Clinical Outcomes of Atrial Fibrillation in Aortic Aneurysm Patients: Insights from the National Inpatient Sample

Analysis for RCOP NIS Cardio13

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## Preamble:

* **Reference Papers:**
  + [Kumi et al. 2024](https://doi.org/10.1136/bmjopen-2023-077839)
* **Study Objective**: Examine the impact of atrial fibrillation on in-hospital mortality and length of stay among inpatient admissions with a principal diagnosis of aortic aneurysm (AA).
* **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 AA.
* **Aortic Aneurysm + Atrial Fibrillation Categories**:
  + Aortic Aneurysm with Atrial Fibrillation
  + Aortic Aneurysm without Atrial Fibrillation
* **Primary Outcomes**:
  + In-hospital all-cause mortality
  + Total hospital length of stay (days)
  + Total charge, inflation adjusted to 2020 ($)
* **Secondary Outcomes**:
  + Ischemic Stroke
  + Transient Ischemic Attack
  + Acute Myocardial Infarction
  + Major Bleeding
  + Bleeding Requiring Transfusion
  + Arterial Embolism
* **Statistical Analysis**: Multiple logistic and linear regression to determine the independent association of atrial fibrillation with in-hospital mortality and length of stay, respectively, adjusted for:
  + Demographics: Age, sex, race, residential income, insurance, hospital region, hospital bedsize, hospital location, and teaching status.
  + Medical History: Hypertension, cerebrovascular disease, heart failure, diabetes mellitus, chronic kidney disease, chronic obstructive pulmonary disease, and HIV/AIDS.
  + Comorbidities: Charlson comorbidity index.
* **Software:** All analyses were performed using R Version 4.4.1 (R Foundation for Statistical Computing, Vienna, Austria)

## Baseline Table:

| **Characteristic** | **Aortic Aneurysm without Atrial Fibrillation** N = 161,220*1* | **Aortic Aneurysm with Atrial Fibrillation** N = 39,030*1* | **p-value***2* | **Overall** N = 200,250*1* |
| --- | --- | --- | --- | --- |
| Age, y | 69 (12) | 73 (11) | <0.001 | 70 (12) |
| Sex |  |  | 0.24 |  |
| Female | 47,475 (29) | 11,765 (30) |  | 59,240 (30) |
| Male | 113,745 (71) | 27,265 (70) |  | 141,010 (70) |
| Race |  |  | <0.001 |  |
| White | 119,555 (76) | 30,940 (82) |  | 150,495 (77) |
| Asian or Pacific Islander | 4,145 (2.6) | 1,105 (2.9) |  | 5,250 (2.7) |
| Black | 19,185 (12) | 2,890 (7.6) |  | 22,075 (11) |
| Hispanic | 8,865 (5.7) | 1,830 (4.8) |  | 10,695 (5.5) |
| Native American | 620 (0.4) | 120 (0.3) |  | 740 (0.4) |
| Other | 4,155 (2.7) | 975 (2.6) |  | 5,130 (2.6) |
| Charlson comorbidity index | 2.54 (1.66) | 2.98 (1.80) | <0.001 | 2.63 (1.70) |
| Residential income |  |  | <0.001 |  |
| $1 - $51,999 | 45,185 (29) | 8,995 (23) |  | 54,180 (28) |
| $52,000 - $65,999 | 43,500 (27) | 10,025 (26) |  | 53,525 (27) |
| $66,000 - $87,999 | 38,300 (24) | 10,115 (26) |  | 48,415 (25) |
| $88,000 or more | 31,440 (20) | 9,260 (24) |  | 40,700 (21) |
| Expected primary payer |  |  | <0.001 |  |
| Private | 40,020 (25) | 7,875 (20) |  | 47,895 (24) |
| Medicaid | 11,680 (7.3) | 1,670 (4.3) |  | 13,350 (6.7) |
| Medicare | 104,660 (65) | 28,480 (73) |  | 133,140 (67) |
| Other | 4,630 (2.9) | 980 (2.5) |  | 5,610 (2.8) |
| Hospital region |  |  | <0.001 |  |
| Midwest | 39,265 (24) | 9,875 (25) |  | 49,140 (25) |
| Northeast | 28,735 (18) | 7,095 (18) |  | 35,830 (18) |
| South | 63,855 (40) | 14,105 (36) |  | 77,960 (39) |
| West | 29,365 (18) | 7,955 (20) |  | 37,320 (19) |
| Hospital bedsize |  |  | <0.001 |  |
| Large | 104,555 (65) | 26,610 (68) |  | 131,165 (66) |
| Medium | 37,925 (24) | 8,465 (22) |  | 46,390 (23) |
| Small | 18,740 (12) | 3,955 (10) |  | 22,695 (11) |
| Hospital location and teaching status |  |  | <0.001 |  |
| Rural | 5,170 (3.2) | 930 (2.4) |  | 6,100 (3.0) |
| Urban, non-teaching | 18,685 (12) | 3,880 (9.9) |  | 22,565 (11) |
| Urban, teaching | 137,365 (85) | 34,220 (88) |  | 171,585 (86) |
| Hypertension | 132,060 (82) | 33,940 (87) | <0.001 | 166,000 (83) |
| Cerebrovascular disease | 13,190 (8.2) | 4,265 (11) | <0.001 | 17,455 (8.7) |
| Heart failure | 23,845 (15) | 12,575 (32) | <0.001 | 36,420 (18) |
| Diabetes mellitus | 28,625 (18) | 7,325 (19) | 0.042 | 35,950 (18) |
| Chronic kidney disease | 31,270 (19) | 9,835 (25) | <0.001 | 41,105 (21) |
| Chronic obstructive pulmonary disease | 47,770 (30) | 12,365 (32) | <0.001 | 60,135 (30) |
| HIV/AIDS | 1,135 (0.7) | 285 (0.7) | 0.80 | 1,420 (0.7) |
| *1*Mean (SD); n (%) | | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | | |

## Outcomes Table:

| **Characteristic** | **Aortic Aneurysm without Atrial Fibrillation** N = 161,220*1* | **Aortic Aneurysm with Atrial Fibrillation** N = 39,030*1* | **p-value***2* | **Overall** N = 200,250*1* |
| --- | --- | --- | --- | --- |
| Died during hospitalization | 9,660 (6.0) | 2,890 (7.4) | <0.001 | 12,550 (6.3) |
| Length of stay (days) | 3.0 (1.0 – 6.0) | 6.0 (2.0 – 10.0) | <0.001 | 3.0 (1.0 – 7.0) |
| Inflation-adjusted total charge ($) | 132,608 (78,760 – 221,765) | 174,179 (96,714 – 303,076) | <0.001 | 138,835 (81,133 – 236,264) |
| Ischemic stroke | 4,025 (2.5) | 1,660 (4.3) | <0.001 | 5,685 (2.8) |
| Transient ischemic attack | 270 (0.2) | 190 (0.5) | <0.001 | 460 (0.2) |
| Acute myocardial infarction | 2,770 (1.7) | 1,050 (2.7) | <0.001 | 3,820 (1.9) |
| Arterial embolism | 10,430 (6.5) | 2,265 (5.8) | 0.028 | 12,695 (6.3) |
| Major Bleeding | 12,785 (7.9) | 3,985 (10) | <0.001 | 16,770 (8.4) |
| Bleeding Requiring Transfusion | 24,880 (15) | 8,960 (23) | <0.001 | 33,840 (17) |
| *1*n (%); Median (Q1 – Q3) | | | | |
| *2*Pearson's X^2: Rao & Scott adjustment; Design-based KruskalWallis test | | | | |

## Multivariable Logistic Regression:

### All-Cause Mortality:

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Atrial fibrillation categories |  |  |
| Aortic Aneurysm without Atrial Fibrillation | — |  |
| Aortic Aneurysm with Atrial Fibrillation | 1.09 (0.98 to 1.21) | 0.11 |
| Age, y | 1.03 (1.02 to 1.03) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 0.57 (0.52 to 0.62) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 1.23 (0.97 to 1.57) | 0.084 |
| Black | 1.15 (1.00 to 1.33) | 0.052 |
| Hispanic | 1.08 (0.90 to 1.30) | 0.41 |
| Native American | 0.88 (0.41 to 1.90) | 0.74 |
| Other | 1.25 (0.96 to 1.63) | 0.10 |
| Charlson comorbidity index | 1.25 (1.19 to 1.32) | <0.001 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 0.96 (0.85 to 1.08) | 0.47 |
| $66,000 - $87,999 | 0.96 (0.85 to 1.08) | 0.47 |
| $88,000 or more | 0.83 (0.73 to 0.96) | 0.009 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 1.05 (0.85 to 1.29) | 0.64 |
| Medicare | 0.71 (0.63 to 0.80) | <0.001 |
| Other | 0.91 (0.69 to 1.22) | 0.54 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 1.15 (1.00 to 1.33) | 0.050 |
| South | 1.03 (0.91 to 1.17) | 0.60 |
| West | 1.15 (1.00 to 1.33) | 0.052 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 1.01 (0.90 to 1.12) | 0.90 |
| Small | 1.05 (0.91 to 1.20) | 0.50 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 0.88 (0.68 to 1.13) | 0.31 |
| Urban, teaching | 0.87 (0.69 to 1.09) | 0.21 |
| Hypertension |  |  |
| No | — |  |
| Yes | 0.49 (0.44 to 0.54) | <0.001 |
| Cerebrovascular disease |  |  |
| No | — |  |
| Yes | 1.80 (1.57 to 2.06) | <0.001 |
| Heart failure |  |  |
| No | — |  |
| Yes | 1.30 (1.15 to 1.47) | <0.001 |
| Diabetes mellitus |  |  |
| No | — |  |
| Yes | 0.56 (0.48 to 0.64) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.72 (0.62 to 0.84) | <0.001 |
| Chronic obstructive pulmonary disease |  |  |
| No | — |  |
| Yes | 0.60 (0.53 to 0.67) | <0.001 |
| HIV/AIDS |  |  |
| No | — |  |
| Yes | 0.36 (0.21 to 0.61) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Ischemic Stroke

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Atrial fibrillation categories |  |  |
| Aortic Aneurysm without Atrial Fibrillation | — |  |
| Aortic Aneurysm with Atrial Fibrillation | 1.77 (1.45 to 2.15) | <0.001 |
| Age, y | 0.97 (0.96 to 0.98) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 0.71 (0.60 to 0.85) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 1.20 (0.79 to 1.82) | 0.39 |
| Black | 1.28 (0.97 to 1.68) | 0.081 |
| Hispanic | 1.20 (0.81 to 1.78) | 0.35 |
| Native American | 0.38 (0.10 to 1.38) | 0.14 |
| Other | 1.29 (0.83 to 2.00) | 0.26 |
| Charlson comorbidity index | 2.07 (1.87 to 2.28) | <0.001 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 1.11 (0.88 to 1.40) | 0.37 |
| $66,000 - $87,999 | 1.11 (0.87 to 1.41) | 0.41 |
| $88,000 or more | 1.14 (0.89 to 1.47) | 0.30 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 1.00 (0.73 to 1.37) | >0.99 |
| Medicare | 0.54 (0.43 to 0.68) | <0.001 |
| Other | 0.86 (0.52 to 1.42) | 0.55 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 1.11 (0.83 to 1.49) | 0.49 |
| South | 1.18 (0.92 to 1.51) | 0.20 |
| West | 1.41 (1.07 to 1.85) | 0.014 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 0.70 (0.56 to 0.88) | 0.002 |
| Small | 0.66 (0.47 to 0.93) | 0.016 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 2.61 (1.24 to 5.50) | 0.012 |
| Urban, teaching | 3.19 (1.59 to 6.43) | 0.001 |
| Hypertension |  |  |
| No | — |  |
| Yes | 0.42 (0.33 to 0.53) | <0.001 |
| Cerebrovascular disease |  |  |
| No | — |  |
| Yes | 1,498,893,758 (1,306,594,732 to 1,719,494,533) | <0.001 |
| Heart failure |  |  |
| No | — |  |
| Yes | 0.53 (0.41 to 0.67) | <0.001 |
| Diabetes mellitus |  |  |
| No | — |  |
| Yes | 0.26 (0.20 to 0.35) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.22 (0.16 to 0.29) | <0.001 |
| Chronic obstructive pulmonary disease |  |  |
| No | — |  |
| Yes | 0.28 (0.22 to 0.35) | <0.001 |
| HIV/AIDS |  |  |
| No | — |  |
| Yes | 0.03 (0.01 to 0.09) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Transient Ischemic Attack

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Atrial fibrillation categories |  |  |
| Aortic Aneurysm without Atrial Fibrillation | — |  |
| Aortic Aneurysm with Atrial Fibrillation | 2.39 (1.49 to 3.83) | <0.001 |
| Age, y | 1.00 (0.98 to 1.02) | 0.90 |
| Sex |  |  |
| Female | — |  |
| Male | 1.21 (0.75 to 1.95) | 0.43 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 0.33 (0.04 to 2.46) | 0.28 |
| Black | 0.79 (0.34 to 1.79) | 0.57 |
| Hispanic | 1.74 (0.84 to 3.60) | 0.14 |
| Native American | 2.47 (0.27 to 22.3) | 0.42 |
| Other | 2.07 (0.76 to 5.61) | 0.15 |
| Charlson comorbidity index | 0.74 (0.56 to 1.00) | 0.047 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 1.30 (0.71 to 2.38) | 0.40 |
| $66,000 - $87,999 | 1.20 (0.62 to 2.32) | 0.59 |
| $88,000 or more | 1.12 (0.56 to 2.27) | 0.75 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 0.44 (0.15 to 1.23) | 0.12 |
| Medicare | 0.69 (0.41 to 1.15) | 0.15 |
| Other | 0.57 (0.15 to 2.21) | 0.42 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 0.96 (0.45 to 2.05) | 0.91 |
| South | 1.30 (0.70 to 2.41) | 0.41 |
| West | 1.26 (0.61 to 2.58) | 0.53 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 1.10 (0.65 to 1.85) | 0.72 |
| Small | 0.57 (0.23 to 1.44) | 0.24 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 0.67 (0.20 to 2.28) | 0.52 |
| Urban, teaching | 0.47 (0.16 to 1.44) | 0.19 |
| Hypertension |  |  |
| No | — |  |
| Yes | 0.81 (0.46 to 1.43) | 0.47 |
| Cerebrovascular disease |  |  |
| No | — |  |
| Yes | 661,822,711 (430,297,704 to 1,017,921,540) | <0.001 |
| Heart failure |  |  |
| No | — |  |
| Yes | 1.25 (0.65 to 2.43) | 0.50 |
| Diabetes mellitus |  |  |
| No | — |  |
| Yes | 1.61 (0.86 to 3.00) | 0.13 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 2.06 (0.98 to 4.35) | 0.058 |
| Chronic obstructive pulmonary disease |  |  |
| No | — |  |
| Yes | 1.32 (0.72 to 2.44) | 0.37 |
| HIV/AIDS |  |  |
| No | — |  |
| Yes | 10.7 (0.85 to 136) | 0.067 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Acute Myocardial Infarction

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Atrial fibrillation categories |  |  |
| Aortic Aneurysm without Atrial Fibrillation | — |  |
| Aortic Aneurysm with Atrial Fibrillation | 1.31 (1.10 to 1.56) | 0.003 |
| Age, y | 1.0 (0.99 to 1.00) | 0.19 |
| Sex |  |  |
| Female | — |  |
| Male | 0.81 (0.69 to 0.97) | 0.018 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 1.54 (1.02 to 2.34) | 0.041 |
| Black | 0.82 (0.62 to 1.09) | 0.16 |
| Hispanic | 1.09 (0.78 to 1.53) | 0.60 |
| Native American | 1.63 (0.57 to 4.68) | 0.36 |
| Other | 1.37 (0.89 to 2.11) | 0.15 |
| Charlson comorbidity index | 2.33 (2.19 to 2.48) | <0.001 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 0.95 (0.76 to 1.19) | 0.65 |
| $66,000 - $87,999 | 0.96 (0.77 to 1.21) | 0.74 |
| $88,000 or more | 0.93 (0.73 to 1.19) | 0.57 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 0.86 (0.62 to 1.19) | 0.36 |
| Medicare | 0.74 (0.59 to 0.92) | 0.007 |
| Other | 0.71 (0.41 to 1.25) | 0.23 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 1.12 (0.87 to 1.44) | 0.37 |
| South | 1.00 (0.81 to 1.24) | >0.99 |
| West | 1.15 (0.89 to 1.48) | 0.27 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 0.99 (0.80 to 1.21) | 0.89 |
| Small | 1.24 (0.96 to 1.60) | 0.10 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 1.57 (0.85 to 2.90) | 0.15 |
| Urban, teaching | 1.48 (0.84 to 2.63) | 0.18 |
| Hypertension |  |  |
| No | — |  |
| Yes | 0.70 (0.57 to 0.86) | <0.001 |
| Cerebrovascular disease |  |  |
| No | — |  |
| Yes | 0.55 (0.42 to 0.70) | <0.001 |
| Heart failure |  |  |
| No | — |  |
| Yes | 1.27 (1.06 to 1.52) | 0.010 |
| Diabetes mellitus |  |  |
| No | — |  |
| Yes | 0.21 (0.16 to 0.27) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.23 (0.18 to 0.29) | <0.001 |
| Chronic obstructive pulmonary disease |  |  |
| No | — |  |
| Yes | 0.40 (0.33 to 0.49) | <0.001 |
| HIV/AIDS |  |  |
| No | — |  |
| Yes | 0.01 (0.00 to 0.02) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Major Bleeding

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Atrial fibrillation categories |  |  |
| Aortic Aneurysm without Atrial Fibrillation | — |  |
| Aortic Aneurysm with Atrial Fibrillation | 1.14 (1.04 to 1.25) | 0.005 |
| Age, y | 1.01 (1.00 to 1.01) | 0.018 |
| Sex |  |  |
| Female | — |  |
| Male | 0.86 (0.80 to 0.94) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 1.36 (1.09 to 1.70) | 0.006 |
| Black | 1.23 (1.09 to 1.39) | <0.001 |
| Hispanic | 1.46 (1.25 to 1.70) | <0.001 |
| Native American | 1.03 (0.56 to 1.91) | 0.93 |
| Other | 1.16 (0.91 to 1.46) | 0.22 |
| Charlson comorbidity index | 1.26 (1.20 to 1.32) | <0.001 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 1.07 (0.96 to 1.19) | 0.20 |
| $66,000 - $87,999 | 0.98 (0.87 to 1.10) | 0.72 |
| $88,000 or more | 1.03 (0.91 to 1.16) | 0.70 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 1.19 (1.00 to 1.40) | 0.046 |
| Medicare | 1.08 (0.96 to 1.21) | 0.21 |
| Other | 1.02 (0.79 to 1.32) | 0.85 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 0.98 (0.86 to 1.11) | 0.73 |
| South | 1.02 (0.92 to 1.14) | 0.67 |
| West | 1.07 (0.94 to 1.21) | 0.33 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 0.97 (0.88 to 1.07) | 0.49 |
| Small | 1.06 (0.93 to 1.20) | 0.38 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 1.15 (0.85 to 1.55) | 0.36 |
| Urban, teaching | 1.22 (0.93 to 1.62) | 0.16 |
| Hypertension |  |  |
| No | — |  |
| Yes | 0.96 (0.86 to 1.08) | 0.52 |
| Cerebrovascular disease |  |  |
| No | — |  |
| Yes | 6.56 (5.88 to 7.32) | <0.001 |
| Heart failure |  |  |
| No | — |  |
| Yes | 0.95 (0.85 to 1.07) | 0.39 |
| Diabetes mellitus |  |  |
| No | — |  |
| Yes | 0.68 (0.60 to 0.77) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.78 (0.68 to 0.89) | <0.001 |
| Chronic obstructive pulmonary disease |  |  |
| No | — |  |
| Yes | 0.92 (0.83 to 1.01) | 0.073 |
| HIV/AIDS |  |  |
| No | — |  |
| Yes | 0.43 (0.27 to 0.69) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Bleeding Requiring Transfusion

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Atrial fibrillation categories |  |  |
| Aortic Aneurysm without Atrial Fibrillation | — |  |
| Aortic Aneurysm with Atrial Fibrillation | 1.53 (1.43 to 1.65) | <0.001 |
| Age, y | 1.0 (0.99 to 1.00) | 0.002 |
| Sex |  |  |
| Female | — |  |
| Male | 0.74 (0.70 to 0.79) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 1.70 (1.44 to 2.01) | <0.001 |
| Black | 1.45 (1.31 to 1.59) | <0.001 |
| Hispanic | 1.51 (1.33 to 1.71) | <0.001 |
| Native American | 0.93 (0.57 to 1.52) | 0.76 |
| Other | 1.37 (1.13 to 1.65) | 0.001 |
| Charlson comorbidity index | 1.19 (1.15 to 1.24) | <0.001 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 1.00 (0.92 to 1.08) | 0.96 |
| $66,000 - $87,999 | 1.02 (0.94 to 1.12) | 0.60 |
| $88,000 or more | 1.17 (1.06 to 1.29) | 0.002 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 1.03 (0.91 to 1.17) | 0.67 |
| Medicare | 0.95 (0.87 to 1.03) | 0.24 |
| Other | 0.94 (0.76 to 1.17) | 0.58 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 1.47 (1.28 to 1.68) | <0.001 |
| South | 1.39 (1.22 to 1.58) | <0.001 |
| West | 1.34 (1.17 to 1.53) | <0.001 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 0.89 (0.80 to 0.99) | 0.036 |
| Small | 1.00 (0.86 to 1.17) | >0.99 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 0.97 (0.78 to 1.21) | 0.81 |
| Urban, teaching | 1.11 (0.91 to 1.35) | 0.32 |
| Hypertension |  |  |
| No | — |  |
| Yes | 0.94 (0.87 to 1.02) | 0.14 |
| Cerebrovascular disease |  |  |
| No | — |  |
| Yes | 3.88 (3.54 to 4.25) | <0.001 |
| Heart failure |  |  |
| No | — |  |
| Yes | 1.07 (0.98 to 1.17) | 0.11 |
| Diabetes mellitus |  |  |
| No | — |  |
| Yes | 0.74 (0.68 to 0.82) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.90 (0.81 to 1.01) | 0.063 |
| Chronic obstructive pulmonary disease |  |  |
| No | — |  |
| Yes | 0.86 (0.80 to 0.92) | <0.001 |
| HIV/AIDS |  |  |
| No | — |  |
| Yes | 0.40 (0.27 to 0.61) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Arterial Embolism

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Atrial fibrillation categories |  |  |
| Aortic Aneurysm without Atrial Fibrillation | — |  |
| Aortic Aneurysm with Atrial Fibrillation | 0.90 (0.80 to 1.00) | 0.053 |
| Age, y | 0.99 (0.99 to 1.00) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 0.77 (0.70 to 0.84) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 0.90 (0.70 to 1.17) | 0.44 |
| Black | 1.01 (0.88 to 1.16) | 0.91 |
| Hispanic | 1.23 (1.04 to 1.46) | 0.014 |
| Native American | 1.54 (0.89 to 2.68) | 0.13 |
| Other | 1.24 (0.98 to 1.57) | 0.072 |
| Charlson comorbidity index | 1.14 (1.08 to 1.19) | <0.001 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 0.92 (0.82 to 1.03) | 0.13 |
| $66,000 - $87,999 | 0.93 (0.83 to 1.05) | 0.26 |
| $88,000 or more | 0.80 (0.70 to 0.91) | <0.001 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 1.21 (1.02 to 1.43) | 0.029 |
| Medicare | 1.03 (0.91 to 1.17) | 0.58 |
| Other | 0.98 (0.75 to 1.27) | 0.88 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 1.00 (0.87 to 1.15) | >0.99 |
| South | 0.98 (0.87 to 1.11) | 0.75 |
| West | 1.17 (1.02 to 1.34) | 0.025 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 0.92 (0.83 to 1.02) | 0.11 |
| Small | 0.84 (0.72 to 0.97) | 0.020 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 0.89 (0.66 to 1.20) | 0.43 |
| Urban, teaching | 1.09 (0.83 to 1.43) | 0.53 |
| Hypertension |  |  |
| No | — |  |
| Yes | 0.85 (0.76 to 0.95) | 0.006 |
| Cerebrovascular disease |  |  |
| No | — |  |
| Yes | 1.31 (1.13 to 1.51) | <0.001 |
| Heart failure |  |  |
| No | — |  |
| Yes | 0.90 (0.80 to 1.02) | 0.11 |
| Diabetes mellitus |  |  |
| No | — |  |
| Yes | 0.69 (0.60 to 0.79) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.97 (0.83 to 1.14) | 0.70 |
| Chronic obstructive pulmonary disease |  |  |
| No | — |  |
| Yes | 1.02 (0.92 to 1.13) | 0.71 |
| HIV/AIDS |  |  |
| No | — |  |
| Yes | 0.37 (0.20 to 0.71) | 0.003 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

## Multivariable Linear Regression:

### Length of Stay:

| **Characteristic** | **Beta** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Atrial fibrillation categories |  |  |
| Aortic Aneurysm without Atrial Fibrillation | — |  |
| Aortic Aneurysm with Atrial Fibrillation | 2.5 (2.3 to 2.7) | <0.001 |
| Age, y | -0.09 (-0.10 to -0.09) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | -0.92 (-1.1 to -0.74) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 1.1 (0.60 to 1.7) | <0.001 |
| Black | 1.7 (1.4 to 2.0) | <0.001 |
| Hispanic | 1.3 (0.88 to 1.7) | <0.001 |
| Native American | -0.20 (-1.1 to 0.74) | 0.67 |
| Other | 0.95 (0.46 to 1.4) | <0.001 |
| Charlson comorbidity index | 0.94 (0.79 to 1.1) | <0.001 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | -0.06 (-0.28 to 0.16) | 0.62 |
| $66,000 - $87,999 | 0.00 (-0.24 to 0.25) | 0.98 |
| $88,000 or more | 0.09 (-0.17 to 0.35) | 0.48 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 1.8 (1.3 to 2.3) | <0.001 |
| Medicare | -0.18 (-0.41 to 0.05) | 0.13 |
| Other | 0.48 (-0.09 to 1.1) | 0.10 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 0.85 (0.49 to 1.2) | <0.001 |
| South | 0.62 (0.35 to 0.90) | <0.001 |
| West | 0.47 (0.19 to 0.75) | <0.001 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | -1.4 (-1.6 to -1.1) | <0.001 |
| Small | -1.6 (-1.9 to -1.4) | <0.001 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 0.71 (0.32 to 1.1) | <0.001 |
| Urban, teaching | 2.2 (1.8 to 2.6) | <0.001 |
| Hypertension |  |  |
| No | — |  |
| Yes | -1.0 (-1.3 to -0.73) | <0.001 |
| Cerebrovascular disease |  |  |
| No | — |  |
| Yes | 3.4 (3.0 to 3.9) | <0.001 |
| Heart failure |  |  |
| No | — |  |
| Yes | 1.2 (0.85 to 1.5) | <0.001 |
| Diabetes mellitus |  |  |
| No | — |  |
| Yes | -1.7 (-2.0 to -1.4) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | -0.50 (-0.89 to -0.11) | 0.011 |
| Chronic obstructive pulmonary disease |  |  |
| No | — |  |
| Yes | -1.1 (-1.4 to -0.91) | <0.001 |
| HIV/AIDS |  |  |
| No | — |  |
| Yes | -5.2 (-6.4 to -4.0) | <0.001 |
| *1*CI = Confidence Interval | | |

### Inflation Adjusted Total Charge:

| **Characteristic** | **Beta** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Atrial fibrillation categories |  |  |
| Aortic Aneurysm without Atrial Fibrillation | — |  |
| Aortic Aneurysm with Atrial Fibrillation | 47,941 (40,621 to 55,261) | <0.001 |
| Age, y | -2,783 (-3,131 to -2,435) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 6,361 (1,199 to 11,522) | 0.016 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 26,644 (2,981 to 50,307) | 0.027 |
| Black | 23,852 (14,251 to 33,452) | <0.001 |
| Hispanic | 40,239 (24,788 to 55,690) | <0.001 |
| Native American | -14,332 (-43,291 to 14,626) | 0.33 |
| Other | 45,354 (23,988 to 66,720) | <0.001 |
| Charlson comorbidity index | 16,310 (12,197 to 20,422) | <0.001 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 6,209 (-507 to 12,925) | 0.070 |
| $66,000 - $87,999 | 6,262 (-1,641 to 14,165) | 0.12 |
| $88,000 or more | 19,413 (9,054 to 29,772) | <0.001 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 14,948 (-652 to 30,547) | 0.060 |
| Medicare | 327 (-7,732 to 8,387) | 0.94 |
| Other | 16,937 (-4,483 to 38,356) | 0.12 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 34,073 (18,832 to 49,314) | <0.001 |
| South | 33,133 (25,613 to 40,653) | <0.001 |
| West | 107,084 (82,039 to 132,129) | <0.001 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | -32,361 (-42,797 to -21,925) | <0.001 |
| Small | -38,304 (-49,943 to -26,666) | <0.001 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 48,425 (37,048 to 59,803) | <0.001 |
| Urban, teaching | 75,489 (66,329 to 84,648) | <0.001 |
| Hypertension |  |  |
| No | — |  |
| Yes | -38,978 (-48,329 to -29,626) | <0.001 |
| Cerebrovascular disease |  |  |
| No | — |  |
| Yes | 99,018 (82,127 to 115,909) | <0.001 |
| Heart failure |  |  |
| No | — |  |
| Yes | 40,971 (26,631 to 55,312) | <0.001 |
| Diabetes mellitus |  |  |
| No | — |  |
| Yes | -28,123 (-36,201 to -20,046) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | -7,887 (-21,650 to 5,876) | 0.26 |
| Chronic obstructive pulmonary disease |  |  |
| No | — |  |
| Yes | -24,755 (-31,262 to -18,247) | <0.001 |
| HIV/AIDS |  |  |
| No | — |  |
| Yes | -118,687 (-154,398 to -82,977) | <0.001 |
| *1*CI = Confidence Interval | | |