Racial and Accessibility Disparities with Mechanical Thrombectomy Usage for Acute Ischemic Stroke
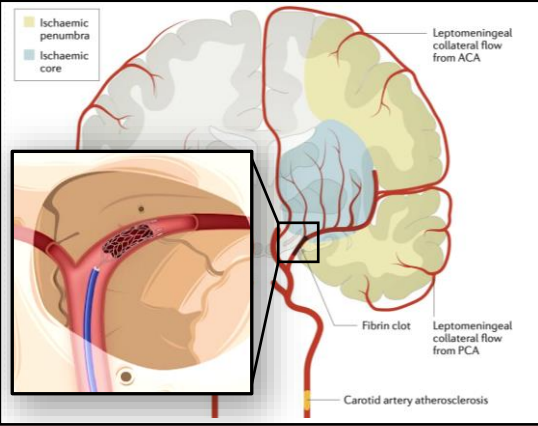
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Background

Recent studies describe racial and socioeconomic (SES) disparities with mechanical thrombectomy (MT) for acute ischemic stroke (AIS). Our study investigated whether such disparities are present at our institution and surrounding region.
MT is the "gold standard" treatment for AIS. AIS comprises more than 80% of cases of stroke (another major category of stroke includes hemorrhagic). IUH Methodist sees patients transferred over from a variety of counties within the entire state of Indiana.

Methods

A retrospective cohort study of 456 patients was conducted at a single institution between January 1, 2017 to August 29, 2019. Patients were grouped based based on racial status. We compared demographics, clinical presentation, treatment characteristics, and outcomes. We utilized univariate analysis and multivariate logistical regression to adjust for confounders and effect modifiers, repspectively.

Transportation methods
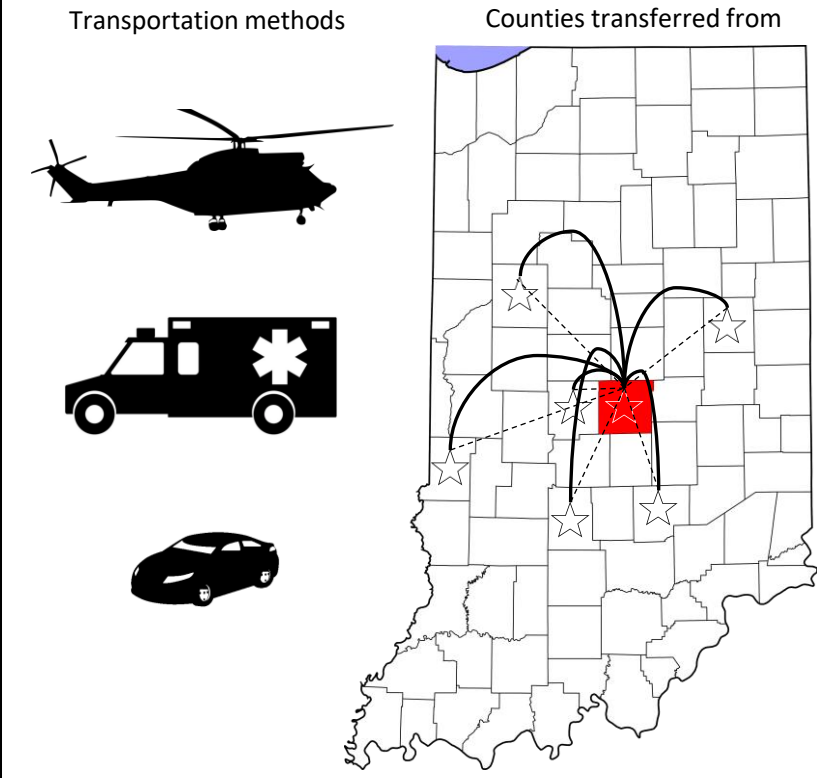
Counties transferred from

Figure 1. A detailed representation of which counties with 20+ patients were transferred from to IUH Methodist, located in Marion County. From the total 62 non-White patients, 21 were transferred from an outside hospital (OSH), indicating that most non-White patients were from Marion county. Contrastingly, 318 of the 394 White patients were transferred from an outside hospital, indicating that most of the White treated patients came from elsewhere. Interestingly, there were only three non-White patients that were transported by helicopter compared to 170 White patients. While racial status was not implicated in the difference between outcomes, transfer status was, and this may be an area of future research.

Results

From a total of 456 patients, the racial status of **394 patients was reported as White** and **62 patients as non-White**. All patients were diagnosed with AIS and underwent MT. Key findings are summarized below:
- The racial disparity in stroke-onset-to-arrival time (p = 0.03) and arrival-to-puncture time (p < 0.0001) was resolved after adjusting for transfer status.
- In multivariate analysis, shorter times for stroke-onset-to-arrival (p < 0.001), arrival-to-puncture (p = 0.03), and puncture-to-recanalization (p = 0.004) along with Thrombolysis in Cerebral Infarction scores 2b-3 (p = 0.03), younger age (0.009), and female sex (0.002) increased the likelihood of "good" neurological outcomes.
- Diabetes mellitus (OR 0.45 CI 0.25-0.79, p= 0.006) and higher NIHSS admission scores (p = 0.02) decreased this likelihood. Stroke-onset-to-arrival time was an effect modifier of transfer status.

Table 1. Hierarchical binomial logistic regression model for a "good" neurological outcome (mRS of 0-2)

Variable	Before Addition of Effect Modifier		After Addition of Effect Modifier	
	OR (95% CI)	p Value	OR (95% CI)	p Value
Age, per yr	0.97 (0.95-0.99)	0.007	0.97 (0.95-0.99)	0.009
Race, non-White as reference	1.97 (0.88-4.45)	0.10	1.78 (0.77-4.11)	0.18
Female sex	2.03 (1.23-3.33)	0.005	2.24 (1.33-3.75)	0.002
HTN	0.89 (0.48-1.64)	0.702	0.87 (0.467-1.64)	0.674
DM	0.45 (0.26-0.80)	0.006	0.45 (0.25-0.79)	0.006
AFib	0.88 (0.51-1.52)	0.65	0.86 (0.50-1.50)	0.60
Distance, mi	1.00 (0.99-1.01)	0.89	1.00 (0.99-1.01)	0.92
Transferred from OSH	0.46 (0.21-1.00)	0.051	0.68 (0.30-1.55)	0.357
Admission NIHSS score, per unit		0.04		0.02
Arrival-to-puncture, mins	0.992 (0.986-0.998)	0.01	0.993 (0.987-0.999)	0.03
Puncture-to-recanalization, mins	0.988 (0.979-0.996)	0.006	0.987 (0.978-0.996)	0.004
TICI score 2b-3	3.17 (1.28-7.81)	0.01	2.80 (1.109-7.08)	0.03

Effect modifier was the **stroke-onset-to-arrival time**; p values are calculated with respect to mRS score of 0-2 as the outcome of interest.

Conclusion

Racial status was not associated with a difference in clinical presentation, treatment characteristics, nor outcomes. However, nuances in interhospital transportation seem to play a significant role and future studies should be aimed at those disparities in stroke accessibility.