Transcather vs Surgical Aortic Valve Replacement in young adults with Chronic Kidney Disease

Analysis for RCOP NIS group

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## Preamble:

* **Study Objective**: Examine in-hospital outcomes in young adults with CKD undergoing TAVR or SAVR.
* **Data Source**: Cross-sectional analysis of the National Inpatient Sample (NIS) from 2018 to 2020.
* **Population**: Included inpatient admissions (age<65) with CKD undergoing aortic valve replacement.
* **Primary Outcomes**:
  + In-hospital mortality
  + Cardiogenic shock
  + Major bleeding
  + Venous thromboembolism
  + Acute kidney injury
  + Acute myocardial infarction
  + Total hospital charges
  + Length of stay
* **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 and linear regression was performed to identify variables independently associated with outcomes in young adults undergoing aortic valve replacement, respectively, adjusted for:
  + Demographics: Age, sex, race, residential income, insurance, hospital region, hospital bedsize, hospital location, and teaching status.
  + Medical History: Hypertension, diabetes mellitus, coronary artery disease, liver disease, atrial fibrillation, heart failure, chronic obstructive pulmonary disease, obesity, tobacco use disorder, prior stroke, prior MI
  + Comorbidities: Charlson comorbidity index.
* **Software:** All analyses were performed using R Version 4.4.1 (R Foundation for Statistical Computing, Vienna, Austria)

## Descriptive analysis

### Baseline Characteristics:

| **Characteristic** | **Overall** N = 11,315*1* | **SAVR** N = 7,450*1* | **TAVR** N = 3,865*1* | **p-value***2* |
| --- | --- | --- | --- | --- |
| Age, y | 59 (54, 62) | 58 (52, 62) | 61 (57, 63) | <0.001 |
| Sex |  |  |  | <0.001 |
| Female | 3,225 (29%) | 1,880 (25%) | 1,345 (35%) |  |
| Male | 8,090 (71%) | 5,570 (75%) | 2,520 (65%) |  |
| Residential income |  |  |  | 0.029 |
| $1 - $51,999 | 3,330 (30%) | 2,105 (29%) | 1,225 (32%) |  |
| $52,000 - $65,999 | 3,210 (29%) | 2,125 (29%) | 1,085 (29%) |  |
| $66,000 - $87,999 | 2,550 (23%) | 1,640 (22%) | 910 (24%) |  |
| $88,000 or more | 1,990 (18%) | 1,435 (20%) | 555 (15%) |  |
| Expected primary payer |  |  |  | <0.001 |
| Private | 4,945 (44%) | 3,860 (52%) | 1,085 (28%) |  |
| Medicaid | 1,745 (15%) | 1,205 (16%) | 540 (14%) |  |
| Medicare | 4,200 (37%) | 2,105 (28%) | 2,095 (54%) |  |
| Other | 405 (3.6%) | 260 (3.5%) | 145 (3.8%) |  |
| Hospital region |  |  |  | 0.028 |
| East North Central | 1,940 (17%) | 1,335 (18%) | 605 (16%) |  |
| East South Central | 740 (6.5%) | 500 (6.7%) | 240 (6.2%) |  |
| Middle Atlantic | 1,510 (13%) | 945 (13%) | 565 (15%) |  |
| Mountain | 615 (5.4%) | 335 (4.5%) | 280 (7.2%) |  |
| New England | 445 (3.9%) | 270 (3.6%) | 175 (4.5%) |  |
| Pacific | 1,555 (14%) | 1,110 (15%) | 445 (12%) |  |
| South Atlantic | 2,350 (21%) | 1,455 (20%) | 895 (23%) |  |
| West North Central | 975 (8.6%) | 680 (9.1%) | 295 (7.6%) |  |
| West South Central | 1,185 (10%) | 820 (11%) | 365 (9.4%) |  |
| Hospital bedsize |  |  |  | 0.058 |
| Large | 8,295 (73%) | 5,345 (72%) | 2,950 (76%) |  |
| Medium | 2,225 (20%) | 1,525 (20%) | 700 (18%) |  |
| Small | 795 (7.0%) | 580 (7.8%) | 215 (5.6%) |  |
| Hospital location and teaching status |  |  |  | 0.8 |
| Rural | 155 (1.4%) | 110 (1.5%) | 45 (1.2%) |  |
| Urban, non-teaching | 905 (8.0%) | 580 (7.8%) | 325 (8.4%) |  |
| Urban, teaching | 10,255 (91%) | 6,760 (91%) | 3,495 (90%) |  |
| CKD |  |  |  |  |
| Yes | 11,315 (100%) | 7,450 (100%) | 3,865 (100%) |  |
| Hypertension | 10,305 (91%) | 6,690 (90%) | 3,615 (94%) | 0.003 |
| Diabetes mellitus | 5,465 (48%) | 3,180 (43%) | 2,285 (59%) | <0.001 |
| Coronary artery disease | 5,990 (53%) | 3,585 (48%) | 2,405 (62%) | <0.001 |
| Heart failure | 8,130 (72%) | 4,915 (66%) | 3,215 (83%) | <0.001 |
| Chronic obstructive pulmonary disease | 2,775 (25%) | 1,695 (23%) | 1,080 (28%) | 0.005 |
| Liver disease | 1,300 (11%) | 720 (9.7%) | 580 (15%) | <0.001 |
| Atrial Fibrillation | 3,705 (33%) | 2,690 (36%) | 1,015 (26%) | <0.001 |
| Obesity | 3,695 (33%) | 2,410 (32%) | 1,285 (33%) | 0.7 |
| Tobacco use disorder | 80 (0.7%) | 60 (0.8%) | 20 (0.5%) | 0.4 |
| Prior stroke | 1,275 (11%) | 685 (9.2%) | 590 (15%) | <0.001 |
| Prior coronary artery bypass graft | 745 (6.6%) | 260 (3.5%) | 485 (13%) | <0.001 |
| Prior myocardial infarction | 1,165 (10%) | 580 (7.8%) | 585 (15%) | <0.001 |
| Charlson comorbidity index | 5.00 (4.00, 6.00) | 4.00 (3.00, 5.00) | 5.00 (4.00, 6.00) | <0.001 |
| *1*Median (Q1, Q3); n (%) | | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | | |

### Outcomes Table:

| **Characteristic** | **Overall** N = 11,315*1* | **SAVR** N = 7,450*1* | **TAVR** N = 3,865*1* | **p-value***2* |
| --- | --- | --- | --- | --- |
| Died during hospitalization | 400 (3.5%) | 335 (4.5%) | 65 (1.7%) | <0.001 |
| Length of stay (days) | 8 (4, 14) | 10 (6, 17) | 3 (1, 8) | <0.001 |
| Inflation-adjusted total charge ($) | 235,534 (164,420, 382,600) | 259,123 (173,371, 425,177) | 207,507 (151,560, 306,436) | <0.001 |
| Major bleeding | 1,065 (9.4%) | 700 (9.4%) | 365 (9.4%) | >0.9 |
| Acute ischemic stroke | 705 (6.2%) | 460 (6.2%) | 245 (6.3%) | 0.9 |
| Cardiogenic shock | 1,225 (11%) | 960 (13%) | 265 (6.9%) | <0.001 |
| Cardiac arrest | 270 (2.4%) | 215 (2.9%) | 55 (1.4%) | 0.028 |
| Acute kidney injury | 4,180 (37%) | 3,405 (46%) | 775 (20%) | <0.001 |
| Venous thromboembolism | 500 (4.4%) | 425 (5.7%) | 75 (1.9%) | <0.001 |
| Acute myocardial infarction | 940 (8.3%) | 720 (9.7%) | 220 (5.7%) | 0.001 |
| *1*n (%); Median (Q1, Q3) | | | | |
| *2*Pearson's X^2: Rao & Scott adjustment; Design-based KruskalWallis test | | | | |

## Multivariable Logistic Regression:

### In-hospital mortality:

| **Characteristic** | **OR***1* | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| AVR |  |  |  |
| SAVR | — | — |  |
| TAVR | 0.19 | 0.10, 0.39 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.86 | 0.51, 1.48 | 0.6 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.08 | 0.18, 6.39 | >0.9 |
| Black | 0.86 | 0.45, 1.63 | 0.6 |
| Hispanic | 1.03 | 0.42, 2.50 | >0.9 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 1.75 | 0.30, 10.1 | 0.5 |
| Age, y | 1.05 | 1.01, 1.09 | 0.023 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.06 | 0.56, 1.99 | 0.9 |
| $66,000 - $87,999 | 0.74 | 0.36, 1.52 | 0.4 |
| $88,000 or more | 1.06 | 0.47, 2.38 | 0.9 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.89 | 0.37, 2.16 | 0.8 |
| Medicare | 1.90 | 1.01, 3.57 | 0.047 |
| Other | 0.43 | 0.05, 3.64 | 0.4 |
| Hospital region |  |  |  |
| East North Central | — | — |  |
| East South Central | 1.40 | 0.46, 4.24 | 0.5 |
| Middle Atlantic | 0.45 | 0.14, 1.48 | 0.2 |
| Mountain | 1.02 | 0.26, 4.08 | >0.9 |
| New England | 2.16 | 0.55, 8.48 | 0.3 |
| Pacific | 0.73 | 0.27, 2.03 | 0.5 |
| South Atlantic | 1.69 | 0.70, 4.05 | 0.2 |
| West North Central | 1.02 | 0.33, 3.16 | >0.9 |
| West South Central | 2.05 | 0.74, 5.66 | 0.2 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 1.01 | 0.54, 1.88 | >0.9 |
| Small | 0.25 | 0.05, 1.23 | 0.088 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 3,343,591 | 725,670, 15,405,899 | <0.001 |
| Urban, teaching | 4,946,136 | 1,434,221, 17,057,521 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.53 | 0.57, 4.14 | 0.4 |
| Diabetes mellitus |  |  |  |
| No | — | — |  |
| Yes | 1.10 | 0.54, 2.26 | 0.8 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 0.69 | 0.41, 1.17 | 0.2 |
| Heart failure |  |  |  |
| No | — | — |  |
| Yes | 3.02 | 1.39, 6.56 | 0.005 |
| Charlson comorbidity index | 0.85 | 0.64, 1.12 | 0.2 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 1.00 | 0.51, 1.95 | >0.9 |
| Atrial Fibrillation |  |  |  |
| No | — | — |  |
| Yes | 0.62 | 0.37, 1.05 | 0.075 |
| Obesity |  |  |  |
| No | — | — |  |
| Yes | 0.75 | 0.43, 1.33 | 0.3 |
| Tobacco use disorder |  |  |  |
| No | — | — |  |
| Yes | 0.00 | 0.00, 0.00 | <0.001 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 0.34 | 0.10, 1.19 | 0.091 |
| Liver disease |  |  |  |
| No | — | — |  |
| Yes | 9.27 | 4.62, 18.6 | <0.001 |
| Prior coronary artery bypass graft |  |  |  |
| No | — | — |  |
| Yes | 0.89 | 0.31, 2.56 | 0.8 |
| Prior myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 1.44 | 0.59, 3.51 | 0.4 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | | |

### Major bleeding:

| **Characteristic** | **OR***1* | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| AVR |  |  |  |
| SAVR | — | — |  |
| TAVR | 0.72 | 0.49, 1.04 | 0.083 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.11 | 0.79, 1.58 | 0.5 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.42 | 0.14, 1.24 | 0.12 |
| Black | 0.73 | 0.45, 1.18 | 0.2 |
| Hispanic | 1.14 | 0.65, 1.97 | 0.7 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 1.10 | 0.38, 3.25 | 0.9 |
| Age, y | 1.01 | 0.99, 1.03 | 0.3 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.05 | 0.69, 1.60 | 0.8 |
| $66,000 - $87,999 | 0.95 | 0.59, 1.51 | 0.8 |
| $88,000 or more | 0.81 | 0.47, 1.39 | 0.5 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.56 | 0.97, 2.50 | 0.065 |
| Medicare | 1.44 | 0.96, 2.17 | 0.078 |
| Other | 1.09 | 0.43, 2.76 | 0.8 |
| Hospital region |  |  |  |
| East North Central | — | — |  |
| East South Central | 0.65 | 0.30, 1.42 | 0.3 |
| Middle Atlantic | 0.94 | 0.48, 1.82 | 0.8 |
| Mountain | 0.33 | 0.11, 1.01 | 0.052 |
| New England | 0.84 | 0.33, 2.15 | 0.7 |
| Pacific | 1.20 | 0.63, 2.30 | 0.6 |
| South Atlantic | 0.96 | 0.55, 1.68 | 0.9 |
| West North Central | 0.84 | 0.39, 1.82 | 0.7 |
| West South Central | 0.76 | 0.39, 1.48 | 0.4 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 1.10 | 0.73, 1.64 | 0.6 |
| Small | 1.21 | 0.62, 2.35 | 0.6 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 2.09 | 0.33, 13.0 | 0.4 |
| Urban, teaching | 1.63 | 0.29, 9.18 | 0.6 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.85 | 0.51, 1.44 | 0.6 |
| Diabetes mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.55 | 0.37, 0.82 | 0.003 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 0.72 | 0.52, 1.01 | 0.057 |
| Heart failure |  |  |  |
| No | — | — |  |
| Yes | 0.75 | 0.50, 1.12 | 0.2 |
| Charlson comorbidity index | 1.42 | 1.26, 1.59 | <0.001 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.57 | 0.39, 0.83 | 0.004 |
| Atrial Fibrillation |  |  |  |
| No | — | — |  |
| Yes | 0.78 | 0.56, 1.09 | 0.15 |
| Obesity |  |  |  |
| No | — | — |  |
| Yes | 0.77 | 0.52, 1.14 | 0.2 |
| Tobacco use disorder |  |  |  |
| No | — | — |  |
| Yes | 1.59 | 0.41, 6.21 | 0.5 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 6.20 | 4.29, 8.98 | <0.001 |
| Liver disease |  |  |  |
| No | — | — |  |
| Yes | 2.11 | 1.43, 3.11 | <0.001 |
| Prior coronary artery bypass graft |  |  |  |
| No | — | — |  |
| Yes | 0.84 | 0.39, 1.81 | 0.7 |
| Prior myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 0.72 | 0.42, 1.24 | 0.2 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | | |

### Acute ischemic stroke:

| **Characteristic** | **OR***1* | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| AVR |  |  |  |
| SAVR | — | — |  |
| TAVR | 0.99 | 0.64, 1.54 | >0.9 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.67 | 1.06, 2.62 | 0.026 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 2.34 | 0.84, 6.55 | 0.11 |
| Black | 1.75 | 1.13, 2.72 | 0.013 |
| Hispanic | 1.03 | 0.52, 2.04 | >0.9 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 0.46 | 0.06, 3.61 | 0.5 |
| Age, y | 0.97 | 0.95, 1.00 | 0.028 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.80 | 0.51, 1.26 | 0.3 |
| $66,000 - $87,999 | 0.65 | 0.39, 1.09 | 0.10 |
| $88,000 or more | 0.49 | 0.26, 0.92 | 0.026 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.38 | 0.78, 2.45 | 0.3 |
| Medicare | 1.78 | 1.14, 2.79 | 0.012 |
| Other | 0.79 | 0.23, 2.76 | 0.7 |
| Hospital region |  |  |  |
| East North Central | — | — |  |
| East South Central | 0.80 | 0.33, 1.93 | 0.6 |
| Middle Atlantic | 1.16 | 0.54, 2.47 | 0.7 |
| Mountain | 2.00 | 0.81, 4.96 | 0.13 |
| New England | 1.12 | 0.35, 3.64 | 0.8 |
| Pacific | 1.17 | 0.57, 2.41 | 0.7 |
| South Atlantic | 1.31 | 0.71, 2.39 | 0.4 |
| West North Central | 0.78 | 0.31, 1.96 | 0.6 |
| West South Central | 1.44 | 0.69, 2.99 | 0.3 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.88 | 0.53, 1.47 | 0.6 |
| Small | 2.33 | 1.19, 4.58 | 0.014 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 3,492,493 | 1,398,487, 8,721,931 | <0.001 |
| Urban, teaching | 2,149,139 | 1,131,614, 4,081,599 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 2.51 | 0.97, 6.52 | 0.059 |
| Diabetes mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.96 | 0.63, 1.47 | 0.9 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 0.93 | 0.62, 1.40 | 0.7 |
| Heart failure |  |  |  |
| No | — | — |  |
| Yes | 0.78 | 0.48, 1.26 | 0.3 |
| Charlson comorbidity index | 1.25 | 1.10, 1.42 | <0.001 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.92 | 0.58, 1.46 | 0.7 |
| Atrial Fibrillation |  |  |  |
| No | — | — |  |
| Yes | 0.66 | 0.43, 1.02 | 0.060 |
| Obesity |  |  |  |
| No | — | — |  |
| Yes | 1.28 | 0.88, 1.87 | 0.2 |
| Tobacco use disorder |  |  |  |
| No | — | — |  |
| Yes | 1.58 | 0.12, 20.0 | 0.7 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 0.48 | 0.24, 0.98 | 0.044 |
| Liver disease |  |  |  |
| No | — | — |  |
| Yes | 1.64 | 0.98, 2.73 | 0.060 |
| Prior coronary artery bypass graft |  |  |  |
| No | — | — |  |
| Yes | 0.83 | 0.36, 1.93 | 0.7 |
| Prior myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 1.04 | 0.54, 1.98 | >0.9 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | | |

### Acute kidney injury:

| **Characteristic** | **OR***1* | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| AVR |  |  |  |
| SAVR | — | — |  |
| TAVR | 0.28 | 0.22, 0.36 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.11 | 0.88, 1.39 | 0.4 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.62 | 0.34, 1.13 | 0.12 |
| Black | 0.75 | 0.58, 0.98 | 0.034 |
| Hispanic | 0.99 | 0.71, 1.39 | >0.9 |
| Native American | 0.75 | 0.25, 2.28 | 0.6 |
| Other | 0.52 | 0.25, 1.07 | 0.077 |
| Age, y | 1.01 | 0.99, 1.02 | 0.3 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.23 | 0.95, 1.59 | 0.12 |
| $66,000 - $87,999 | 1.16 | 0.88, 1.53 | 0.3 |
| $88,000 or more | 1.21 | 0.87, 1.67 | 0.3 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.05 | 0.78, 1.41 | 0.7 |
| Medicare | 0.43 | 0.34, 0.55 | <0.001 |
| Other | 0.69 | 0.41, 1.15 | 0.2 |
| Hospital region |  |  |  |
| East North Central | — | — |  |
| East South Central | 0.83 | 0.53, 1.28 | 0.4 |
| Middle Atlantic | 0.62 | 0.43, 0.89 | 0.010 |
| Mountain | 0.77 | 0.47, 1.28 | 0.3 |
| New England | 0.96 | 0.56, 1.64 | 0.9 |
| Pacific | 0.87 | 0.59, 1.27 | 0.5 |
| South Atlantic | 0.89 | 0.64, 1.24 | 0.5 |
| West North Central | 0.67 | 0.42, 1.07 | 0.090 |
| West South Central | 1.00 | 0.69, 1.46 | >0.9 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.89 | 0.69, 1.16 | 0.4 |
| Small | 1.24 | 0.82, 1.88 | 0.3 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 0.64 | 0.26, 1.58 | 0.3 |
| Urban, teaching | 0.71 | 0.31, 1.62 | 0.4 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.06 | 0.75, 1.49 | 0.7 |
| Diabetes mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.90 | 0.69, 1.19 | 0.5 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 1.00 | 0.82, 1.23 | >0.9 |
| Heart failure |  |  |  |
| No | — | — |  |
| Yes | 1.86 | 1.46, 2.36 | <0.001 |
| Charlson comorbidity index | 1.12 | 1.02, 1.23 | 0.017 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.78 | 0.61, 1.00 | 0.052 |
| Atrial Fibrillation |  |  |  |
| No | — | — |  |
| Yes | 1.07 | 0.87, 1.32 | 0.5 |
| Obesity |  |  |  |
| No | — | — |  |
| Yes | 1.39 | 1.13, 1.71 | 0.002 |
| Tobacco use disorder |  |  |  |
| No | — | — |  |
| Yes | 0.59 | 0.15, 2.39 | 0.5 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 0.86 | 0.63, 1.17 | 0.3 |
| Liver disease |  |  |  |
| No | — | — |  |
| Yes | 1.75 | 1.28, 2.39 | <0.001 |
| Prior coronary artery bypass graft |  |  |  |
| No | — | — |  |
| Yes | 1.04 | 0.65, 1.67 | 0.9 |
| Prior myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 0.60 | 0.42, 0.86 | 0.006 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | | |

### Cardiogenic shock:

| **Characteristic** | **OR***1* | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| AVR |  |  |  |
| SAVR | — | — |  |
| TAVR | 0.39 | 0.27, 0.56 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.81 | 0.58, 1.14 | 0.2 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.61 | 0.22, 1.68 | 0.3 |
| Black | 1.29 | 0.88, 1.90 | 0.2 |
| Hispanic | 0.84 | 0.46, 1.55 | 0.6 |
| Native American | 0.73 | 0.12, 4.30 | 0.7 |
| Other | 1.20 | 0.47, 3.01 | 0.7 |
| Age, y | 0.99 | 0.97, 1.01 | 0.2 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.82 | 0.56, 1.20 | 0.3 |
| $66,000 - $87,999 | 0.98 | 0.65, 1.46 | >0.9 |
| $88,000 or more | 0.93 | 0.58, 1.47 | 0.7 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.12 | 0.72, 1.75 | 0.6 |
| Medicare | 0.94 | 0.66, 1.32 | 0.7 |
| Other | 0.56 | 0.22, 1.46 | 0.2 |
| Hospital region |  |  |  |
| East North Central | — | — |  |
| East South Central | 0.27 | 0.10, 0.70 | 0.007 |
| Middle Atlantic | 0.43 | 0.22, 0.83 | 0.012 |
| Mountain | 1.35 | 0.66, 2.77 | 0.4 |
| New England | 0.93 | 0.32, 2.66 | 0.9 |
| Pacific | 1.01 | 0.56, 1.82 | >0.9 |
| South Atlantic | 1.26 | 0.77, 2.09 | 0.4 |
| West North Central | 1.34 | 0.73, 2.49 | 0.3 |
| West South Central | 1.22 | 0.68, 2.18 | 0.5 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 1.16 | 0.78, 1.73 | 0.5 |
| Small | 0.79 | 0.41, 1.52 | 0.5 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 2.46 | 0.37, 16.5 | 0.4 |
| Urban, teaching | 3.12 | 0.49, 19.9 | 0.2 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.66 | 0.41, 1.06 | 0.087 |
| Diabetes mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.98 | 0.68, 1.41 | >0.9 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 0.98 | 0.71, 1.34 | 0.9 |
| Heart failure |  |  |  |
| No | — | — |  |
| Yes | 5.93 | 3.53, 9.96 | <0.001 |
| Charlson comorbidity index | 1.04 | 0.93, 1.18 | 0.5 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.77 | 0.52, 1.13 | 0.2 |
| Atrial Fibrillation |  |  |  |
| No | — | — |  |
| Yes | 1.11 | 0.82, 1.50 | 0.5 |
| Obesity |  |  |  |
| No | — | — |  |
| Yes | 0.64 | 0.46, 0.88 | 0.007 |
| Tobacco use disorder |  |  |  |
| No | — | — |  |
| Yes | 1.19 | 0.21, 6.93 | 0.8 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 0.68 | 0.39, 1.19 | 0.2 |
| Liver disease |  |  |  |
| No | — | — |  |
| Yes | 3.18 | 2.13, 4.74 | <0.001 |
| Prior coronary artery bypass graft |  |  |  |
| No | — | — |  |
| Yes | 1.35 | 0.70, 2.62 | 0.4 |
| Prior myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 0.83 | 0.48, 1.44 | 0.5 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | | |

### Cardiac arrest:

| **Characteristic** | **OR***1* | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| AVR |  |  |  |
| SAVR | — | — |  |
| TAVR | 0.37 | 0.19, 0.75 | 0.006 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.43 | 0.67, 3.08 | 0.4 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 2.17 | 0.46, 10.3 | 0.3 |
| Black | 0.42 | 0.17, 1.03 | 0.059 |
| Hispanic | 1.35 | 0.48, 3.83 | 0.6 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 0.00 | 0.00, 0.00 | <0.001 |
| Age, y | 1.00 | 0.96, 1.04 | 0.9 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.34 | 0.60, 3.00 | 0.5 |
| $66,000 - $87,999 | 1.37 | 0.57, 3.28 | 0.5 |
| $88,000 or more | 1.45 | 0.55, 3.84 | 0.5 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.44 | 0.57, 3.66 | 0.4 |
| Medicare | 2.02 | 0.95, 4.33 | 0.069 |
| Other | 2.06 | 0.42, 10.0 | 0.4 |
| Hospital region |  |  |  |
| East North Central | — | — |  |
| East South Central | 2.31 | 0.79, 6.77 | 0.13 |
| Middle Atlantic | 0.68 | 0.23, 1.97 | 0.5 |
| Mountain | 0.77 | 0.17, 3.41 | 0.7 |
| New England | 0.46 | 0.06, 3.55 | 0.5 |
| Pacific | 0.49 | 0.15, 1.59 | 0.2 |
| South Atlantic | 0.37 | 0.10, 1.32 | 0.12 |
| West North Central | 0.94 | 0.28, 3.18 | >0.9 |
| West South Central | 1.18 | 0.41, 3.38 | 0.8 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 1.38 | 0.66, 2.88 | 0.4 |
| Small | 2.22 | 0.78, 6.33 | 0.14 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 2,386,538 | 628,869, 9,056,833 | <0.001 |
| Urban, teaching | 2,533,485 | 1,066,706, 6,017,168 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.92 | 0.58, 6.40 | 0.3 |
| Diabetes mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.95 | 0.45, 1.99 | 0.9 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 0.86 | 0.44, 1.65 | 0.6 |
| Heart failure |  |  |  |
| No | — | — |  |
| Yes | 2.15 | 0.89, 5.17 | 0.087 |
| Charlson comorbidity index | 1.03 | 0.81, 1.32 | 0.8 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.72 | 0.31, 1.66 | 0.4 |
| Atrial Fibrillation |  |  |  |
| No | — | — |  |
| Yes | 1.01 | 0.54, 1.89 | >0.9 |
| Obesity |  |  |  |
| No | — | — |  |
| Yes | 0.39 | 0.18, 0.87 | 0.022 |
| Tobacco use disorder |  |  |  |
| No | — | — |  |
| Yes | 0.00 | 0.00, 0.00 | <0.001 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 0.54 | 0.18, 1.66 | 0.3 |
| Liver disease |  |  |  |
| No | — | — |  |
| Yes | 2.01 | 0.92, 4.40 | 0.080 |
| Prior coronary artery bypass graft |  |  |  |
| No | — | — |  |
| Yes | 0.65 | 0.16, 2.70 | 0.6 |
| Prior myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 1.08 | 0.42, 2.75 | 0.9 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | | |

### Venous thromboembolism:

| **Characteristic** | **OR***1* | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| AVR |  |  |  |
| SAVR | — | — |  |
| TAVR | 0.38 | 0.21, 0.67 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.81 | 0.50, 1.32 | 0.4 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.00 | 0.00, 0.00 | <0.001 |
| Black | 1.36 | 0.82, 2.27 | 0.2 |
| Hispanic | 1.01 | 0.46, 2.21 | >0.9 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 1.38 | 0.43, 4.39 | 0.6 |
| Age, y | 0.98 | 0.95, 1.00 | 0.081 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.47 | 0.26, 0.84 | 0.010 |
| $66,000 - $87,999 | 0.78 | 0.45, 1.35 | 0.4 |
| $88,000 or more | 0.80 | 0.40, 1.62 | 0.5 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.16 | 0.62, 2.19 | 0.6 |
| Medicare | 0.96 | 0.55, 1.68 | 0.9 |
| Other | 1.54 | 0.51, 4.65 | 0.4 |
| Hospital region |  |  |  |
| East North Central | — | — |  |
| East South Central | 0.23 | 0.07, 0.80 | 0.021 |
| Middle Atlantic | 0.46 | 0.21, 1.01 | 0.054 |
| Mountain | 0.42 | 0.12, 1.47 | 0.2 |
| New England | 0.66 | 0.18, 2.43 | 0.5 |
| Pacific | 0.41 | 0.19, 0.92 | 0.031 |
| South Atlantic | 0.70 | 0.39, 1.25 | 0.2 |
| West North Central | 0.31 | 0.11, 0.88 | 0.028 |
| West South Central | 0.38 | 0.16, 0.91 | 0.030 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.26 | 0.11, 0.61 | 0.002 |
| Small | 0.32 | 0.10, 1.00 | 0.051 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 9,481,463 | 3,771,525, 23,836,020 | <0.001 |
| Urban, teaching | 7,578,977 | 3,997,187, 14,370,331 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.06 | 0.52, 2.17 | 0.9 |
| Diabetes mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.54 | 0.31, 0.91 | 0.022 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 1.06 | 0.69, 1.62 | 0.8 |
| Heart failure |  |  |  |
| No | — | — |  |
| Yes | 0.86 | 0.54, 1.38 | 0.5 |
| Charlson comorbidity index | 1.11 | 0.96, 1.30 | 0.2 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.68 | 0.41, 1.13 | 0.14 |
| Atrial Fibrillation |  |  |  |
| No | — | — |  |
| Yes | 1.78 | 1.17, 2.69 | 0.007 |
| Obesity |  |  |  |
| No | — | — |  |
| Yes | 0.48 | 0.28, 0.81 | 0.007 |
| Tobacco use disorder |  |  |  |
| No | — | — |  |
| Yes | 0.00 | 0.00, 0.00 | <0.001 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 0.58 | 0.28, 1.23 | 0.2 |
| Liver disease |  |  |  |
| No | — | — |  |
| Yes | 1.59 | 0.82, 3.09 | 0.2 |
| Prior coronary artery bypass graft |  |  |  |
| No | — | — |  |
| Yes | 0.58 | 0.18, 1.92 | 0.4 |
| Prior myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 1.40 | 0.69, 2.84 | 0.4 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | | |

### Acute myocardial infarction:

| **Characteristic** | **OR***1* | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| AVR |  |  |  |
| SAVR | — | — |  |
| TAVR | 0.43 | 0.28, 0.66 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.86 | 0.59, 1.25 | 0.4 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.05 | 0.42, 2.62 | >0.9 |
| Black | 0.91 | 0.56, 1.46 | 0.7 |
| Hispanic | 0.57 | 0.28, 1.17 | 0.12 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 0.85 | 0.24, 3.04 | 0.8 |
| Age, y | 1.02 | 0.99, 1.05 | 0.13 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.98 | 0.63, 1.51 | >0.9 |
| $66,000 - $87,999 | 0.99 | 0.62, 1.56 | >0.9 |
| $88,000 or more | 0.71 | 0.42, 1.21 | 0.2 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.30 | 0.77, 2.17 | 0.3 |
| Medicare | 0.93 | 0.61, 1.41 | 0.7 |
| Other | 1.06 | 0.40, 2.84 | >0.9 |
| Hospital region |  |  |  |
| East North Central | — | — |  |
| East South Central | 2.35 | 1.10, 5.06 | 0.028 |
| Middle Atlantic | 1.29 | 0.67, 2.49 | 0.5 |
| Mountain | 1.57 | 0.60, 4.13 | 0.4 |
| New England | 1.69 | 0.69, 4.12 | 0.2 |
| Pacific | 1.60 | 0.83, 3.11 | 0.2 |
| South Atlantic | 1.43 | 0.79, 2.59 | 0.2 |
| West North Central | 1.41 | 0.66, 3.00 | 0.4 |
| West South Central | 1.44 | 0.72, 2.87 | 0.3 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 1.21 | 0.81, 1.81 | 0.3 |
| Small | 0.86 | 0.44, 1.67 | 0.7 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.99 | 0.27, 14.4 | 0.5 |
| Urban, teaching | 1.68 | 0.26, 11.0 | 0.6 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.60 | 0.67, 3.82 | 0.3 |
| Diabetes mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.62 | 0.41, 0.96 | 0.032 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 2.69 | 1.81, 3.99 | <0.001 |
| Heart failure |  |  |  |
| No | — | — |  |
| Yes | 1.62 | 1.03, 2.56 | 0.039 |
| Charlson comorbidity index | 1.71 | 1.49, 1.95 | <0.001 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.49 | 0.32, 0.75 | 0.001 |
| Atrial Fibrillation |  |  |  |
| No | — | — |  |
| Yes | 0.96 | 0.67, 1.38 | 0.8 |
| Obesity |  |  |  |
| No | — | — |  |
| Yes | 0.84 | 0.58, 1.24 | 0.4 |
| Tobacco use disorder |  |  |  |
| No | — | — |  |
| Yes | 0.00 | 0.00, 0.00 | <0.001 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 0.62 | 0.34, 1.11 | 0.11 |
| Liver disease |  |  |  |
| No | — | — |  |
| Yes | 0.76 | 0.43, 1.35 | 0.3 |
| Prior coronary artery bypass graft |  |  |  |
| No | — | — |  |
| Yes | 0.37 | 0.14, 0.98 | 0.046 |
| Prior myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 0.52 | 0.28, 0.96 | 0.036 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | | |

## Multivariable Linear Regression:

### Length of stay:

| **Characteristic** | **Beta** | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| AVR |  |  |  |
| SAVR | — | — |  |
| TAVR | -8.5 | -9.5, -7.4 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | -1.1 | -2.2, 0.12 | 0.077 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.7 | -1.9, 5.4 | 0.3 |
| Black | 1.3 | -0.31, 2.9 | 0.11 |
| Hispanic | 0.13 | -1.6, 1.8 | 0.9 |
| Native American | 0.76 | -4.7, 6.2 | 0.8 |
| Other | 1.2 | -2.9, 5.3 | 0.6 |
| Age, y | -0.13 | -0.24, -0.02 | 0.024 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -0.60 | -1.8, 0.58 | 0.3 |
| $66,000 - $87,999 | 0.45 | -1.3, 2.2 | 0.6 |
| $88,000 or more | -0.39 | -2.1, 1.4 | 0.7 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 4.1 | 1.7, 6.4 | <0.001 |
| Medicare | 1.8 | 0.59, 3.0 | 0.004 |
| Other | 1.5 | -0.82, 3.9 | 0.2 |
| Hospital region |  |  |  |
| East North Central | — | — |  |
| East South Central | -0.27 | -2.4, 1.9 | 0.8 |
| Middle Atlantic | -0.68 | -2.4, 1.1 | 0.4 |
| Mountain | -1.9 | -3.8, -0.04 | 0.045 |
| New England | -0.62 | -2.5, 1.3 | 0.5 |
| Pacific | -1.7 | -3.3, -0.17 | 0.030 |
| South Atlantic | 1.7 | -0.41, 3.8 | 0.12 |
| West North Central | -1.8 | -3.5, -0.08 | 0.041 |
| West South Central | -0.02 | -2.0, 1.9 | >0.9 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -1.3 | -2.4, -0.24 | 0.016 |
| Small | -2.1 | -3.4, -0.81 | 0.002 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 3.0 | 0.02, 5.9 | 0.049 |
| Urban, teaching | 3.3 | 0.67, 6.0 | 0.014 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | -1.9 | -4.8, 0.91 | 0.2 |
| Diabetes mellitus |  |  |  |
| No | — | — |  |
| Yes | -1.5 | -3.0, -0.05 | 0.043 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | -0.54 | -1.5, 0.45 | 0.3 |
| Heart failure |  |  |  |
| No | — | — |  |
| Yes | 2.2 | 1.0, 3.5 | <0.001 |
| Charlson comorbidity index | 1.2 | 0.69, 1.8 | <0.001 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | -1.3 | -2.8, 0.15 | 0.079 |
| Atrial Fibrillation |  |  |  |
| No | — | — |  |
| Yes | 0.26 | -0.74, 1.3 | 0.6 |
| Obesity |  |  |  |
| No | — | — |  |
| Yes | -1.3 | -2.3, -0.41 | 0.005 |
| Tobacco use disorder |  |  |  |
| No | — | — |  |
| Yes | -5.5 | -8.0, -3.0 | <0.001 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | -1.2 | -2.5, 0.03 | 0.056 |
| Liver disease |  |  |  |
| No | — | — |  |
| Yes | 4.2 | 1.8, 6.6 | <0.001 |
| Prior coronary artery bypass graft |  |  |  |
| No | — | — |  |
| Yes | -0.54 | -1.8, 0.71 | 0.4 |
| Prior myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | -2.2 | -3.4, -1.0 | <0.001 |
| *1*CI = Confidence Interval | | | |

### Total hospital charges:

| **Characteristic** | **Beta** | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| AVR |  |  |  |
| SAVR | — | — |  |
| TAVR | -103,755 | -128,235, -79,275 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | -24,970 | -52,411, 2,470 | 0.074 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 23,441 | -86,841, 133,723 | 0.7 |
| Black | 46,266 | 10,931, 81,602 | 0.010 |
| Hispanic | 43,734 | -3,483, 90,951 | 0.069 |
| Native American | -53,204 | -125,234, 18,827 | 0.15 |
| Other | 65,395 | -23,935, 154,725 | 0.2 |
| Age, y | -2,754 | -4,929, -580 | 0.013 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -4,474 | -29,912, 20,965 | 0.7 |
| $66,000 - $87,999 | 2,343 | -28,087, 32,772 | 0.9 |
| $88,000 or more | 27,258 | -17,348, 71,863 | 0.2 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 47,863 | 3,704, 92,021 | 0.034 |
| Medicare | 25,979 | -3,509, 55,466 | 0.084 |
| Other | 10,640 | -45,470, 66,749 | 0.7 |
| Hospital region |  |  |  |
| East North Central | — | — |  |
| East South Central | 14,110 | -37,093, 65,313 | 0.6 |
| Middle Atlantic | 59,532 | 12,762, 106,303 | 0.013 |
| Mountain | 34,829 | -12,811, 82,469 | 0.2 |
| New England | -53,396 | -87,606, -19,186 | 0.002 |
| Pacific | 123,143 | 60,814, 185,472 | <0.001 |
| South Atlantic | 54,397 | 16,726, 92,068 | 0.005 |
| West North Central | -39,866 | -71,623, -8,109 | 0.014 |
| West South Central | 45,560 | 2,490, 88,630 | 0.038 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -16,741 | -44,506, 11,025 | 0.2 |
| Small | -31,722 | -68,148, 4,704 | 0.088 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 89,966 | 21,999, 157,932 | 0.010 |
| Urban, teaching | 75,501 | 23,308, 127,694 | 0.005 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | -27,893 | -82,936, 27,150 | 0.3 |
| Diabetes mellitus |  |  |  |
| No | — | — |  |
| Yes | -44,595 | -78,493, -10,697 | 0.010 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | -6,921 | -29,569, 15,728 | 0.5 |
| Heart failure |  |  |  |
| No | — | — |  |
| Yes | 60,740 | 32,543, 88,936 | <0.001 |
| Charlson comorbidity index | 16,781 | 4,453, 29,109 | 0.008 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | -3,253 | -39,927, 33,422 | 0.9 |
| Atrial Fibrillation |  |  |  |
| No | — | — |  |
| Yes | 9,145 | -14,493, 32,784 | 0.4 |
| Obesity |  |  |  |
| No | — | — |  |
| Yes | -49,515 | -70,594, -28,437 | <0.001 |
| Tobacco use disorder |  |  |  |
| No | — | — |  |
| Yes | -80,826 | -164,012, 2,360 | 0.057 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | -38,511 | -70,464, -6,558 | 0.018 |
| Liver disease |  |  |  |
| No | — | — |  |
| Yes | 117,342 | 57,070, 177,614 | <0.001 |
| Prior coronary artery bypass graft |  |  |  |
| No | — | — |  |
| Yes | 20,903 | -11,267, 53,074 | 0.2 |
| Prior myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | -36,274 | -65,145, -7,402 | 0.014 |
| *1*CI = Confidence Interval | | | |