Impact of Catheter Ablation in Atrial Fibrillation Among Patients with Heart Failure with Reduced Versus Preserved Ejection Fraction

Analysis for RCOP NIS IM11

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## Preamble:

* *Reference Papers:*
  + [Munir et al. 2023](https://pmc.ncbi.nlm.nih.gov/articles/PMC8691359/)
  + [Wu et al. 2019](https://pubmed.ncbi.nlm.nih.gov/33650749/)
* *Study Objective*: Assess the impact of Catheter Ablation in Atrial fibrillation among patients with Heart failure with reduced ejection fraction vs preserved ejection fraction.
* *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 Atrial fibrillation, comparing those with a secondary diagnosis of HFrEF versus HFpEF.
* *Heart failure categories*:
  + Heart failure with reduced ejection fraction
  + Heart failure with preserved ejection fraction
* *Primary Outcomes*:
  + In-hospital all-cause mortality
  + Total hospital length of stay (days)
  + Total charge, inflation adjusted to 2020 ($)
* *Secondary Outcomes*:
  + Acute Kidney Injury
  + Acute Ischemic Stroke
  + Acute Myocardial Infarction
  + Cardiac Tamponade
  + Cardiac Arrest
  + Cardiogenic Shock
* *Statistical Analysis*: Multiple logistic and linear regression models to evaluate the independent association of HFrEF vs HFpEF with in-hospital outcomes in patients with AF, adjusting for:
  + Demographics: Age, sex, race, residential income, insurance, hospital region, hospital bedsize, hospital location, teaching status and admission type (elective or non-elective).
  + Medical History: Diabetes mellitus, previous myocardial infarction, hypertension, hyperthyroidism, pulmonary hypertension, chronic obstructive pulmonary disease, alcohol use, obesity, end stage renal disease, obstructive sleep apnea, anemia, previous PCI, previous CABG, previous ICD insertion, previous PPM or CRT insertion, coronary artery disease, previous stroke or TIA, peripheral vascular disease, and valvular heart disease.
  + 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** | **Atrial fibrillation with heart failure reduced ejection fraction** N = 18,685*1* | **Atrial fibrillation with heart failure preserved ejection fraction** N = 20,675*1* | **p-value***2* | **Overall** N = 39,360*1* |
| --- | --- | --- | --- | --- |
| Age, y | 69 (12) | 71 (12) | <0.001 | 70 (12) |
| Sex |  |  | 0.012 |  |
| Female | 6,740 (36%) | 8,020 (39%) |  | 14,760 (38%) |
| Male | 11,940 (64%) | 12,655 (61%) |  | 24,595 (62%) |
| Race |  |  | 0.2 |  |
| White | 14,145 (77%) | 15,470 (76%) |  | 29,615 (77%) |
| Asian or Pacific Islander | 270 (1.5%) | 255 (1.3%) |  | 525 (1.4%) |
| Black | 2,520 (14%) | 2,850 (14%) |  | 5,370 (14%) |
| Hispanic | 915 (5.0%) | 1,275 (6.3%) |  | 2,190 (5.7%) |
| Native American | 70 (0.4%) | 85 (0.4%) |  | 155 (0.4%) |
| Other | 395 (2.2%) | 385 (1.9%) |  | 780 (2.0%) |
| Residential income |  |  | 0.046 |  |
| $1 - $51,999 | 4,940 (27%) | 5,850 (29%) |  | 10,790 (28%) |
| $52,000 - $65,999 | 5,070 (28%) | 5,310 (26%) |  | 10,380 (27%) |
| $66,000 - $87,999 | 4,725 (26%) | 4,835 (24%) |  | 9,560 (25%) |
| $88,000 or more | 3,695 (20%) | 4,310 (21%) |  | 8,005 (21%) |
| Expected primary payer |  |  | <0.001 |  |
| Private | 3,565 (19%) | 2,990 (14%) |  | 6,555 (17%) |
| Medicaid | 1,390 (7.4%) | 1,540 (7.5%) |  | 2,930 (7.4%) |
| Medicare | 13,045 (70%) | 15,255 (74%) |  | 28,300 (72%) |
| Other | 670 (3.6%) | 885 (4.3%) |  | 1,555 (4.0%) |
| Hospital region |  |  | <0.001 |  |
| Midwest | 4,600 (25%) | 4,540 (22%) |  | 9,140 (23%) |
| Northeast | 3,910 (21%) | 3,670 (18%) |  | 7,580 (19%) |
| South | 7,785 (42%) | 9,380 (45%) |  | 17,165 (44%) |
| West | 2,390 (13%) | 3,085 (15%) |  | 5,475 (14%) |
| Hospital bedsize |  |  | 0.003 |  |
| Large | 12,430 (67%) | 12,990 (63%) |  | 25,420 (65%) |
| Medium | 4,455 (24%) | 5,315 (26%) |  | 9,770 (25%) |
| Small | 1,800 (9.6%) | 2,370 (11%) |  | 4,170 (11%) |
| Hospital location and teaching status |  |  | 0.4 |  |
| Rural | 420 (2.2%) | 505 (2.4%) |  | 925 (2.4%) |
| Urban, non-teaching | 1,740 (9.3%) | 2,150 (10%) |  | 3,890 (9.9%) |
| Urban, teaching | 16,525 (88%) | 18,020 (87%) |  | 34,545 (88%) |
| Admission type |  |  | <0.001 |  |
| Elective | 5,720 (31%) | 3,495 (17%) |  | 9,215 (23%) |
| Non-elective | 12,950 (69%) | 17,160 (83%) |  | 30,110 (77%) |
| Charlson comorbidity index | 3.50 (1.94) | 3.76 (1.95) | <0.001 | 3.64 (1.95) |
| Diabetes Mellitus | 6,860 (37%) | 8,540 (41%) | <0.001 | 15,400 (39%) |
| Previous myocardial infarction | 3,305 (18%) | 3,300 (16%) | 0.038 | 6,605 (17%) |
| obesity | 5,085 (27%) | 6,350 (31%) | <0.001 | 11,435 (29%) |
| Hypertension | 9,560 (51%) | 9,050 (44%) | <0.001 | 18,610 (47%) |
| Pulmonary Hypertension | 2,570 (14%) | 4,300 (21%) | <0.001 | 6,870 (17%) |
| Chronic obstructive pulmonary disease | 5,095 (27%) | 6,880 (33%) | <0.001 | 11,975 (30%) |
| Alcohol use | 7,170 (38%) | 8,625 (42%) | 0.004 | 15,795 (40%) |
| Peripheral vascular disease | 1,300 (7.0%) | 1,415 (6.8%) | 0.8 | 2,715 (6.9%) |
| Anemia | 1,050 (5.6%) | 1,450 (7.0%) | 0.009 | 2,500 (6.4%) |
| Previous PCI | 2,770 (15%) | 2,650 (13%) | 0.010 | 5,420 (14%) |
| Valvular heart disease | 5,415 (29%) | 7,195 (35%) | <0.001 | 12,610 (32%) |
| Obstructive sleep apnea | 4,640 (25%) | 5,220 (25%) | 0.7 | 9,860 (25%) |
| Coronary artery disease | 10,165 (54%) | 10,965 (53%) | 0.2 | 21,130 (54%) |
| End stage renal disease | 920 (4.9%) | 695 (3.4%) | <0.001 | 1,615 (4.1%) |
| Previous CABG | 2,535 (14%) | 2,860 (14%) | 0.7 | 5,395 (14%) |
| Hyperthyroidism | 315 (1.7%) | 375 (1.8%) | 0.7 | 690 (1.8%) |
| Previous stroke/TIA | 2,445 (13%) | 2,170 (10%) | <0.001 | 4,615 (12%) |
| Previous ICD insertion | 4,250 (23%) | 3,050 (15%) | <0.001 | 7,300 (19%) |
| Previous PPM or CRT insertion | 1,645 (8.8%) | 1,845 (8.9%) | 0.9 | 3,490 (8.9%) |
| *1*Mean (SD); n (%) | | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | | |

## Outcomes Table:

| **Characteristic** | **Atrial fibrillation with heart failure reduced ejection fraction** N = 18,685*1* | **Atrial fibrillation with heart failure preserved ejection fraction** N = 20,675*1* | **p-value***2* | **Overall** N = 39,360*1* |
| --- | --- | --- | --- | --- |
| Died during hospitalization | 235 (1.3%) | 450 (2.2%) | 0.003 | 685 (1.7%) |
| Length of stay (days) | 4 (2, 7) | 7 (4, 11) | <0.001 | 5 (3, 9) |
| Inflation-adjusted total charge ($) | 145,714 (99,661, 222,431) | 167,630 (108,164, 257,971) | <0.001 | 156,923 (103,881, 240,706) |
| Acute kidney injury | 4,325 (23%) | 8,870 (43%) | <0.001 | 13,195 (34%) |
| Acute ischemic stroke | 215 (1.2%) | 185 (0.9%) | 0.3 | 400 (1.0%) |
| Acute myocardial infarction | 975 (5.2%) | 1,500 (7.3%) | <0.001 | 2,475 (6.3%) |
| Cardiac tamponade | 160 (0.9%) | 145 (0.7%) | 0.4 | 305 (0.8%) |
| Cardiac arrest | 285 (1.5%) | 400 (1.9%) | 0.2 | 685 (1.7%) |
| Cardiogenic shock | 885 (4.7%) | 1,965 (9.5%) | <0.001 | 2,850 (7.2%) |
| *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** | **p-value** |
| --- | --- | --- | --- |
| Heart failure categories |  |  |  |
| Atrial fibrillation with heart failure reduced ejection fraction | — | — |  |
| Atrial fibrillation with heart failure preserved ejection fraction | 1.66 | 1.12, 2.46 | 0.012 |
| Age, y | 1.02 | 1.00, 1.04 | 0.075 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.47 | 0.98, 2.19 | 0.063 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.53 | 0.07, 3.73 | 0.5 |
| Black | 0.91 | 0.51, 1.61 | 0.7 |
| Hispanic | 0.75 | 0.28, 2.04 | 0.6 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 1.92 | 0.81, 4.55 | 0.14 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.85 | 0.52, 1.38 | 0.5 |
| $66,000 - $87,999 | 0.86 | 0.52, 1.42 | 0.6 |
| $88,000 or more | 0.76 | 0.43, 1.34 | 0.3 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.79 | 0.32, 1.97 | 0.6 |
| Medicare | 0.82 | 0.47, 1.42 | 0.5 |
| Other | 2.06 | 0.95, 4.47 | 0.069 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.08 | 0.61, 1.91 | 0.8 |
| South | 0.97 | 0.60, 1.58 | >0.9 |
| West | 1.10 | 0.60, 2.00 | 0.8 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.66 | 0.40, 1.07 | 0.091 |
| Small | 0.65 | 0.35, 1.21 | 0.2 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.32 | 0.27, 6.52 | 0.7 |
| Urban, teaching | 1.94 | 0.47, 8.08 | 0.4 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | 1.36 | 0.84, 2.22 | 0.2 |
| Charlson comorbidity index | 1.11 | 0.94, 1.30 | 0.2 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.72 | 0.43, 1.21 | 0.2 |
| Pulmonary Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.99 | 1.34, 2.97 | <0.001 |
| Hyperthyroidism |  |  |  |
| No | — | — |  |
| Yes | 0.42 | 0.06, 3.15 | 0.4 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 0.92 | 0.54, 1.57 | 0.8 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.48 | 0.29, 0.81 | 0.006 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 1.25 | 0.83, 1.88 | 0.3 |
| Alcohol use |  |  |  |
| No | — | — |  |
| Yes | 0.99 | 0.69, 1.43 | >0.9 |
| obesity |  |  |  |
| No | — | — |  |
| Yes | 0.54 | 0.34, 0.87 | 0.011 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 2.21 | 1.22, 3.98 | 0.009 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.94 | 0.61, 1.47 | 0.8 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 0.98 | 0.51, 1.88 | >0.9 |
| Previous PCI | 0.93 | 0.51, 1.70 | 0.8 |
| Previous CABG |  |  |  |
| No | — | — |  |
| Yes | 0.77 | 0.45, 1.33 | 0.4 |
| Previous ICD insertion |  |  |  |
| No | — | — |  |
| Yes | 1.19 | 0.78, 1.82 | 0.4 |
| Previous PPM or CRT insertion |  |  |  |
| No | — | — |  |
| Yes | 0.73 | 0.35, 1.51 | 0.4 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 0.83 | 0.56, 1.22 | 0.3 |
| Previous stroke/TIA |  |  |  |
| No | — | — |  |
| Yes | 0.44 | 0.22, 0.91 | 0.026 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 1.45 | 0.81, 2.59 | 0.2 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 0.64 | 0.42, 0.96 | 0.032 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Acute Kidney Injury

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| Heart failure categories |  |  |  |
| Atrial fibrillation with heart failure reduced ejection fraction | — | — |  |
| Atrial fibrillation with heart failure preserved ejection fraction | 2.17 | 1.94, 2.43 | <0.001 |
| Age, y | 1.00 | 1.00, 1.01 | 0.3 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.44 | 1.27, 1.63 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.67 | 1.12, 2.49 | 0.012 |
| Black | 1.32 | 1.12, 1.56 | 0.001 |
| Hispanic | 1.12 | 0.89, 1.42 | 0.3 |
| Native American | 1.19 | 0.50, 2.85 | 0.7 |
| Other | 1.55 | 1.07, 2.24 | 0.020 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.94 | 0.81, 1.08 | 0.4 |
| $66,000 - $87,999 | 1.04 | 0.89, 1.21 | 0.7 |
| $88,000 or more | 1.01 | 0.86, 1.18 | >0.9 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.07 | 0.84, 1.37 | 0.6 |
| Medicare | 1.05 | 0.89, 1.24 | 0.6 |
| Other | 1.22 | 0.91, 1.65 | 0.2 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.78 | 0.66, 0.93 | 0.006 |
| South | 0.87 | 0.76, 1.00 | 0.059 |
| West | 0.95 | 0.80, 1.14 | 0.6 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.90 | 0.79, 1.03 | 0.14 |
| Small | 0.93 | 0.77, 1.11 | 0.4 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.36 | 0.87, 2.10 | 0.2 |
| Urban, teaching | 1.45 | 0.96, 2.17 | 0.075 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | 1.81 | 1.58, 2.07 | <0.001 |
| Charlson comorbidity index | 1.22 | 1.16, 1.27 | <0.001 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.91 | 0.79, 1.05 | 0.2 |
| Pulmonary Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.31 | 1.13, 1.51 | <0.001 |
| Hyperthyroidism |  |  |  |
| No | — | — |  |
| Yes | 0.86 | 0.55, 1.32 | 0.5 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 0.73 | 0.62, 0.86 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.34 | 0.29, 0.39 | <0.001 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.87 | 0.77, 0.99 | 0.029 |
| Alcohol use |  |  |  |
| No | — | — |  |
| Yes | 1.00 | 0.89, 1.12 | >0.9 |
| obesity |  |  |  |
| No | — | — |  |
| Yes | 1.12 | 0.99, 1.26 | 0.077 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 0.14 | 0.10, 0.19 | <0.001 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.91 | 0.80, 1.03 | 0.14 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 1.25 | 1.02, 1.54 | 0.035 |
| Previous PCI | 0.84 | 0.70, 1.00 | 0.047 |
| Previous CABG |  |  |  |
| No | — | — |  |
| Yes | 0.83 | 0.70, 0.98 | 0.030 |
| Previous ICD insertion |  |  |  |
| No | — | — |  |
| Yes | 0.72 | 0.62, 0.84 | <0.001 |
| Previous PPM or CRT insertion |  |  |  |
| No | — | — |  |
| Yes | 0.76 | 0.63, 0.93 | 0.008 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 1.05 | 0.92, 1.18 | 0.5 |
| Previous stroke/TIA |  |  |  |
| No | — | — |  |
| Yes | 0.87 | 0.72, 1.03 | 0.11 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 0.97 | 0.78, 1.20 | 0.8 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 1.07 | 0.95, 1.20 | 0.3 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Acute Ischemic Stroke

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| Heart failure categories |  |  |  |
| Atrial fibrillation with heart failure reduced ejection fraction | — | — |  |
| Atrial fibrillation with heart failure preserved ejection fraction | 0.80 | 0.48, 1.34 | 0.4 |
| Age, y | 1.01 | 0.98, 1.03 | 0.7 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.03 | 0.60, 1.75 | >0.9 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.05 | 0.17, 6.38 | >0.9 |
| Black | 0.92 | 0.43, 1.95 | 0.8 |
| Hispanic | 1.39 | 0.59, 3.29 | 0.4 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 2.18 | 0.70, 6.82 | 0.2 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.15 | 0.62, 2.14 | 0.7 |
| $66,000 - $87,999 | 1.01 | 0.52, 1.97 | >0.9 |
| $88,000 or more | 0.73 | 0.33, 1.60 | 0.4 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.16 | 0.46, 2.95 | 0.8 |
| Medicare | 0.57 | 0.28, 1.15 | 0.12 |
| Other | 0.46 | 0.09, 2.30 | 0.3 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.90 | 0.39, 2.06 | 0.8 |
| South | 0.98 | 0.50, 1.92 | >0.9 |
| West | 1.70 | 0.75, 3.83 | 0.2 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.64 | 0.34, 1.22 | 0.2 |
| Small | 0.96 | 0.42, 2.19 | >0.9 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 0.73 | 0.19, 2.89 | 0.7 |
| Urban, teaching | 0.58 | 0.17, 1.98 | 0.4 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | 0.81 | 0.45, 1.47 | 0.5 |
| Charlson comorbidity index | 1.83 | 1.62, 2.06 | <0.001 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.38 | 0.22, 0.66 | <0.001 |
| Pulmonary Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.86 | 0.42, 1.75 | 0.7 |
| Hyperthyroidism |  |  |  |
| No | — | — |  |
| Yes | 0.58 | 0.07, 5.13 | 0.6 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 0.49 | 0.24, 0.99 | 0.046 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 2.28 | 1.26, 4.11 | 0.006 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.34 | 0.18, 0.66 | 0.001 |
| Alcohol use |  |  |  |
| No | — | — |  |
| Yes | 0.90 | 0.54, 1.51 | 0.7 |
| obesity |  |  |  |
| No | — | — |  |
| Yes | 0.90 | 0.51, 1.59 | 0.7 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 0.33 | 0.07, 1.66 | 0.2 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.74 | 0.40, 1.36 | 0.3 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 1.26 | 0.55, 2.89 | 0.6 |
| Previous PCI | 0.73 | 0.33, 1.61 | 0.4 |
| Previous CABG |  |  |  |
| No | — | — |  |
| Yes | 0.55 | 0.23, 1.34 | 0.2 |
| Previous ICD insertion |  |  |  |
| No | — | — |  |
| Yes | 0.38 | 0.18, 0.81 | 0.013 |
| Previous PPM or CRT insertion |  |  |  |
| No | — | — |  |
| Yes | 0.60 | 0.21, 1.68 | 0.3 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 1.45 | 0.87, 2.41 | 0.2 |
| Previous stroke/TIA |  |  |  |
| No | — | — |  |
| Yes | 1.16 | 0.55, 2.43 | 0.7 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 0.21 | 0.05, 0.91 | 0.037 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 0.67 | 0.38, 1.19 | 0.2 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Acute Myocardial Infarction

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| Heart failure categories |  |  |  |
| Atrial fibrillation with heart failure reduced ejection fraction | — | — |  |
| Atrial fibrillation with heart failure preserved ejection fraction | 1.24 | 1.01, 1.53 | 0.039 |
| Age, y | 1.00 | 0.99, 1.01 | 0.5 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.02 | 0.81, 1.27 | 0.9 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.03 | 0.48, 2.22 | >0.9 |
| Black | 0.75 | 0.55, 1.04 | 0.083 |
| Hispanic | 1.47 | 1.02, 2.11 | 0.037 |
| Native American | 0.55 | 0.06, 4.76 | 0.6 |
| Other | 1.23 | 0.63, 2.37 | 0.5 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.86 | 0.65, 1.14 | 0.3 |
| $66,000 - $87,999 | 0.86 | 0.65, 1.14 | 0.3 |
| $88,000 or more | 0.86 | 0.63, 1.18 | 0.4 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.62 | 1.06, 2.47 | 0.027 |
| Medicare | 0.93 | 0.68, 1.28 | 0.7 |
| Other | 1.35 | 0.79, 2.31 | 0.3 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.89 | 0.63, 1.25 | 0.5 |
| South | 0.88 | 0.68, 1.14 | 0.3 |
| West | 1.02 | 0.74, 1.41 | 0.9 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.99 | 0.78, 1.26 | >0.9 |
| Small | 1.16 | 0.86, 1.57 | 0.3 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 0.82 | 0.42, 1.61 | 0.6 |
| Urban, teaching | 1.04 | 0.58, 1.90 | 0.9 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | 4.44 | 2.96, 6.65 | <0.001 |
| Charlson comorbidity index | 1.55 | 1.46, 1.65 | <0.001 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.61 | 0.48, 0.78 | <0.001 |
| Pulmonary Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.30 | 1.01, 1.66 | 0.042 |
| Hyperthyroidism |  |  |  |
| No | — | — |  |
| Yes | 0.28 | 0.08, 0.97 | 0.045 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 0.83 | 0.63, 1.08 | 0.2 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.89 | 1.49, 2.40 | <0.001 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.45 | 0.35, 0.57 | <0.001 |
| Alcohol use |  |  |  |
| No | — | — |  |
| Yes | 1.00 | 0.81, 1.23 | >0.9 |
| obesity |  |  |  |
| No | — | — |  |
| Yes | 1.05 | 0.83, 1.32 | 0.7 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 1.42 | 0.95, 2.14 | 0.089 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.83 | 0.65, 1.06 | 0.14 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 0.98 | 0.67, 1.43 | 0.9 |
| Previous PCI | 0.99 | 0.75, 1.31 | >0.9 |
| Previous CABG |  |  |  |
| No | — | — |  |
| Yes | 0.90 | 0.66, 1.21 | 0.5 |
| Previous ICD insertion |  |  |  |
| No | — | — |  |
| Yes | 0.55 | 0.42, 0.73 | <0.001 |
| Previous PPM or CRT insertion |  |  |  |
| No | — | — |  |
| Yes | 0.61 | 0.41, 0.89 | 0.011 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 2.07 | 1.63, 2.64 | <0.001 |
| Previous stroke/TIA |  |  |  |
| No | — | — |  |
| Yes | 0.94 | 0.70, 1.28 | 0.7 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 0.62 | 0.42, 0.93 | 0.021 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 0.94 | 0.76, 1.15 | 0.5 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Cardiac Tamponade

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| Heart failure categories |  |  |  |
| Atrial fibrillation with heart failure reduced ejection fraction | — | — |  |
| Atrial fibrillation with heart failure preserved ejection fraction | 1.11 | 0.64, 1.94 | 0.7 |
| Age, y | 1.00 | 0.98, 1.03 | 0.8 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.74 | 0.43, 1.28 | 0.3 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 3.55 | 0.79, 15.9 | 0.10 |
| Black | 0.32 | 0.08, 1.22 | 0.094 |
| Hispanic | 0.31 | 0.04, 2.52 | 0.3 |
| Native American | 3.71 | 0.37, 36.7 | 0.3 |
| Other | 0.84 | 0.13, 5.40 | 0.8 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.96 | 0.75, 5.14 | 0.2 |
| $66,000 - $87,999 | 3.55 | 1.45, 8.67 | 0.005 |
| $88,000 or more | 1.82 | 0.68, 4.93 | 0.2 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.44 | 0.05, 3.76 | 0.5 |
| Medicare | 1.69 | 0.66, 4.34 | 0.3 |
| Other | 2.37 | 0.61, 9.23 | 0.2 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.02 | 0.42, 2.48 | >0.9 |
| South | 1.42 | 0.70, 2.89 | 0.3 |
| West | 1.35 | 0.58, 3.16 | 0.5 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.82 | 0.42, 1.60 | 0.6 |
| Small | 0.43 | 0.14, 1.33 | 0.14 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 0.20 | 0.03, 1.15 | 0.071 |
| Urban, teaching | 0.47 | 0.13, 1.76 | 0.3 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | 0.29 | 0.17, 0.49 | <0.001 |
| Charlson comorbidity index | 0.81 | 0.61, 1.08 | 0.2 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.84 | 0.39, 1.82 | 0.7 |
| Pulmonary Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.83 | 0.39, 1.76 | 0.6 |
| Hyperthyroidism |  |  |  |
| No | — | — |  |
| Yes | 2.77 | 0.67, 11.4 | 0.2 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 0.95 | 0.39, 2.33 | >0.9 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.69 | 0.34, 1.39 | 0.3 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 1.22 | 0.60, 2.49 | 0.6 |
| Alcohol use |  |  |  |
| No | — | — |  |
| Yes | 0.79 | 0.44, 1.41 | 0.4 |
| obesity |  |  |  |
| No | — | — |  |
| Yes | 1.06 | 0.56, 2.02 | 0.9 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 1.55 | 0.34, 7.07 | 0.6 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 1.27 | 0.68, 2.38 | 0.5 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 1.98 | 0.81, 4.81 | 0.13 |
| Previous PCI | 1.94 | 0.91, 4.11 | 0.085 |
| Previous CABG |  |  |  |
| No | — | — |  |
| Yes | 0.00 | 0.00, 0.00 | <0.001 |
| Previous ICD insertion |  |  |  |
| No | — | — |  |
| Yes | 1.05 | 0.54, 2.06 | 0.9 |
| Previous PPM or CRT insertion |  |  |  |
| No | — | — |  |
| Yes | 0.71 | 0.25, 2.07 | 0.5 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 1.14 | 0.62, 2.09 | 0.7 |
| Previous stroke/TIA |  |  |  |
| No | — | — |  |
| Yes | 0.60 | 0.21, 1.73 | 0.3 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 1.04 | 0.33, 3.30 | >0.9 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 0.57 | 0.31, 1.07 | 0.082 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Cardiac Arrest

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| Heart failure categories |  |  |  |
| Atrial fibrillation with heart failure reduced ejection fraction | — | — |  |
| Atrial fibrillation with heart failure preserved ejection fraction | 1.33 | 0.90, 1.95 | 0.2 |
| Age, y | 0.98 | 0.96, 1.00 | 0.11 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.09 | 0.73, 1.64 | 0.7 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.00 | 0.00, 0.00 | <0.001 |
| Black | 1.06 | 0.62, 1.80 | 0.8 |
| Hispanic | 2.03 | 1.15, 3.60 | 0.015 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 2.05 | 0.80, 5.23 | 0.14 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.27 | 0.77, 2.09 | 0.4 |
| $66,000 - $87,999 | 1.50 | 0.90, 2.52 | 0.12 |
| $88,000 or more | 1.38 | 0.80, 2.40 | 0.2 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.55 | 0.24, 1.23 | 0.15 |
| Medicare | 0.91 | 0.56, 1.50 | 0.7 |
| Other | 0.67 | 0.26, 1.76 | 0.4 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.71 | 0.40, 1.25 | 0.2 |
| South | 0.79 | 0.51, 1.22 | 0.3 |
| West | 0.74 | 0.40, 1.37 | 0.3 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 1.19 | 0.79, 1.79 | 0.4 |
| Small | 1.14 | 0.64, 2.04 | 0.6 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.25 | 0.27, 5.82 | 0.8 |
| Urban, teaching | 1.29 | 0.31, 5.35 | 0.7 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | 0.84 | 0.56, 1.27 | 0.4 |
| Charlson comorbidity index | 1.07 | 0.91, 1.26 | 0.4 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | 1.00 | 0.65, 1.52 | >0.9 |
| Pulmonary Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.03 | 0.67, 1.60 | 0.9 |
| Hyperthyroidism |  |  |  |
| No | — | — |  |
| Yes | 0.00 | 0.00, 0.00 | <0.001 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 1.52 | 0.95, 2.44 | 0.078 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.03 | 0.64, 1.67 | >0.9 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.70 | 0.46, 1.05 | 0.082 |
| Alcohol use |  |  |  |
| No | — | — |  |
| Yes | 1.16 | 0.79, 1.68 | 0.5 |
| obesity |  |  |  |
| No | — | — |  |
| Yes | 0.88 | 0.60, 1.28 | 0.5 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 1.74 | 0.87, 3.49 | 0.12 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 1.01 | 0.66, 1.54 | >0.9 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 0.79 | 0.37, 1.70 | 0.6 |
| Previous PCI | 0.91 | 0.52, 1.58 | 0.7 |
| Previous CABG |  |  |  |
| No | — | — |  |
| Yes | 0.66 | 0.35, 1.25 | 0.2 |
| Previous ICD insertion |  |  |  |
| No | — | — |  |
| Yes | 0.80 | 0.49, 1.30 | 0.4 |
| Previous PPM or CRT insertion |  |  |  |
| No | — | — |  |
| Yes | 0.35 | 0.12, 0.96 | 0.042 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 0.84 | 0.55, 1.28 | 0.4 |
| Previous stroke/TIA |  |  |  |
| No | — | — |  |
| Yes | 0.48 | 0.23, 1.01 | 0.053 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 1.07 | 0.51, 2.25 | 0.8 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 1.16 | 0.78, 1.73 | 0.5 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Cardiogenic Shock

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| Heart failure categories |  |  |  |
| Atrial fibrillation with heart failure reduced ejection fraction | — | — |  |
| Atrial fibrillation with heart failure preserved ejection fraction | 2.08 | 1.72, 2.52 | <0.001 |
| Age, y | 0.98 | 0.97, 0.99 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.62 | 1.31, 2.02 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.43 | 0.75, 2.72 | 0.3 |
| Black | 0.92 | 0.70, 1.21 | 0.5 |
| Hispanic | 1.16 | 0.80, 1.70 | 0.4 |
| Native American | 1.32 | 0.42, 4.13 | 0.6 |
| Other | 1.38 | 0.78, 2.47 | 0.3 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.90 | 0.70, 1.17 | 0.4 |
| $66,000 - $87,999 | 0.81 | 0.62, 1.05 | 0.11 |
| $88,000 or more | 0.83 | 0.63, 1.10 | 0.2 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.73 | 0.49, 1.08 | 0.11 |
| Medicare | 1.11 | 0.85, 1.45 | 0.5 |
| Other | 0.77 | 0.46, 1.28 | 0.3 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.69 | 0.50, 0.95 | 0.024 |
| South | 0.84 | 0.65, 1.09 | 0.2 |
| West | 1.20 | 0.89, 1.62 | 0.2 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.68 | 0.54, 0.86 | 0.001 |
| Small | 0.70 | 0.51, 0.96 | 0.027 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.26 | 0.61, 2.63 | 0.5 |
| Urban, teaching | 2.23 | 1.16, 4.29 | 0.016 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | 1.51 | 1.17, 1.96 | 0.002 |
| Charlson comorbidity index | 1.03 | 0.95, 1.11 | 0.5 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | 1.09 | 0.85, 1.40 | 0.5 |
| Pulmonary Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.59 | 1.29, 1.98 | <0.001 |
| Hyperthyroidism |  |  |  |
| No | — | — |  |
| Yes | 0.84 | 0.43, 1.63 | 0.6 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 0.92 | 0.70, 1.21 | 0.5 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.48 | 0.38, 0.61 | <0.001 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.66 | 0.52, 0.83 | <0.001 |
| Alcohol use |  |  |  |
| No | — | — |  |
| Yes | 1.01 | 0.83, 1.23 | >0.9 |
| obesity |  |  |  |
| No | — | — |  |
| Yes | 0.58 | 0.46, 0.73 | <0.001 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 0.60 | 0.37, 0.99 | 0.044 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.82 | 0.66, 1.02 | 0.079 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 1.61 | 1.17, 2.23 | 0.004 |
| Previous PCI | 0.79 | 0.58, 1.07 | 0.13 |
| Previous CABG |  |  |  |
| No | — | — |  |
| Yes | 0.80 | 0.60, 1.07 | 0.13 |
| Previous ICD insertion |  |  |  |
| No | — | — |  |
| Yes | 1.14 | 0.88, 1.46 | 0.3 |
| Previous PPM or CRT insertion |  |  |  |
| No | — | — |  |
| Yes | 0.74 | 0.51, 1.08 | 0.12 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 1.13 | 0.92, 1.38 | 0.2 |
| Previous stroke/TIA |  |  |  |
| No | — | — |  |
| Yes | 0.62 | 0.45, 0.86 | 0.004 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 1.10 | 0.77, 1.55 | 0.6 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 1.15 | 0.96, 1.38 | 0.13 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

## Multivariable Linear Regression:

### Length of Stay:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| Heart failure categories |  |  |  |
| Atrial fibrillation with heart failure reduced ejection fraction | — | — |  |
| Atrial fibrillation with heart failure preserved ejection fraction | 2.5 | 2.1, 2.8 | <0.001 |
| Age, y | -0.03 | -0.05, 0.00 | 0.016 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.62 | 0.24, 0.99 | 0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.5 | -0.80, 3.8 | 0.2 |
| Black | 0.84 | 0.14, 1.5 | 0.018 |
| Hispanic | 0.21 | -0.52, 0.95 | 0.6 |
| Native American | -0.01 | -1.7, 1.7 | >0.9 |
| Other | 0.92 | -0.30, 2.1 | 0.14 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -0.14 | -0.59, 0.30 | 0.5 |
| $66,000 - $87,999 | -0.29 | -0.83, 0.25 | 0.3 |
| $88,000 or more | -0.19 | -0.70, 0.32 | 0.5 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | -0.31 | -1.2, 0.57 | 0.5 |
| Medicare | -0.11 | -0.67, 0.44 | 0.7 |
| Other | -1.2 | -1.9, -0.41 | 0.003 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.06 | -0.50, 0.62 | 0.8 |
| South | 0.04 | -0.40, 0.48 | 0.9 |
| West | -0.04 | -0.68, 0.59 | 0.9 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -0.93 | -1.3, -0.55 | <0.001 |
| Small | -1.2 | -1.6, -0.70 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | -0.14 | -1.2, 0.90 | 0.8 |
| Urban, teaching | 0.63 | -0.32, 1.6 | 0.2 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | 2.5 | 2.1, 2.9 | <0.001 |
| Charlson comorbidity index | 0.36 | 0.22, 0.51 | <0.001 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | -0.45 | -0.90, 0.00 | 0.051 |
| Pulmonary Hypertension |  |  |  |
| No | — | — |  |
| Yes | 1.7 | 1.2, 2.3 | <0.001 |
| Hyperthyroidism |  |  |  |
| No | — | — |  |
| Yes | 0.58 | -0.57, 1.7 | 0.3 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | -0.88 | -1.3, -0.47 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | -0.86 | -1.3, -0.44 | <0.001 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.69 | 0.28, 1.1 | <0.001 |
| Alcohol use |  |  |  |
| No | — | — |  |
| Yes | -0.18 | -0.57, 0.20 | 0.3 |
| obesity |  |  |  |
| No | — | — |  |
| Yes | -0.07 | -0.51, 0.37 | 0.8 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 2.0 | 0.33, 3.6 | 0.019 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | -0.62 | -1.0, -0.22 | 0.002 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 2.0 | 0.92, 3.1 | <0.001 |
| Previous PCI | -0.57 | -0.95, -0.18 | 0.004 |
| Previous CABG |  |  |  |
| No | — | — |  |
| Yes | -0.90 | -1.3, -0.53 | <0.001 |
| Previous ICD insertion |  |  |  |
| No | — | — |  |
| Yes | -0.93 | -1.5, -0.40 | <0.001 |
| Previous PPM or CRT insertion |  |  |  |
| No | — | — |  |
| Yes | -1.1 | -1.5, -0.68 | <0.001 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | -0.17 | -0.59, 0.25 | 0.4 |
| Previous stroke/TIA |  |  |  |
| No | — | — |  |
| Yes | -0.80 | -1.2, -0.39 | <0.001 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 0.42 | -0.22, 1.1 | 0.2 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 0.12 | -0.26, 0.49 | 0.5 |
| Abbreviation: CI = Confidence Interval | | | |

### Inflation Adjusted Total Charge:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| Heart failure categories |  |  |  |
| Atrial fibrillation with heart failure reduced ejection fraction | — | — |  |
| Atrial fibrillation with heart failure preserved ejection fraction | 27,858 | 18,564, 37,152 | <0.001 |
| Age, y | -1,132 | -1,639, -625 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 29,254 | 20,489, 38,020 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 73,562 | 15,395, 131,730 | 0.013 |
| Black | 13,047 | -4,192, 30,285 | 0.14 |
| Hispanic | 34,853 | 13,894, 55,813 | 0.001 |
| Native American | 35,870 | -48,303, 120,044 | 0.4 |
| Other | 64,168 | 17,589, 110,748 | 0.007 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1,749 | -9,973, 13,471 | 0.8 |
| $66,000 - $87,999 | 4,288 | -8,994, 17,569 | 0.5 |
| $88,000 or more | 11,504 | -3,209, 26,217 | 0.13 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | -30,244 | -51,754, -8,735 | 0.006 |
| Medicare | -5,574 | -21,144, 9,996 | 0.5 |
| Other | -14,913 | -37,429, 7,603 | 0.2 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 44,110 | 25,628, 62,592 | <0.001 |
| South | 43,560 | 32,224, 54,896 | <0.001 |
| West | 74,583 | 53,765, 95,401 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -13,331 | -25,930, -731 | 0.038 |
| Small | -1,577 | -19,665, 16,511 | 0.9 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 50,044 | 22,037, 78,052 | <0.001 |
| Urban, teaching | 53,665 | 28,135, 79,194 | <0.001 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | -1,949 | -12,422, 8,523 | 0.7 |
| Charlson comorbidity index | 2,378 | -1,404, 6,160 | 0.2 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | -5,844 | -17,380, 5,692 | 0.3 |
| Pulmonary Hypertension |  |  |  |
| No | — | — |  |
| Yes | 14,045 | 2,091, 25,999 | 0.021 |
| Hyperthyroidism |  |  |  |
| No | — | — |  |
| Yes | -8,874 | -31,433, 13,685 | 0.4 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | -12,651 | -23,687, -1,614 | 0.025 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | -17,944 | -29,863, -6,026 | 0.003 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 5,535 | -4,576, 15,645 | 0.3 |
| Alcohol use |  |  |  |
| No | — | — |  |
| Yes | 13,187 | 1,415, 24,959 | 0.028 |
| obesity |  |  |  |
| No | — | — |  |
| Yes | 330 | -9,753, 10,412 | >0.9 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 18,971 | -13,068, 51,010 | 0.2 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | -10,706 | -21,114, -298 | 0.044 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 22,298 | 3,264, 41,332 | 0.022 |
| Previous PCI | -13,449 | -23,244, -3,655 | 0.007 |
| Previous CABG |  |  |  |
| No | — | — |  |
| Yes | -10,969 | -21,589, -348 | 0.043 |
| Previous ICD insertion |  |  |  |
| No | — | — |  |
| Yes | -21,793 | -34,434, -9,152 | <0.001 |
| Previous PPM or CRT insertion |  |  |  |
| No | — | — |  |
| Yes | -47,539 | -57,210, -37,868 | <0.001 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 9,349 | -734, 19,432 | 0.069 |
| Previous stroke/TIA |  |  |  |
| No | — | — |  |
| Yes | -15,220 | -25,887, -4,552 | 0.005 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 10,587 | -4,844, 26,018 | 0.2 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 203 | -8,913, 9,319 | >0.9 |
| Abbreviation: CI = Confidence Interval | | | |