Association of Diabetes Mellitus with In-Hospital Outcomes of Patients with Hypertensive Crisis

Analysis for RCOP NIS Cardio3

Muhammad Saad

## Preamble:

* **Reference Papers:**
  + [Sethupathi et al. 2024](https://linkinghub.elsevier.com/retrieve/pii/S1553838923000647)
* **Study Objective**: Investigate the impact of diabetes on outcomes in patients hospitalized with a hypertensive crisis
* **Data Source**: Cross-sectional analysis of the National Inpatient Sample (NIS) from 2018 to 2020.
* **Patient Selection**: Included all inpatient admissions with a primary diagnosis of hypertensive crisis
* **Hypertensive Crisis Categories**:
  + Hypertensive Crisis with Diabetes
  + Hypertensive Crisis without Diabetes
* **Primary Outcomes**:
  + In-hospital all-cause mortality
  + Total hospital length of stay (days)
  + Total charge, inflation adjusted to 2020 ($)
* **Secondary Outcomes**:
  + Acute heart failure
  + Ischemic stroke
  + Transient ischemic attack
  + Hemorrhagic stroke
  + Acute kidney injury
  + Acute myocardial infarction
  + Aortic dissection
* **Statistical Analysis**: Multiple logistic and linear regression to evaluate the independent association of diabetes with in-hospital outcomes in hypertensive crisis patients, adjusted for:
  + Demographics: Age, sex, race, residential income, insurance, hospital region, hospital bedsize, hospital location, and teaching status.
  + Medical History: Coronary artery disease, previous heart failure, hypercholesterolemia, obesity, peripheral vascular disease, chronic pulmonary disease, chronic kidney disease, atrial fibrillation, liver disease, anemia, dementia, smoking status, previous myocardial infarction, previous percutaneous coronary intervention (PCI), previous coronary artery bypass grafting (CABG), previous implantable cardioverter-defibrillator (ICD) insertion, previous pacemaker or cardiac resynchronization therapy (CRT) insertion, and previous stroke or TIA.
  + 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** | **Hypertensive Crisis without Diabetes** N = 258,270*1* | **Hypertensive Crisis with Diabetes** N = 171,090*1* | **p-value***2* | **Overall** N = 429,360*1* |
| --- | --- | --- | --- | --- |
| Age, y | 61 (18) | 63 (15) | <0.001 | 61 (17) |
| Sex |  |  | <0.001 |  |
| Female | 141,440 (55) | 97,275 (57) |  | 238,715 (56) |
| Male | 116,820 (45) | 73,815 (43) |  | 190,635 (44) |
| Race |  |  | <0.001 |  |
| White | 124,115 (49) | 64,750 (39) |  | 188,865 (45) |
| Asian or Pacific Islander | 5,645 (2.2) | 5,010 (3.0) |  | 10,655 (2.5) |
| Black | 92,035 (36) | 67,100 (40) |  | 159,135 (38) |
| Hispanic | 23,205 (9.2) | 24,400 (15) |  | 47,605 (11) |
| Native American | 905 (0.4) | 1,210 (0.7) |  | 2,115 (0.5) |
| Other | 6,940 (2.7) | 5,255 (3.1) |  | 12,195 (2.9) |
| Residential income |  |  | <0.001 |  |
| $1 - $51,999 | 96,825 (38) | 71,470 (43) |  | 168,295 (40) |
| $52,000 - $65,999 | 65,695 (26) | 43,890 (26) |  | 109,585 (26) |
| $66,000 - $87,999 | 53,635 (21) | 33,030 (20) |  | 86,665 (21) |
| $88,000 or more | 37,655 (15) | 19,755 (12) |  | 57,410 (14) |
| Expected primary payer |  |  | <0.001 |  |
| Private | 83,690 (32) | 40,530 (24) |  | 124,220 (29) |
| Medicaid | 46,925 (18) | 30,060 (18) |  | 76,985 (18) |
| Medicare | 121,245 (47) | 96,605 (57) |  | 217,850 (51) |
| Other | 6,005 (2.3) | 3,660 (2.1) |  | 9,665 (2.3) |
| Hospital region |  |  | <0.001 |  |
| Midwest | 54,455 (21) | 33,665 (20) |  | 88,120 (21) |
| Northeast | 45,545 (18) | 28,550 (17) |  | 74,095 (17) |
| South | 121,130 (47) | 83,160 (49) |  | 204,290 (48) |
| West | 37,140 (14) | 25,715 (15) |  | 62,855 (15) |
| Hospital bedsize |  |  | <0.001 |  |
| Large | 119,860 (46) | 81,965 (48) |  | 201,825 (47) |
| Medium | 78,265 (30) | 51,650 (30) |  | 129,915 (30) |
| Small | 60,145 (23) | 37,475 (22) |  | 97,620 (23) |
| Hospital location and teaching status |  |  | <0.001 |  |
| Rural | 20,730 (8.0) | 12,680 (7.4) |  | 33,410 (7.8) |
| Urban, non-teaching | 50,295 (19) | 32,035 (19) |  | 82,330 (19) |
| Urban, teaching | 187,245 (72) | 126,375 (74) |  | 313,620 (73) |
| Charlson comorbidity index | 1.71 (1.65) | 3.84 (1.97) | <0.001 | 2.56 (2.07) |
| Coronary artery disease | 56,165 (22) | 58,105 (34) | <0.001 | 114,270 (27) |
| Previous congestive heart failure | 34,285 (13) | 29,100 (17) | <0.001 | 63,385 (15) |
| Hypercholesterolemia | 99,600 (39) | 102,310 (60) | <0.001 | 201,910 (47) |
| Obesity | 49,740 (19) | 46,185 (27) | <0.001 | 95,925 (22) |
| Peripheral vascular disease | 25,900 (10) | 12,665 (7.4) | <0.001 | 38,565 (9.0) |
| Chronic pulmonary disease | 45,235 (18) | 33,680 (20) | <0.001 | 78,915 (18) |
| Chronic kidney disease | 84,375 (33) | 88,255 (52) | <0.001 | 172,630 (40) |
| Atrial fibrillation | 27,760 (11) | 19,085 (11) | 0.066 | 46,845 (11) |
| Liver disease | 8,000 (3.1) | 6,540 (3.8) | <0.001 | 14,540 (3.4) |
| Anemia | 53,220 (21) | 54,135 (32) | <0.001 | 107,355 (25) |
| Dementia | 14,445 (5.6) | 10,580 (6.2) | <0.001 | 25,025 (5.8) |
| Smoking status | 50,710 (20) | 22,260 (13) | <0.001 | 72,970 (17) |
| Previous myocardial infarction | 18,755 (7.3) | 18,535 (11) | <0.001 | 37,290 (8.7) |
| Previous PCI | 17,580 (6.8) | 19,905 (12) | <0.001 | 37,485 (8.7) |
| Previous CABG | 9,640 (3.7) | 11,905 (7.0) | <0.001 | 21,545 (5.0) |
| Previous ICD insertion | 2,245 (0.9) | 1,875 (1.1) | <0.001 | 4,120 (1.0) |
| Previous PPM or CRT insertion | 5,780 (2.2) | 4,105 (2.4) | 0.13 | 9,885 (2.3) |
| Previous stroke/TIA | 37,800 (15) | 34,465 (20) | <0.001 | 72,265 (17) |
| *1*Mean (SD); n (%) | | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | | |

## Outcomes Table:

| **Characteristic** | **Hypertensive Crisis without Diabetes** N = 258,270*1* | **Hypertensive Crisis with Diabetes** N = 171,090*1* | **p-value***2* | **Overall** N = 429,360*1* |
| --- | --- | --- | --- | --- |
| Died during hospitalization | 700 (0.3) | 410 (0.2) | 0.37 | 1,110 (0.3) |
| Length of stay (days) | 2.00 (1.00 – 4.00) | 3.00 (2.00 – 4.00) | <0.001 | 2.00 (1.00 – 4.00) |
| Inflation-adjusted total charge ($) | 26,496 (16,537 – 43,081) | 30,022 (18,459 – 49,371) | <0.001 | 27,825 (17,260 – 45,522) |
| Acute heart failure | 24,665 (9.6) | 19,925 (12) | <0.001 | 44,590 (10) |
| Ischemic stroke | 4,170 (1.6) | 2,990 (1.7) | 0.14 | 7,160 (1.7) |
| Transient ischemic attack | 3,570 (1.4) | 2,295 (1.3) | 0.61 | 5,865 (1.4) |
| Hemorrhagic stroke | 1,520 (0.6) | 760 (0.4) | 0.003 | 2,280 (0.5) |
| Acute kidney injury | 54,020 (21) | 45,195 (26) | <0.001 | 99,215 (23) |
| Acute myocardial infarction | 17,900 (6.9) | 12,690 (7.4) | 0.008 | 30,590 (7.1) |
| Aortic dissection | 1,735 (0.7) | 365 (0.2) | <0.001 | 2,100 (0.5) |
| *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** |
| --- | --- | --- |
| Hypertensive Crisis Categories |  |  |
| Hypertensive Crisis without Diabetes | — |  |
| Hypertensive Crisis with Diabetes | 0.43 (0.31 to 0.60) | <0.001 |
| Age, y | 1.04 (1.03 to 1.05) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 1.45 (1.09 to 1.95) | 0.012 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 0.78 (0.31 to 1.97) | 0.60 |
| Black | 0.74 (0.52 to 1.05) | 0.088 |
| Hispanic | 0.68 (0.41 to 1.14) | 0.15 |
| Native American | 0.00 (0.00 to 0.00) | <0.001 |
| Other | 1.35 (0.67 to 2.71) | 0.40 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 0.93 (0.66 to 1.32) | 0.69 |
| $66,000 - $87,999 | 0.95 (0.66 to 1.38) | 0.80 |
| $88,000 or more | 0.70 (0.44 to 1.11) | 0.13 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 1.22 (0.76 to 1.96) | 0.41 |
| Medicare | 0.74 (0.50 to 1.11) | 0.14 |
| Other | 0.43 (0.10 to 1.78) | 0.24 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 0.91 (0.56 to 1.48) | 0.70 |
| South | 1.36 (0.93 to 1.98) | 0.12 |
| West | 1.38 (0.86 to 2.22) | 0.18 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 1.09 (0.80 to 1.49) | 0.60 |
| Small | 0.81 (0.56 to 1.18) | 0.27 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 1.18 (0.59 to 2.39) | 0.64 |
| Urban, teaching | 1.75 (0.93 to 3.30) | 0.081 |
| Charlson comorbidity index | 1.51 (1.42 to 1.60) | <0.001 |
| Coronary artery disease |  |  |
| No | — |  |
| Yes | 1.25 (0.89 to 1.76) | 0.19 |
| Previous heart failure |  |  |
| No | — |  |
| Yes | 0.63 (0.42 to 0.93) | 0.021 |
| Hypercholesterolemia |  |  |
| No | — |  |
| Yes | 0.45 (0.33 to 0.61) | <0.001 |
| Obesity |  |  |
| No | — |  |
| Yes | 1.03 (0.71 to 1.52) | 0.86 |
| Peripheral vascular disease |  |  |
| No | — |  |
| Yes | 0.81 (0.52 to 1.25) | 0.34 |
| Chronic pulmonary disease |  |  |
| No | — |  |
| Yes | 0.63 (0.44 to 0.92) | 0.017 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.60 (0.42 to 0.85) | 0.004 |
| Atrial fibrillation |  |  |
| No | — |  |
| Yes | 1.79 (1.27 to 2.52) | <0.001 |
| Liver disease |  |  |
| No | — |  |
| Yes | 1.52 (0.87 to 2.67) | 0.14 |
| Anemia |  |  |
| No | — |  |
| Yes | 1.61 (1.17 to 2.22) | 0.004 |
| Dementia |  |  |
| No | — |  |
| Yes | 1.03 (0.67 to 1.59) | 0.89 |
| Smoking status |  |  |
| No | — |  |
| Yes | 0.78 (0.49 to 1.25) | 0.30 |
| Previous myocardial infarction |  |  |
| No | — |  |
| Yes | 0.47 (0.25 to 0.86) | 0.014 |
| Previous PCI |  |  |
| No | — |  |
| Yes | 0.68 (0.38 to 1.22) | 0.19 |
| Previous CABG |  |  |
| No | — |  |
| Yes | 0.58 (0.28 to 1.20) | 0.14 |
| Previous ICD insertion |  |  |
| No | — |  |
| Yes | 0.80 (0.19 to 3.33) | 0.76 |
| Previous PPM or CRT insertion |  |  |
| No | — |  |
| Yes | 0.74 (0.32 to 1.71) | 0.48 |
| Previous stroke/TIA |  |  |
| No | — |  |
| Yes | 0.83 (0.57 to 1.22) | 0.35 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Acute Heart Failure

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Hypertensive Crisis Categories |  |  |
| Hypertensive Crisis without Diabetes | — |  |
| Hypertensive Crisis with Diabetes | 0.43 (0.41 to 0.47) | <0.001 |
| Age, y | 1.01 (1.00 to 1.01) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 1.40 (1.33 to 1.47) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 1.37 (1.17 to 1.61) | <0.001 |
| Black | 1.38 (1.30 to 1.47) | <0.001 |
| Hispanic | 1.08 (0.98 to 1.18) | 0.12 |
| Native American | 1.18 (0.86 to 1.63) | 0.30 |
| Other | 1.13 (0.96 to 1.32) | 0.14 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 0.94 (0.89 to 1.00) | 0.065 |
| $66,000 - $87,999 | 0.96 (0.89 to 1.03) | 0.22 |
| $88,000 or more | 0.90 (0.83 to 0.98) | 0.017 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 1.0 (0.93 to 1.07) | 0.89 |
| Medicare | 0.69 (0.64 to 0.74) | <0.001 |
| Other | 0.66 (0.56 to 0.80) | <0.001 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 1.12 (1.02 to 1.22) | 0.016 |
| South | 1.17 (1.09 to 1.25) | <0.001 |
| West | 1.13 (1.03 to 1.24) | 0.010 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 1.02 (0.96 to 1.08) | 0.58 |
| Small | 1.05 (0.98 to 1.12) | 0.20 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 0.80 (0.72 to 0.90) | <0.001 |
| Urban, teaching | 0.85 (0.77 to 0.93) | <0.001 |
| Charlson comorbidity index | 1.76 (1.71 to 1.80) | <0.001 |
| Coronary artery disease |  |  |
| No | — |  |
| Yes | 1.66 (1.55 to 1.77) | <0.001 |
| Previous heart failure |  |  |
| No | — |  |
| Yes | 0.71 (0.66 to 0.77) | <0.001 |
| Hypercholesterolemia |  |  |
| No | — |  |
| Yes | 0.90 (0.85 to 0.95) | <0.001 |
| Obesity |  |  |
| No | — |  |
| Yes | 1.76 (1.67 to 1.86) | <0.001 |
| Peripheral vascular disease |  |  |
| No | — |  |
| Yes | 0.55 (0.50 to 0.60) | <0.001 |
| Chronic pulmonary disease |  |  |
| No | — |  |
| Yes | 0.79 (0.74 to 0.84) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.34 (0.31 to 0.37) | <0.001 |
| Atrial fibrillation |  |  |
| No | — |  |
| Yes | 1.81 (1.68 to 1.94) | <0.001 |
| Liver disease |  |  |
| No | — |  |
| Yes | 0.49 (0.43 to 0.57) | <0.001 |
| Anemia |  |  |
| No | — |  |
| Yes | 1.28 (1.21 to 1.36) | <0.001 |
| Dementia |  |  |
| No | — |  |
| Yes | 0.40 (0.35 to 0.45) | <0.001 |
| Smoking status |  |  |
| No | — |  |
| Yes | 1.30 (1.22 to 1.38) | <0.001 |
| Previous myocardial infarction |  |  |
| No | — |  |
| Yes | 0.64 (0.58 to 0.70) | <0.001 |
| Previous PCI |  |  |
| No | — |  |
| Yes | 0.84 (0.77 to 0.92) | <0.001 |
| Previous CABG |  |  |
| No | — |  |
| Yes | 1.03 (0.93 to 1.14) | 0.56 |
| Previous ICD insertion |  |  |
| No | — |  |
| Yes | 2.34 (1.93 to 2.84) | <0.001 |
| Previous PPM or CRT insertion |  |  |
| No | — |  |
| Yes | 1.44 (1.25 to 1.65) | <0.001 |
| Previous stroke/TIA |  |  |
| No | — |  |
| Yes | 0.60 (0.55 to 0.64) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Acute Ischemic Stroke

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Hypertensive Crisis Categories |  |  |
| Hypertensive Crisis without Diabetes | — |  |
| Hypertensive Crisis with Diabetes | 0.48 (0.42 to 0.55) | <0.001 |
| Age, y | 1.01 (1.00 to 1.01) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 1.22 (1.09 to 1.38) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 0.96 (0.65 to 1.41) | 0.82 |
| Black | 0.79 (0.68 to 0.91) | <0.001 |
| Hispanic | 0.83 (0.67 to 1.01) | 0.065 |
| Native American | 0.43 (0.14 to 1.34) | 0.15 |
| Other | 0.93 (0.67 to 1.30) | 0.67 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 1.01 (0.87 to 1.17) | 0.92 |
| $66,000 - $87,999 | 1.19 (1.01 to 1.40) | 0.034 |
| $88,000 or more | 1.08 (0.89 to 1.30) | 0.43 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 0.86 (0.72 to 1.03) | 0.11 |
| Medicare | 0.74 (0.64 to 0.86) | <0.001 |
| Other | 1.02 (0.71 to 1.47) | 0.91 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 0.96 (0.80 to 1.16) | 0.67 |
| South | 1.03 (0.88 to 1.20) | 0.73 |
| West | 1.06 (0.86 to 1.31) | 0.59 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 1.30 (1.13 to 1.48) | <0.001 |
| Small | 1.17 (1.01 to 1.36) | 0.040 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 0.87 (0.68 to 1.10) | 0.25 |
| Urban, teaching | 0.80 (0.64 to 1.00) | 0.052 |
| Charlson comorbidity index | 1.80 (1.76 to 1.85) | <0.001 |
| Coronary artery disease |  |  |
| No | — |  |
| Yes | 0.70 (0.59 to 0.83) | <0.001 |
| Previous heart failure |  |  |
| No | — |  |
| Yes | 0.67 (0.57 to 0.79) | <0.001 |
| Hypercholesterolemia |  |  |
| No | — |  |
| Yes | 1.20 (1.06 to 1.37) | 0.004 |
| Obesity |  |  |
| No | — |  |
| Yes | 0.96 (0.83 to 1.11) | 0.60 |
| Peripheral vascular disease |  |  |
| No | — |  |
| Yes | 0.68 (0.56 to 0.83) | <0.001 |
| Chronic pulmonary disease |  |  |
| No | — |  |
| Yes | 0.35 (0.29 to 0.41) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.22 (0.19 to 0.26) | <0.001 |
| Atrial fibrillation |  |  |
| No | — |  |
| Yes | 0.89 (0.74 to 1.08) | 0.23 |
| Liver disease |  |  |
| No | — |  |
| Yes | 0.38 (0.26 to 0.54) | <0.001 |
| Anemia |  |  |
| No | — |  |
| Yes | 0.62 (0.53 to 0.73) | <0.001 |
| Dementia |  |  |
| No | — |  |
| Yes | 0.60 (0.48 to 0.76) | <0.001 |
| Smoking status |  |  |
| No | — |  |
| Yes | 1.10 (0.93 to 1.30) | 0.25 |
| Previous myocardial infarction |  |  |
| No | — |  |
| Yes | 0.52 (0.41 to 0.67) | <0.001 |
| Previous PCI |  |  |
| No | — |  |
| Yes | 0.63 (0.48 to 0.84) | 0.001 |
| Previous CABG |  |  |
| No | — |  |
| Yes | 0.80 (0.59 to 1.10) | 0.17 |
| Previous ICD insertion |  |  |
| No | — |  |
| Yes | 0.45 (0.19 to 1.03) | 0.060 |
| Previous PPM or CRT insertion |  |  |
| No | — |  |
| Yes | 0.95 (0.64 to 1.40) | 0.79 |
| Previous stroke/TIA |  |  |
| No | — |  |
| Yes | 1.45 (1.25 to 1.68) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Transient Ischemic Attack

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Hypertensive Crisis Categories |  |  |
| Hypertensive Crisis without Diabetes | — |  |
| Hypertensive Crisis with Diabetes | 0.50 (0.44 to 0.58) | <0.001 |
| Age, y | 1.02 (1.02 to 1.03) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 1.00 (0.88 to 1.15) | 0.97 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 0.84 (0.55 to 1.27) | 0.40 |
| Black | 0.68 (0.58 to 0.80) | <0.001 |
| Hispanic | 0.87 (0.70 to 1.07) | 0.19 |
| Native American | 0.52 (0.17 to 1.65) | 0.27 |
| Other | 0.82 (0.56 to 1.19) | 0.30 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 1.01 (0.86 to 1.18) | 0.93 |
| $66,000 - $87,999 | 1.00 (0.84 to 1.18) | 0.97 |
| $88,000 or more | 1.05 (0.86 to 1.28) | 0.64 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 0.68 (0.54 to 0.86) | 0.001 |
| Medicare | 0.78 (0.66 to 0.93) | 0.004 |
| Other | 0.82 (0.52 to 1.29) | 0.38 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 0.95 (0.77 to 1.16) | 0.58 |
| South | 1.02 (0.86 to 1.20) | 0.84 |
| West | 0.97 (0.77 to 1.20) | 0.76 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 1.26 (1.09 to 1.45) | 0.002 |
| Small | 1.21 (1.03 to 1.41) | 0.020 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 0.82 (0.64 to 1.04) | 0.10 |
| Urban, teaching | 0.67 (0.54 to 0.83) | <0.001 |
| Charlson comorbidity index | 1.61 (1.57 to 1.65) | <0.001 |
| Coronary artery disease |  |  |
| No | — |  |
| Yes | 0.88 (0.75 to 1.04) | 0.15 |
| Previous heart failure |  |  |
| No | — |  |
| Yes | 0.55 (0.45 to 0.67) | <0.001 |
| Hypercholesterolemia |  |  |
| No | — |  |
| Yes | 1.45 (1.27 to 1.66) | <0.001 |
| Obesity |  |  |
| No | — |  |
| Yes | 1.05 (0.90 to 1.23) | 0.55 |
| Peripheral vascular disease |  |  |
| No | — |  |
| Yes | 0.65 (0.53 to 0.80) | <0.001 |
| Chronic pulmonary disease |  |  |
| No | — |  |
| Yes | 0.52 (0.44 to 0.62) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.23 (0.20 to 0.27) | <0.001 |
| Atrial fibrillation |  |  |
| No | — |  |
| Yes | 0.90 (0.75 to 1.08) | 0.26 |
| Liver disease |  |  |
| No | — |  |
| Yes | 0.37 (0.24 to 0.57) | <0.001 |
| Anemia |  |  |
| No | — |  |
| Yes | 0.72 (0.61 to 0.86) | <0.001 |
| Dementia |  |  |
| No | — |  |
| Yes | 0.60 (0.48 to 0.75) | <0.001 |
| Smoking status |  |  |
| No | — |  |
| Yes | 0.90 (0.74 to 1.10) | 0.31 |
| Previous myocardial infarction |  |  |
| No | — |  |
| Yes | 0.53 (0.41 to 0.68) | <0.001 |
| Previous PCI |  |  |
| No | — |  |
| Yes | 0.79 (0.61 to 1.02) | 0.070 |
| Previous CABG |  |  |
| No | — |  |
| Yes | 0.91 (0.68 to 1.20) | 0.50 |
| Previous ICD insertion |  |  |
| No | — |  |
| Yes | 0.89 (0.43 to 1.84) | 0.75 |
| Previous PPM or CRT insertion |  |  |
| No | — |  |
| Yes | 1.08 (0.77 to 1.53) | 0.66 |
| Previous stroke/TIA |  |  |
| No | — |  |
| Yes | 1.42 (1.23 to 1.64) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Hemorrhagic stroke

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Hypertensive Crisis Categories |  |  |
| Hypertensive Crisis without Diabetes | — |  |
| Hypertensive Crisis with Diabetes | 0.38 (0.30 to 0.48) | <0.001 |
| Age, y | 1.02 (1.01 to 1.02) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 1.47 (1.20 to 1.80) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 1.79 (1.10 to 2.93) | 0.020 |
| Black | 0.90 (0.70 to 1.16) | 0.43 |
| Hispanic | 1.18 (0.85 to 1.63) | 0.31 |
| Native American | 1.24 (0.30 to 5.10) | 0.77 |
| Other | 0.75 (0.39 to 1.43) | 0.38 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 1.28 (0.98 to 1.67) | 0.071 |
| $66,000 - $87,999 | 1.15 (0.87 to 1.53) | 0.33 |
| $88,000 or more | 1.22 (0.89 to 1.66) | 0.22 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 0.86 (0.63 to 1.17) | 0.34 |
| Medicare | 0.65 (0.50 to 0.84) | 0.001 |
| Other | 0.82 (0.42 to 1.62) | 0.57 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 0.90 (0.65 to 1.23) | 0.50 |
| South | 0.94 (0.71 to 1.23) | 0.64 |
| West | 1.10 (0.79 to 1.54) | 0.58 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 0.74 (0.58 to 0.94) | 0.013 |
| Small | 0.69 (0.53 to 0.89) | 0.005 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 1.87 (0.98 to 3.57) | 0.057 |
| Urban, teaching | 3.24 (1.78 to 5.89) | <0.001 |
| Charlson comorbidity index | 1.66 (1.61 to 1.71) | <0.001 |
| Coronary artery disease |  |  |
| No | — |  |
| Yes | 0.48 (0.36 to 0.66) | <0.001 |
| Previous heart failure |  |  |
| No | — |  |
| Yes | 0.66 (0.49 to 0.89) | 0.006 |
| Hypercholesterolemia |  |  |
| No | — |  |
| Yes | 0.95 (0.77 to 1.18) | 0.67 |
| Obesity |  |  |
| No | — |  |
| Yes | 0.91 (0.70 to 1.20) | 0.51 |
| Peripheral vascular disease |  |  |
| No | — |  |
| Yes | 0.59 (0.41 to 0.84) | 0.004 |
| Chronic pulmonary disease |  |  |
| No | — |  |
| Yes | 0.59 (0.45 to 0.78) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.22 (0.17 to 0.29) | <0.001 |
| Atrial fibrillation |  |  |
| No | — |  |
| Yes | 1.15 (0.85 to 1.57) | 0.36 |
| Liver disease |  |  |
| No | — |  |
| Yes | 0.40 (0.22 to 0.73) | 0.003 |
| Anemia |  |  |
| No | — |  |
| Yes | 0.82 (0.64 to 1.07) | 0.14 |
| Dementia |  |  |
| No | — |  |
| Yes | 0.61 (0.41 to 0.90) | 0.013 |
| Smoking status |  |  |
| No | — |  |
| Yes | 0.81 (0.61 to 1.08) | 0.15 |
| Previous myocardial infarction |  |  |
| No | — |  |
| Yes | 0.45 (0.28 to 0.71) | <0.001 |
| Previous PCI |  |  |
| No | — |  |
| Yes | 0.91 (0.57 to 1.46) | 0.71 |
| Previous CABG |  |  |
| No | — |  |
| Yes | 1.21 (0.71 to 2.06) | 0.47 |
| Previous ICD insertion |  |  |
| No | — |  |
| Yes | 0.86 (0.26 to 2.85) | 0.81 |
| Previous PPM or CRT insertion |  |  |
| No | — |  |
| Yes | 0.73 (0.36 to 1.50) | 0.40 |
| Previous stroke/TIA |  |  |
| No | — |  |
| Yes | 1.54 (1.22 to 1.94) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Acute Kidney Injury

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Hypertensive Crisis Categories |  |  |
| Hypertensive Crisis without Diabetes | — |  |
| Hypertensive Crisis with Diabetes | 0.90 (0.86 to 0.95) | <0.001 |
| Age, y | 1.01 (1.01 to 1.01) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 1.41 (1.36 to 1.46) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 0.92 (0.82 to 1.04) | 0.17 |
| Black | 1.20 (1.15 to 1.26) | <0.001 |
| Hispanic | 0.96 (0.90 to 1.03) | 0.25 |
| Native American | 0.95 (0.74 to 1.23) | 0.71 |
| Other | 1.05 (0.94 to 1.17) | 0.38 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 0.97 (0.93 to 1.02) | 0.23 |
| $66,000 - $87,999 | 0.97 (0.92 to 1.02) | 0.28 |
| $88,000 or more | 0.98 (0.92 to 1.04) | 0.55 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 0.94 (0.90 to 1.00) | 0.034 |
| Medicare | 0.52 (0.50 to 0.55) | <0.001 |
| Other | 0.86 (0.77 to 0.97) | 0.011 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 1.02 (0.95 to 1.09) | 0.57 |
| South | 1.05 (1.00 to 1.11) | 0.067 |
| West | 1.15 (1.07 to 1.23) | <0.001 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 0.98 (0.94 to 1.03) | 0.39 |
| Small | 0.95 (0.90 to 1.00) | 0.036 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 1.17 (1.07 to 1.27) | <0.001 |
| Urban, teaching | 1.30 (1.20 to 1.41) | <0.001 |
| Charlson comorbidity index | 1.13 (1.11 to 1.15) | <0.001 |
| Coronary artery disease |  |  |
| No | — |  |
| Yes | 0.92 (0.88 to 0.97) | 0.002 |
| Previous heart failure |  |  |
| No | — |  |
| Yes | 0.95 (0.90 to 1.00) | 0.042 |
| Hypercholesterolemia |  |  |
| No | — |  |
| Yes | 0.96 (0.92 to 0.99) | 0.020 |
| Obesity |  |  |
| No | — |  |
| Yes | 1.27 (1.22 to 1.32) | <0.001 |
| Peripheral vascular disease |  |  |
| No | — |  |
| Yes | 1.05 (0.98 to 1.13) | 0.13 |
| Chronic pulmonary disease |  |  |
| No | — |  |
| Yes | 0.79 (0.75 to 0.83) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 3.27 (3.08 to 3.48) | <0.001 |
| Atrial fibrillation |  |  |
| No | — |  |
| Yes | 0.94 (0.88 to 1.00) | 0.039 |
| Liver disease |  |  |
| No | — |  |
| Yes | 0.83 (0.75 to 0.91) | <0.001 |
| Anemia |  |  |
| No | — |  |
| Yes | 0.97 (0.93 to 1.01) | 0.13 |
| Dementia |  |  |
| No | — |  |
| Yes | 1.09 (1.01 to 1.18) | 0.029 |
| Smoking status |  |  |
| No | — |  |
| Yes | 1.07 (1.02 to 1.12) | 0.006 |
| Previous myocardial infarction |  |  |
| No | — |  |
| Yes | 0.86 (0.80 to 0.92) | <0.001 |
| Previous PCI |  |  |
| No | — |  |
| Yes | 0.93 (0.87 to 1.00) | 0.068 |
| Previous CABG |  |  |
| No | — |  |
| Yes | 0.98 (0.90 to 1.07) | 0.72 |
| Previous ICD insertion |  |  |
| No | — |  |
| Yes | 0.74 (0.61 to 0.90) | 0.003 |
| Previous PPM or CRT insertion |  |  |
| No | — |  |
| Yes | 0.68 (0.60 to 0.78) | <0.001 |
| Previous stroke/TIA |  |  |
| No | — |  |
| Yes | 0.91 (0.87 to 0.96) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Acute Myocardial Infarction

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Hypertensive Crisis Categories |  |  |
| Hypertensive Crisis without Diabetes | — |  |
| Hypertensive Crisis with Diabetes | 0.29 (0.27 to 0.32) | <0.001 |
| Age, y | 1.00 (1.00 to 1.00) | 0.10 |
| Sex |  |  |
| Female | — |  |
| Male | 1.27 (1.19 to 1.35) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 1.03 (0.86 to 1.24) | 0.72 |
| Black | 0.96 (0.88 to 1.04) | 0.29 |
| Hispanic | 0.96 (0.85 to 1.08) | 0.47 |
| Native American | 1.16 (0.79 to 1.72) | 0.44 |
| Other | 0.98 (0.80 to 1.20) | 0.83 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 0.93 (0.85 to 1.01) | 0.081 |
| $66,000 - $87,999 | 0.84 (0.76 to 0.92) | <0.001 |
| $88,000 or more | 0.78 (0.70 to 0.88) | <0.001 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 0.96 (0.87 to 1.05) | 0.38 |
| Medicare | 0.83 (0.76 to 0.90) | <0.001 |
| Other | 1.01 (0.81 to 1.25) | 0.95 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 0.93 (0.80 to 1.08) | 0.34 |
| South | 0.82 (0.72 to 0.92) | 0.001 |
| West | 0.93 (0.81 to 1.08) | 0.36 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 0.87 (0.78 to 0.97) | 0.015 |
| Small | 0.84 (0.75 to 0.94) | 0.003 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 0.99 (0.83 to 1.19) | 0.95 |
| Urban, teaching | 1.29 (1.10 to 1.53) | 0.002 |
| Charlson comorbidity index | 1.99 (1.92 to 2.05) | <0.001 |
| Coronary artery disease |  |  |
| No | — |  |
| Yes | 2.11 (1.95 to 2.28) | <0.001 |
| Previous heart failure |  |  |
| No | — |  |
| Yes | 0.90 (0.83 to 0.97) | 0.008 |
| Hypercholesterolemia |  |  |
| No | — |  |
| Yes | 1.04 (0.97 to 1.11) | 0.25 |
| Obesity |  |  |
| No | — |  |
| Yes | 1.24 (1.15 to 1.33) | <0.001 |
| Peripheral vascular disease |  |  |
| No | — |  |
| Yes | 0.50 (0.45 to 0.56) | <0.001 |
| Chronic pulmonary disease |  |  |
| No | — |  |
| Yes | 0.48 (0.44 to 0.52) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 0.29 (0.26 to 0.32) | <0.001 |
| Atrial fibrillation |  |  |
| No | — |  |
| Yes | 1.07 (0.97 to 1.17) | 0.17 |
| Liver disease |  |  |
| No | — |  |
| Yes | 0.46 (0.39 to 0.55) | <0.001 |
| Anemia |  |  |
| No | — |  |
| Yes | 0.96 (0.89 to 1.04) | 0.33 |
| Dementia |  |  |
| No | — |  |
| Yes | 0.58 (0.51 to 0.66) | <0.001 |
| Smoking status |  |  |
| No | — |  |
| Yes | 1.24 (1.15 to 1.35) | <0.001 |
| Previous myocardial infarction |  |  |
| No | — |  |
| Yes | 0.57 (0.51 to 0.63) | <0.001 |
| Previous PCI |  |  |
| No | — |  |
| Yes | 0.92 (0.83 to 1.02) | 0.12 |
| Previous CABG |  |  |
| No | — |  |
| Yes | 0.78 (0.68 to 0.88) | <0.001 |
| Previous ICD insertion |  |  |
| No | — |  |
| Yes | 0.79 (0.59 to 1.04) | 0.091 |
| Previous PPM or CRT insertion |  |  |
| No | — |  |
| Yes | 0.76 (0.62 to 0.93) | 0.006 |
| Previous stroke/TIA |  |  |
| No | — |  |
| Yes | 0.64 (0.59 to 0.70) | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

### Aortic Dissection

| **Characteristic** | **OR** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Hypertensive Crisis Categories |  |  |
| Hypertensive Crisis without Diabetes | — |  |
| Hypertensive Crisis with Diabetes | 0.63 (0.43 to 0.94) | 0.024 |
| Age, y | 0.98 (0.97 to 0.98) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 1.64 (1.31 to 2.04) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 1.41 (0.73 to 2.73) | 0.30 |
| Black | 1.70 (1.32 to 2.18) | <0.001 |
| Hispanic | 1.04 (0.64 to 1.70) | 0.87 |
| Native American | 0.66 (0.09 to 4.58) | 0.67 |
| Other | 1.17 (0.53 to 2.57) | 0.70 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | 1.02 (0.77 to 1.34) | 0.91 |
| $66,000 - $87,999 | 1.13 (0.83 to 1.53) | 0.43 |
| $88,000 or more | 1.28 (0.89 to 1.83) | 0.18 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 0.98 (0.71 to 1.36) | 0.91 |
| Medicare | 1.08 (0.79 to 1.45) | 0.64 |
| Other | 1.41 (0.71 to 2.78) | 0.33 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 0.86 (0.60 to 1.23) | 0.41 |
| South | 0.98 (0.75 to 1.29) | 0.91 |
| West | 1.01 (0.70 to 1.45) | 0.97 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | 0.63 (0.49 to 0.82) | <0.001 |
| Small | 0.48 (0.35 to 0.65) | <0.001 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 1.06 (0.53 to 2.12) | 0.87 |
| Urban, teaching | 2.60 (1.42 to 4.76) | 0.002 |
| Charlson comorbidity index | 0.88 (0.76 to 1.03) | 0.11 |
| Coronary artery disease |  |  |
| No | — |  |
| Yes | 0.80 (0.61 to 1.06) | 0.13 |
| Previous heart failure |  |  |
| No | — |  |
| Yes | 0.76 (0.55 to 1.05) | 0.10 |
| Hypercholesterolemia |  |  |
| No | — |  |
| Yes | 0.68 (0.55 to 0.85) | <0.001 |
| Obesity |  |  |
| No | — |  |
| Yes | 0.95 (0.70 to 1.27) | 0.71 |
| Peripheral vascular disease |  |  |
| No | — |  |
| Yes | 1,655,981,693 (1,349,554,998 to 2,031,984,894) | <0.001 |
| Chronic pulmonary disease |  |  |
| No | — |  |
| Yes | 1.14 (0.83 to 1.57) | 0.40 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | 1.00 (0.66 to 1.51) | 0.99 |
| Atrial fibrillation |  |  |
| No | — |  |
| Yes | 1.06 (0.76 to 1.47) | 0.75 |
| Liver disease |  |  |
| No | — |  |
| Yes | 1.16 (0.70 to 1.94) | 0.56 |
| Anemia |  |  |
| No | — |  |
| Yes | 1.10 (0.85 to 1.44) | 0.47 |
| Dementia |  |  |
| No | — |  |
| Yes | 0.68 (0.35 to 1.32) | 0.26 |
| Smoking status |  |  |
| No | — |  |
| Yes | 0.87 (0.67 to 1.12) | 0.29 |
| Previous myocardial infarction |  |  |
| No | — |  |
| Yes | 1.18 (0.79 to 1.76) | 0.42 |
| Previous PCI |  |  |
| No | — |  |
| Yes | 0.63 (0.42 to 0.96) | 0.030 |
| Previous CABG |  |  |
| No | — |  |
| Yes | 1.25 (0.81 to 1.95) | 0.32 |
| Previous ICD insertion |  |  |
| No | — |  |
| Yes | 0.02 (0.00 to 0.14) | <0.001 |
| Previous PPM or CRT insertion |  |  |
| No | — |  |
| Yes | 1.00 (0.51 to 1.96) | >0.99 |
| Previous stroke/TIA |  |  |
| No | — |  |
| Yes | 0.69 (0.51 to 0.94) | 0.019 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | |

## Multivariable Linear Regression:

### Length of Stay:

| **Characteristic** | **Beta** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Hypertensive Crisis Categories |  |  |
| Hypertensive Crisis without Diabetes | — |  |
| Hypertensive Crisis with Diabetes | -0.42 (-0.49 to -0.34) | <0.001 |
| Age, y | 0.01 (0.00 to 0.01) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 0.07 (0.01 to 0.13) | 0.023 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | -0.14 (-0.28 to 0.01) | 0.066 |
| Black | -0.09 (-0.16 to -0.02) | 0.012 |
| Hispanic | -0.30 (-0.39 to -0.21) | <0.001 |
| Native American | -0.24 (-0.51 to 0.03) | 0.079 |
| Other | -0.04 (-0.25 to 0.17) | 0.70 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | -0.11 (-0.18 to -0.04) | 0.002 |
| $66,000 - $87,999 | -0.12 (-0.20 to -0.05) | 0.002 |
| $88,000 or more | -0.16 (-0.26 to -0.07) | <0.001 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | 0.32 (0.22 to 0.42) | <0.001 |
| Medicare | -0.05 (-0.12 to 0.01) | 0.11 |
| Other | 0.14 (-0.03 to 0.30) | 0.10 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 0.42 (0.33 to 0.51) | <0.001 |
| South | 0.20 (0.13 to 0.27) | <0.001 |
| West | -0.05 (-0.16 to 0.06) | 0.37 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | -0.33 (-0.40 to -0.26) | <0.001 |
| Small | -0.44 (-0.52 to -0.37) | <0.001 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 0.14 (0.04 to 0.25) | 0.008 |
| Urban, teaching | 0.39 (0.29 to 0.49) | <0.001 |
| Charlson comorbidity index | 0.47 (0.43 to 0.51) | <0.001 |
| Coronary artery disease |  |  |
| No | — |  |
| Yes | 0.21 (0.13 to 0.29) | <0.001 |
| Previous heart failure |  |  |
| No | — |  |
| Yes | -0.11 (-0.20 to -0.02) | 0.019 |
| Hypercholesterolemia |  |  |
| No | — |  |
| Yes | -0.15 (-0.21 to -0.10) | <0.001 |
| Obesity |  |  |
| No | — |  |
| Yes | 0.23 (0.17 to 0.30) | <0.001 |
| Peripheral vascular disease |  |  |
| No | — |  |
| Yes | 0.11 (0.00 to 0.22) | 0.042 |
| Chronic pulmonary disease |  |  |
| No | — |  |
| Yes | -0.40 (-0.49 to -0.31) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | -0.47 (-0.58 to -0.36) | <0.001 |
| Atrial fibrillation |  |  |
| No | — |  |
| Yes | 0.28 (0.17 to 0.40) | <0.001 |
| Liver disease |  |  |
| No | — |  |
| Yes | -0.07 (-0.27 to 0.12) | 0.48 |
| Anemia |  |  |
| No | — |  |
| Yes | 0.96 (0.88 to 1.0) | <0.001 |
| Dementia |  |  |
| No | — |  |
| Yes | 0.88 (0.71 to 1.0) | <0.001 |
| Smoking status |  |  |
| No | — |  |
| Yes | -0.10 (-0.17 to -0.03) | 0.006 |
| Previous myocardial infarction |  |  |
| No | — |  |
| Yes | -0.60 (-0.70 to -0.50) | <0.001 |
| Previous PCI |  |  |
| No | — |  |
| Yes | -0.46 (-0.56 to -0.37) | <0.001 |
| Previous CABG |  |  |
| No | — |  |
| Yes | -0.39 (-0.49 to -0.28) | <0.001 |
| Previous ICD insertion |  |  |
| No | — |  |
| Yes | -0.97 (-1.2 to -0.76) | <0.001 |
| Previous PPM or CRT insertion |  |  |
| No | — |  |
| Yes | -0.36 (-0.49 to -0.24) | <0.001 |
| Previous stroke/TIA |  |  |
| No | — |  |
| Yes | 0.09 (0.01 to 0.16) | 0.019 |
| *1*CI = Confidence Interval | | |

### Inflation Adjusted Total Charge:

| **Characteristic** | **Beta** **(95% CI)***1* | **p-value** |
| --- | --- | --- |
| Hypertensive Crisis Categories |  |  |
| Hypertensive Crisis without Diabetes | — |  |
| Hypertensive Crisis with Diabetes | -6,641 (-7,653 to -5,630) | <0.001 |
| Age, y | -58 (-84 to -32) | <0.001 |
| Sex |  |  |
| Female | — |  |
| Male | 1,097 (466 to 1,727) | <0.001 |
| Race |  |  |
| White | — |  |
| Asian or Pacific Islander | 4,051 (1,805 to 6,296) | <0.001 |
| Black | -302 (-1,193 to 589) | 0.51 |
| Hispanic | 4,489 (3,076 to 5,903) | <0.001 |
| Native American | -5,867 (-9,517 to -2,216) | 0.002 |
| Other | 5,121 (2,582 to 7,661) | <0.001 |
| Residential income |  |  |
| $1 - $51,999 | — |  |
| $52,000 - $65,999 | -357 (-1,287 to 574) | 0.45 |
| $66,000 - $87,999 | -748 (-1,762 to 266) | 0.15 |
| $88,000 or more | 609 (-770 to 1,989) | 0.39 |
| Expected primary payer |  |  |
| Private | — |  |
| Medicaid | -392 (-1,408 to 625) | 0.45 |
| Medicare | -1,074 (-1,896 to -252) | 0.010 |
| Other | -1,184 (-2,931 to 563) | 0.18 |
| Hospital region |  |  |
| Midwest | — |  |
| Northeast | 9,615 (7,764 to 11,467) | <0.001 |
| South | 6,647 (5,592 to 7,701) | <0.001 |
| West | 17,960 (16,097 to 19,824) | <0.001 |
| Hospital bedsize |  |  |
| Large | — |  |
| Medium | -609 (-1,836 to 619) | 0.33 |
| Small | -3,134 (-4,423 to -1,844) | <0.001 |
| Hospital location and teaching status |  |  |
| Rural | — |  |
| Urban, non-teaching | 10,417 (9,125 to 11,710) | <0.001 |
| Urban, teaching | 11,763 (10,667 to 12,860) | <0.001 |
| Charlson comorbidity index | 5,813 (5,262 to 6,365) | <0.001 |
| Coronary artery disease |  |  |
| No | — |  |
| Yes | 7,720 (6,619 to 8,820) | <0.001 |
| Previous heart failure |  |  |
| No | — |  |
| Yes | -2,136 (-3,269 to -1,003) | <0.001 |
| Hypercholesterolemia |  |  |
| No | — |  |
| Yes | 746 (91 to 1,402) | 0.026 |
| Obesity |  |  |
| No | — |  |
| Yes | 2,544 (1,789 to 3,299) | <0.001 |
| Peripheral vascular disease |  |  |
| No | — |  |
| Yes | 2,908 (1,489 to 4,328) | <0.001 |
| Chronic pulmonary disease |  |  |
| No | — |  |
| Yes | -5,416 (-6,446 to -4,387) | <0.001 |
| Chronic kidney disease |  |  |
| No | — |  |
| Yes | -10,555 (-12,074 to -9,036) | <0.001 |
| Atrial fibrillation |  |  |
| No | — |  |
| Yes | 1,894 (816 to 2,971) | <0.001 |
| Liver disease |  |  |
| No | — |  |
| Yes | 103 (-2,147 to 2,353) | 0.93 |
| Anemia |  |  |
| No | — |  |
| Yes | 9,634 (8,610 to 10,658) | <0.001 |
| Dementia |  |  |
| No | — |  |
| Yes | -871 (-2,532 to 790) | 0.30 |
| Smoking status |  |  |
| No | — |  |
| Yes | -1,891 (-2,780 to -1,002) | <0.001 |
| Previous myocardial infarction |  |  |
| No | — |  |
| Yes | -9,054 (-10,424 to -7,684) | <0.001 |
| Previous PCI |  |  |
| No | — |  |
| Yes | -6,115 (-7,439 to -4,791) | <0.001 |
| Previous CABG |  |  |
| No | — |  |
| Yes | -5,533 (-6,962 to -4,104) | <0.001 |
| Previous ICD insertion |  |  |
| No | — |  |
| Yes | -14,010 (-16,767 to -11,254) | <0.001 |
| Previous PPM or CRT insertion |  |  |
| No | — |  |
| Yes | -4,085 (-5,679 to -2,491) | <0.001 |
| Previous stroke/TIA |  |  |
| No | — |  |
| Yes | -248 (-1,073 to 577) | 0.56 |
| *1*CI = Confidence Interval | | |