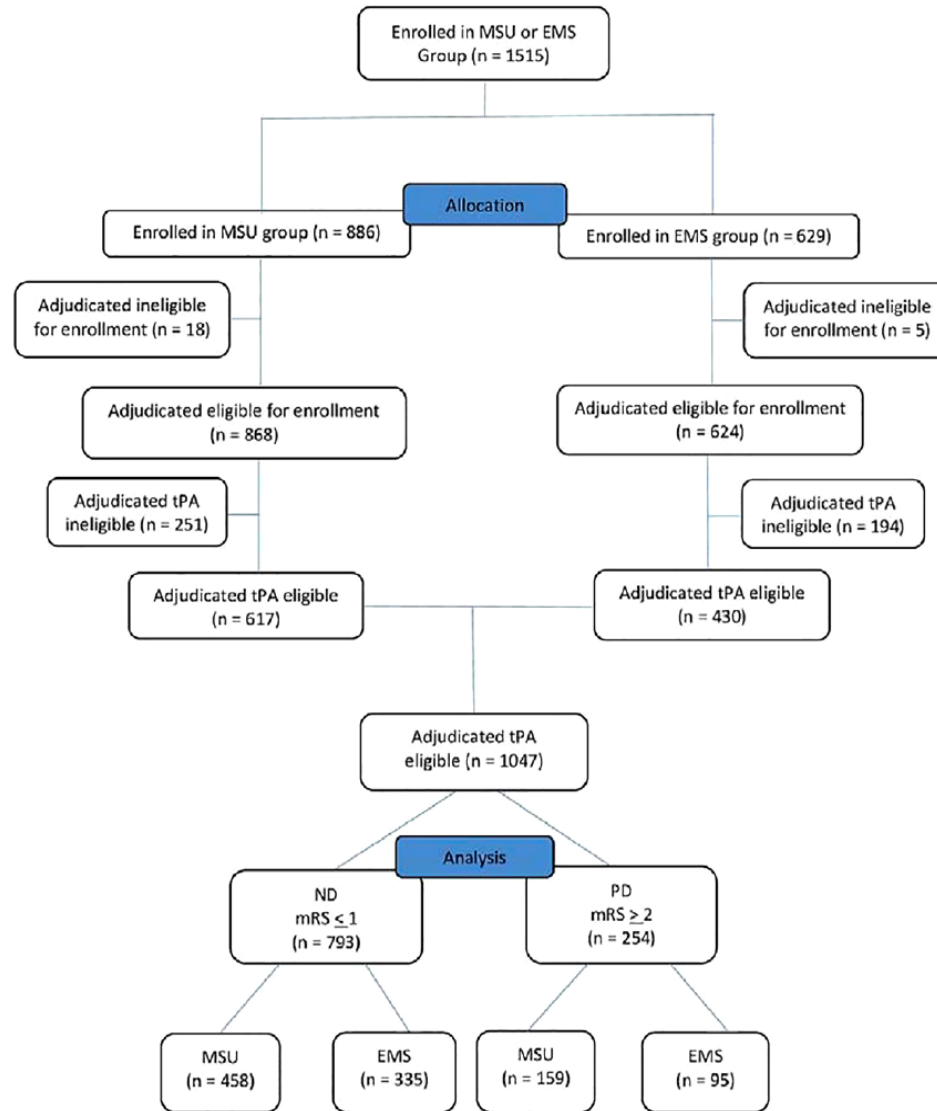
METHODS

- BEST –MSU study was an observational, prospective, multicentred, cluster-randomized trial comparing clinical outcomes in tPA-eligible patients who received care by a MSU EMS
- Sub-analysis comparing the tPA eligible ND vs PD patients
 - ND if the pre-stroke mRS was 0–1
 - PD if mRS ≥ 2 (mRS = 2: slightly disabled, mRS = 3: moderately disabled, and mRS = 4–5: severely disabled)
- All patients had a baseline mRS
- Linear and logistic regression models compared outcomes in patients with vs without PD, and patients with PD treated by MSU vs EMS

METHODS

- **Primary outcome:** utility-weighted mRS (uw-mRS) at 90 days and return to at least baseline mRS at 90 days
- **Safety end points :** symptomatic intracerebral hemorrhages (sICHs), stroke mimics, and mortality
- Time metrics, safety, quality of life, and health-care utilization were also compared between groups.

Figure 1. Consort diagram of all patients. MSU: mobile stroke unit; EMS: emergency medical services; tPA: tissue plasminogen activator; PD: pre-existing disability; ND: no pre-existing disability; mRS: modified Rankin Scale.



RESULTS

Table 1. Comparison of baseline characteristics between PD (mKS 2–5) versus ND (mKS 0–1) tPA-eligible patients.

N	PD	ND	p-Value
	254	793	
Age, median (IQR)	81 (69, 88)	64 (53, 73)	<0.001
Male sex, n (%)	103 (40.6)	414 (52.2)	0.002
Ethnicity, n (%)			0.012
Hispanic or Latino	29 (11.4)	148 (18.7)	
Not Hispanic/Latino	220 (86.6)	641 (80.8)	
Not reported	5 (2.0)	4 (0.5)	
Race, n (%)			0.404
American Indian or Alaska Native	2 (0.8)	3 (0.4)	
Asian	7 (2.8)	37 (4.7)	
Black or African American	99 (39.0)	314 (39.6)	
Native Hawaiian or other Pacific Islander	0 (0.0)	5 (0.6)	
White	141 (55.5)	421 (53.1)	
Not reported	3 (1.2)	7 (0.9)	
Unknown	2 (0.8)	6 (0.8)	
Baseline NIHSS, median (IQR)	11.5 (7, 18.8)	8 (5, 15)	<0.001
NIHSS, n (%)			<0.001
0–5	40 (15.7)	221 (27.9)	
6–12	95 (37.4)	331 (41.7)	
13+	119 (46.9)	241 (30.4)	
Previous transient ischemic attack, n (%)	108 (42.5)	214 (27)	<0.001
Pre-stroke mRS, n (%)			<0.001
0	0 (0)	667 (84.1)	
1	0 (0)	126 (15.9)	
2	78 (30.7)	0 (0)	
3	132 (52.0)	0 (0)	
4	43 (16.9)	0 (0)	
5	1 (0.4)	0 (0)	
Pre-stroke uw-mRS, median (IQR)	0.65 (0.65, 0.74)	1 (1, 1)	<0.001
Comorbidities, n (%)			
Hypertension	207 (81.5)	607 (76.5)	0.118
Atrial fibrillation	70 (27.6)	140 (17.7)	0.001

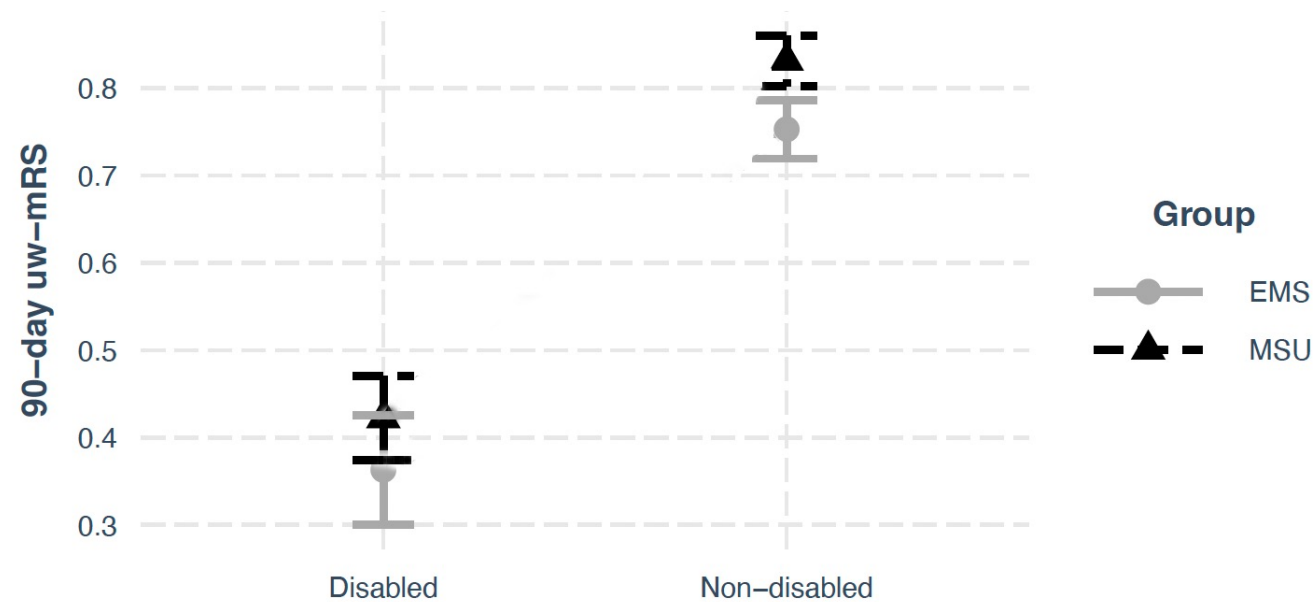
RESULTS

Table I. (Continued)

N	PD	ND	p-Value
	254	793	
Diabetes	89 (35.0)	255 (32.2)	0.44
Neuropsychiatric disease	59 (23.2)	57 (7.2)	<0.001
EVT, n (%)	43 (16.9)	219 (27.6)	<0.001
Living location, n (%)			<0.001
Assisted living Facility	26 (10.2)	3 (0.4)	
Home/local Community	201 (79.1)	780 (98.4)	
Nursing home	8 (3.1)	0 (0)	
Rehabilitation facility	0 (0)	1 (0.1)	
Retirement center	3 (1.2)	8 (1)	
Skilled nursing Facility	15 (5.9)	1 (0.1)	
Unknown/missing	1 (0.4)	0 (0)	
Average care hours per week, median (IQR)	3 (0, 32.5)	0 (0, 0)	<0.001
Time (min) from LKW to tPA bolus, median (IQR)	89 (66, 135)	85 (62, 124)	0.05
Time (min) from ED arrival to tPA bolus, median (IQR)	39.0 (28.5, 53)	40.0 (29, 50)	0.85
Time (min) from ED arrival to EVT, median (IQR)	74.0 (50, 99)	62.5 (44.3, 89)	0.19
Site, n (%)			0.17
Houston	197 (77.6)	610 (76.9)	
Colorado	19 (7.5)	81 (10.2)	
Indianapolis	5 (2.0)	8 (1.0)	
Memphis	15 (5.9)	39 (4.9)	
New York City	3 (1.2)	25 (3.2)	
Burlingame	8 (3.1)	14 (1.8)	
Los Angeles	7 (2.8)	16 (2.0)	

mRS, modified Rankin Scale; uw-mRS, utility-weighted modified Rankin Scale; PD, pre-existing disability; ND, no pre-existing disability; EVT, endovascular therapy; LKW, last known well; ED, emergency department; IQR, interquartile range; tPA, tissue plasminogen activator; NIHSS, National Institutes of Health Stroke Scale.

RESULTS

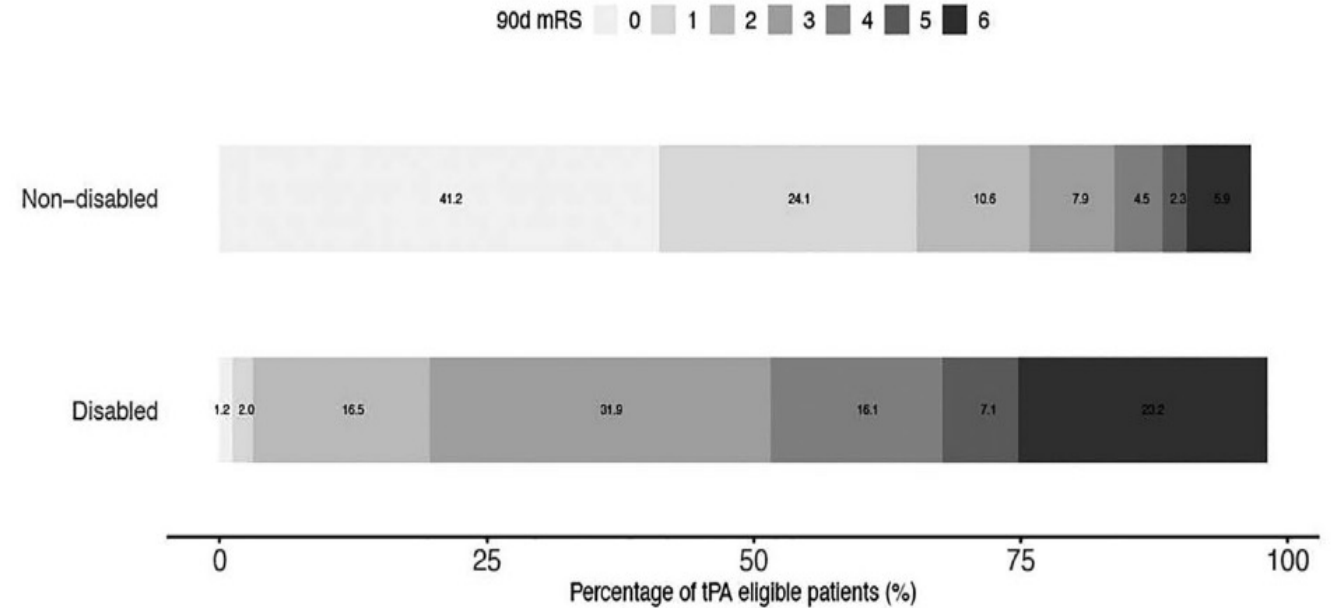


Comparison of 90-day uw-mRS between MSU and EMS patients in both PD and ND groups by baseline disability.

RESULTS

- Return to baseline - PD group 53% vs to 48% in the ND group

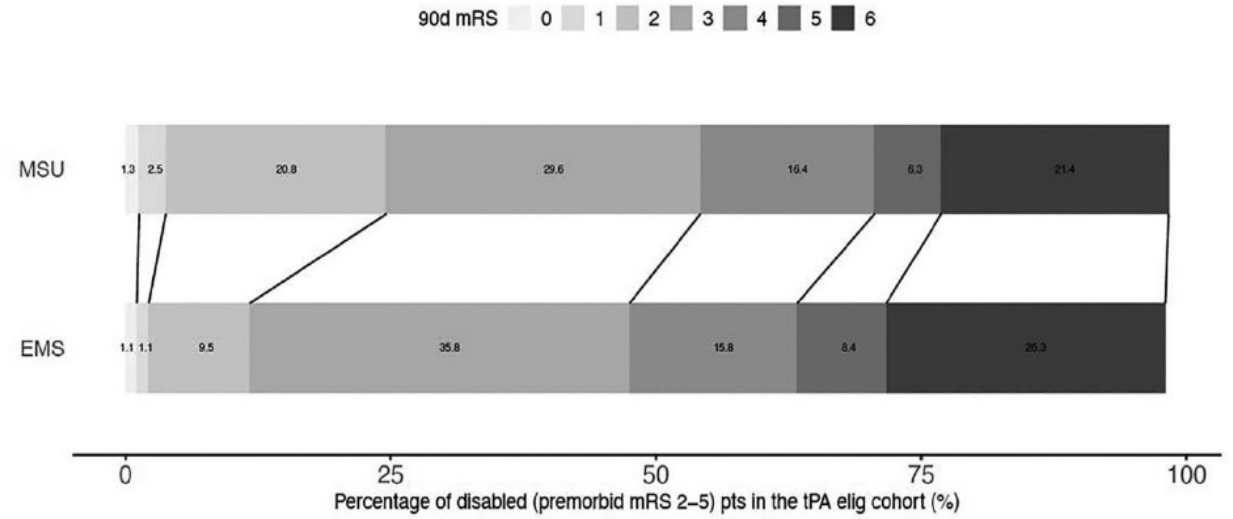
Figure 2. Distribution of 90-day mRS for PD (disabled) and ND (non-disabled) tPA-eligible patients.



RESULTS

- Return to baseline - 57%
In the MSU group versus
46% in the EMS group.

Figure 3. Distribution of 90-day mRS for PD (disabled) tPA-eligible patients in the mobile stroke unit and emergency medical services groups.



RESULTS

- Rates of sICH and final diagnoses of stroke mimics were similar between groups.
- Patients with PD treated within the first “golden hour” had better 90-day uw-mRS than those treated later (0.49 vs 0.38, $p=0.06$).
- Comparing patients with PD treated by MSU vs EMS, time from last-known-well to tPA bolus was shorter (82 vs 111 min), and 23% vs 0% were treated in the first hour.
- MSU patients with PD had non-significantly better 90-day uw-mRS (0.42 vs 0.36, $p=0.07$) and higher rate of returning to baseline mRS (57% vs 46%) than EMS patients with PD.
- There was no interaction between either time to treatment ($p=0.18$) or MSU vs EMS group assignment ($p=0.67$), 90-day uw-mRS, and PD vs no disability status.

DISCUSSIONS

- Our study is one of the largest prospective analyses of patients with disability who qualify for acute stroke treatment.
- Patients with PD have predictably worse outcomes than ND patients, however their disability does not interact with the benefits of faster treatment on a MSU on reducing further disability at 90 days
- Patients with PD also received slower thrombolysis, even among those managed on the MSU, and slower and less frequent EVT compared to ND patients, indicating potential areas for quality improvement
- Almost one-third of our patients with PD were dead or bed-/ wheelchair-bound (mRS 5 or 6) at 90 days. However, 53% of PD patients returned to at least their baseline level of mRS by 90 days.
- We found no increased risk of bleeding complications from thrombolysis with tPA, similar to previous studies

STUDY LIMITATIONS

- small number of PD patients in the EMS group (95) which reduced our power to detect group differences in outcomes
- the population included was diverse, but only represents urban dwellers, and was dominated by patients enrolled at the Houston site and may not be generalizable to rural or more medically underserved regions
- the study was not originally powered to evaluate the interaction between MSU and disability status.

CONCLUSION

Although overall outcomes in patients with PD are less favorable than in those with ND, our data show that benefits of more timely treatment by MSUs compared to EMS were similar across the PD and ND groups. Hence, this study supports continued efforts to provide PD patients with the fastest acute stroke treatment possible.

THANK YOU!

