Racial and Gender Disparities in Mechanical Thrombectomy Utilization in Stroke Patients

Analysis for RCOP NIS group

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## Preamble:

* **Reference Papers:**
  + [Rinaldo et al.2019](https://www.ahajournals.org/doi/full/10.1161/STROKEAHA.118.024651?rfr_dat=cr_pub++0pubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org)
  + [Saber et al.2022](https://www.ahajournals.org/doi/10.1161/SVIN.121.000164)
* **Study Objective**: Examine racial and gender disparities in utilization of mechanical thrombectomy among inpatient admissions with a principal diagnosis of ischemic stroke.
* **Data Source**: Cross-sectional analysis of the National Inpatient Sample (NIS) from 2018 to 2020.
* **Patient Selection**: Included all inpatient admissions with a principal diagnosis of Stroke.
* **ICD-10 codes used for**: Ischemic Stroke (ICD-10-CM: I63), Mechanical Thrombectomy (ICD-10-PCS: 03CG3ZZ), IV-tPA (ICD-10-CM: Z9282 OR ICD-10-PCS: 3E03317)
* **Primary Outcomes**:
  + Assessing characterstics in the thrombectomy vs no thrombectomy groups
  + Assessing racial disparities in patients utilizing mechanical thrombectomy
  + Assessing gender disparities in patients utilizing mechanical thrombectomy
* **Statistical Analysis**: Descriptive statistics for variables of interest are present as frequency and percentage of total admissions. Comparative statistics between patient groups was performed. Multiple logistic regression was performed to identify variables independently associated with utilization of mechanical thrombectomy.
* **Software:** All analyses were performed using R Version 4.4.1 (R Foundation for Statistical Computing, Vienna, Austria)

## Descriptive analysis

###Demographics of Admissions for Stroke:

| **Characteristic** | **N = 655***1* |
| --- | --- |
| Age, y | 71 (13) |
| Sex |  |
| Female | 380 (58) |
| Male | 275 (42) |
| Race |  |
| White | 510 (79) |
| Asian or Pacific Islander | 20 (3.1) |
| Black | 80 (12) |
| Hispanic | 25 (3.9) |
| Native American | 0 (0) |
| Other | 10 (1.6) |
| Residential income |  |
| $1 - $51,999 | 160 (25) |
| $52,000 - $65,999 | 155 (24) |
| $66,000 - $87,999 | 210 (33) |
| $88,000 or more | 120 (19) |
| Expected primary payer |  |
| Private | 145 (22) |
| Medicaid | 60 (9.2) |
| Medicare | 440 (67) |
| Other | 10 (1.5) |
| Hospital region |  |
| Midwest | 470 (72) |
| Northeast | 185 (28) |
| Hospital bedsize |  |
| Large | 370 (56) |
| Medium | 140 (21) |
| Small | 145 (22) |
| Hospital location and teaching status |  |
| Rural | 60 (9.2) |
| Urban, non-teaching | 65 (9.9) |
| Urban, teaching | 530 (81) |
| IV-tPA | 95 (15) |
| *1*Mean (SD); n (%) | |

### Comparison of Patients Who Did and Did Not Recieve MT:

| **Characteristic** | **No Thrombectomy** N = 645*1* | **Thrombectomy** N = 10*1* | **p-value***2* |
| --- | --- | --- | --- |
| Age, y | 71 (61 – 82) | 59 (59 – 69) | 0.076 |
| Sex |  |  | 0.18 |
| Female | 370 (57) | 10 (100) |  |
| Male | 275 (43) | 0 (0) |  |
| Race |  |  |  |
| White | 500 (79) | 10 (100) |  |
| Asian or Pacific Islander | 20 (3.1) | 0 (0) |  |
| Black | 80 (13) | 0 (0) |  |
| Hispanic | 25 (3.9) | 0 (0) |  |
| Native American | 0 (0) | 0 (0) |  |
| Other | 10 (1.6) | 0 (0) |  |
| Residential income |  |  | 0.32 |
| $1 - $51,999 | 160 (25) | 0 (0) |  |
| $52,000 - $65,999 | 145 (23) | 10 (100) |  |
| $66,000 - $87,999 | 210 (33) | 0 (0) |  |
| $88,000 or more | 120 (19) | 0 (0) |  |
| Expected primary payer |  |  | 0.79 |
| Private | 145 (22) | 0 (0) |  |
| Medicaid | 60 (9.3) | 0 (0) |  |
| Medicare | 430 (67) | 10 (100) |  |
| Other | 10 (1.6) | 0 (0) |  |
| Hospital region |  |  | 0.015 |
| Midwest | 470 (73) | 0 (0) |  |
| Northeast | 175 (27) | 10 (100) |  |
| Hospital bedsize |  |  | 0.55 |
| Large | 360 (56) | 10 (100) |  |
| Medium | 140 (22) | 0 (0) |  |
| Small | 145 (22) | 0 (0) |  |
| Hospital location and teaching status |  |  | 0.82 |
| Rural | 60 (9.3) | 0 (0) |  |
| Urban, non-teaching | 65 (10) | 0 (0) |  |
| Urban, teaching | 520 (81) | 10 (100) |  |
| IV-tPA | 90 (14) | 5 (50) | 0.18 |
| *1*Median (Q1 – Q3); n (%) | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | |

### Comparison of male vs female patients undergoing MT:

| **Characteristic** | **Female** N = 380*1* | **Male** N = 275*1* |
| --- | --- | --- |
| Age, y | 75 (62 – 84) | 68 (59 – 77) |
| Race |  |  |
| White | 315 (84) | 195 (72) |
| Asian or Pacific Islander | 5 (1.3) | 15 (5.6) |
| Black | 45 (12) | 35 (13) |
| Hispanic | 0 (0) | 25 (9.3) |
| Native American | 0 (0) | 0 (0) |
| Other | 10 (2.7) | 0 (0) |
| Residential income |  |  |
| $1 - $51,999 | 70 (19) | 90 (33) |
| $52,000 - $65,999 | 90 (24) | 65 (24) |
| $66,000 - $87,999 | 135 (36) | 75 (27) |
| $88,000 or more | 75 (20) | 45 (16) |
| Expected primary payer |  |  |
| Private | 80 (21) | 65 (24) |
| Medicaid | 10 (2.6) | 50 (18) |
| Medicare | 280 (74) | 160 (58) |
| Other | 10 (2.6) | 0 (0) |
| Hospital region |  |  |
| Midwest | 260 (68) | 210 (76) |
| Northeast | 120 (32) | 65 (24) |
| Hospital bedsize |  |  |
| Large | 210 (55) | 160 (58) |
| Medium | 85 (22) | 55 (20) |
| Small | 85 (22) | 60 (22) |
| Hospital location and teaching status |  |  |
| Rural | 35 (9.2) | 25 (9.1) |
| Urban, non-teaching | 20 (5.3) | 45 (16) |
| Urban, teaching | 325 (86) | 205 (75) |
| IV-tPA | 55 (14) | 40 (15) |
| *1*Median (Q1 – Q3); n (%) | | |

### Comparison of patients of different races undergoing MT:

| **Characteristic** | **White** N = 510*1* | **Asian or Pacific Islander** N = 20*1* | **Black** N = 80*1* | **Hispanic** N = 25*1* | **Native American** N = 0*1* | **Other** N = 10*1* |
| --- | --- | --- | --- | --- | --- | --- |
| Age, y | 73 (63 – 82) | 60 (29 – 81) | 70 (57 – 85) | 62 (59 – 64) | NA (NA – NA) | 55 (55 – 86) |
| Sex |  |  |  |  |  |  |
| Female | 315 (62) | 5 (25) | 45 (56) | 0 (0) | 0 (NA) | 10 (100) |
| Male | 195 (38) | 15 (75) | 35 (44) | 25 (100) | 0 (NA) | 0 (0) |
| Residential income |  |  |  |  |  |  |
| $1 - $51,999 | 100 (20) | 0 (0) | 45 (56) | 5 (20) | 0 (NA) | 5 (50) |
| $52,000 - $65,999 | 135 (27) | 5 (25) | 5 (6.3) | 5 (20) | 0 (NA) | 0 (0) |
| $66,000 - $87,999 | 175 (35) | 0 (0) | 25 (31) | 10 (40) | 0 (NA) | 0 (0) |
| $88,000 or more | 90 (18) | 15 (75) | 5 (6.3) | 5 (20) | 0 (NA) | 5 (50) |
| Expected primary payer |  |  |  |  |  |  |
| Private | 100 (20) | 10 (50) | 15 (19) | 15 (60) | 0 (NA) | 5 (50) |
| Medicaid | 30 (5.9) | 0 (0) | 20 (25) | 5 (20) | 0 (NA) | 0 (0) |
| Medicare | 370 (73) | 10 (50) | 45 (56) | 5 (20) | 0 (NA) | 5 (50) |
| Other | 10 (2.0) | 0 (0) | 0 (0) | 0 (0) | 0 (NA) | 0 (0) |
| Hospital region |  |  |  |  |  |  |
| Midwest | 375 (74) | 5 (25) | 60 (75) | 10 (40) | 0 (NA) | 10 (100) |
| Northeast | 135 (26) | 15 (75) | 20 (25) | 15 (60) | 0 (NA) | 0 (0) |
| Hospital bedsize |  |  |  |  |  |  |
| Large | 285 (56) | 5 (25) | 55 (69) | 25 (100) | 0 (NA) | 0 (0) |
| Medium | 100 (20) | 15 (75) | 20 (25) | 0 (0) | 0 (NA) | 5 (50) |
| Small | 125 (25) | 0 (0) | 5 (6.3) | 0 (0) | 0 (NA) | 5 (50) |
| Hospital location and teaching status |  |  |  |  |  |  |
| Rural | 60 (12) | 0 (0) | 0 (0) | 0 (0) | 0 (NA) | 0 (0) |
| Urban, non-teaching | 50 (9.8) | 5 (25) | 5 (6.3) | 5 (20) | 0 (NA) | 0 (0) |
| Urban, teaching | 400 (78) | 15 (75) | 75 (94) | 20 (80) | 0 (NA) | 10 (100) |
| IV-tPA | 75 (15) | 0 (0) | 15 (19) | 5 (20) | 0 (NA) | 0 (0) |
| *1*Median (Q1 – Q3); n (%) | | | | | | |

## Multivariable Logistic Regression:

### Utilization of Mechanical Thrombectomy:

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Age, y | 0.22 (0.20 to 0.26) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 0.00 (0.00 to 0.00) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 14,348,938,033,681 (48,851,206,751 to 4,214,676,287,162,060) | <0.001 |
| Black | 9,655 (591 to 157,720) | <0.001 |
| Hispanic | 0.07 (0.00 to 19.0) | 0.34 |
| Other | 41,415,209,895,148,920 (332,772,362,187,914 to 5,154,333,128,454,549,504) | <0.001 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 12,825,388 (2,781,295 to 59,141,722) | <0.001 |
| $66,000 - $87,999 | 0.00 (0.00 to 0.00) | <0.001 |
| $88,000 or more | 0.00 (0.00 to 0.00) | <0.001 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 993,497,675,025,013 (8,130,722,763,446 to 121,396,050,387,751,536) | <0.001 |
| Medicare | 1,824,384,731,332,312 (15,147,005,328,884 to 219,738,461,540,746,560) | <0.001 |
| Other | 1,047 (8.93 to 122,758) | 0.006 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 23,961,016,060 (4,340,918,145 to 132,260,105,225) | <0.001 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 0.00 (0.00 to 0.00) | <0.001 |
| Small | 0.00 (0.00 to 0.00) | <0.001 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 788,606,315 (2,857,056 to 217,671,562,412) | <0.001 |
| Urban, teaching | 1,232,548,684 (46,764,665 to 32,485,558,768) | <0.001 |
| IV-tPA |  |  |
| No | — |  |
| Yes | 888,281 (95,306 to 8,279,020) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |