Clinical Characteristics and Outcomes of Patients with Inflammatory Bowel Disease and Acute Myocardial Infarction

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## Preamble:

* **Study Objective**: Examine the impact of household income and insurance status on stroke management and outcomes among inpatient admissions with atrial fibrillation.
* **Data Source**: Cross-sectional analysis of the National Inpatient Sample (NIS) from 2018 to 2020.
* **Patient Selection**: Included all inpatient admissions with a principal diagnosis of Stroke.
* **Primary Outcomes**:
  + In-hospital all-cause mortality
  + Total hospital length of stay (days)
  + Total charge, inflation adjusted to 2020 ($)
* **Secondary Outcomes**:
  + Stroke
  + Cardiogenic Shock
  + Cardiac Arrest
  + Utilization of Percutaneous Coronary Intervention
  + Utilization of Coronary Artery Bypass Grafting
* **Covariates for Adjustment:** All models adjusted for the following
  + Demographics: Age, sex, race, hospital region, hospital bedsize, hospital location, and teaching status.
  + Medical History: Hypertension, diabetes mellitus, hyperlipidemia, coronary artery disease, peripheral vascular disease, heart failure, cancer, chronic kidney disease, chronic obstructive pulmonary disease, dementia, liver disease, fluid/electrolyte imbalance, obesity, prior stroke, prior cardiac surgery, presence of pacemaker/defibrillator.
  + Comorbidities: Charlson comorbidity index.
* **Statistical Methods:**
  + **Univariable Analysis:**
    - Categorical variables: Compared using Pearson’s chi-square test with Rao & Scott adjustment
    - Continuous variables: Analyzed using the design-based Kruskal–Wallis test, a non-parametric alternative suitable for survey-weighted data
  + **Multivariable Analysis:**
    - Binary outcomes (e.g., mortality): Survey-weighted logistic regression using the quasibinomial family
    - Continuous outcomes (e.g., LOS, hospital charges): Survey-weighted linear regression using the gaussian family
    - Results reported as adjusted odds ratios (aORs) or beta coefficients with 95% confidence intervals
* **Software:** All statistical analyses were performed using the R Statistical Language (Version 4.5.0; R Foundation for Statistical Computing, Vienna, Austria), incorporating survey-weighted procedures via the *survey* package to account for the complex sampling design of NIS.

## Baseline Table:

| **Characteristic** | **Overall** N = 8,065*1* | **AMI without IBD** N = 8,015*1* | **AMI with IBD** N = 50*1* | **p-value***2* |
| --- | --- | --- | --- | --- |
| Age, y | 66 (14) | 66 (14) | 76 (11) | 0.004 |
| Sex |  |  |  | 0.11 |
| Female | 2,885 (36%) | 2,855 (36%) | 30 (60%) |  |
| Male | 5,180 (64%) | 5,160 (64%) | 20 (40%) |  |
| Race |  |  |  | 0.8 |
| White | 5,660 (71%) | 5,620 (71%) | 40 (80%) |  |
| Asian or Pacific Islander | 200 (2.5%) | 200 (2.5%) | 0 (0%) |  |
| Black | 880 (11%) | 870 (11%) | 10 (20%) |  |
| Hispanic | 810 (10%) | 810 (10%) | 0 (0%) |  |
| Native American | 60 (0.8%) | 60 (0.8%) | 0 (0%) |  |
| Other | 325 (4.1%) | 325 (4.1%) | 0 (0%) |  |
| Residential income |  |  |  | 0.076 |
| $1 - $51,999 | 2,545 (32%) | 2,545 (32%) | 0 (0%) |  |
| $52,000 - $65,999 | 2,305 (29%) | 2,295 (29%) | 10 (22%) |  |
| $66,000 - $87,999 | 1,720 (22%) | 1,700 (22%) | 20 (44%) |  |
| $88,000 or more | 1,315 (17%) | 1,300 (17%) | 15 (33%) |  |
| Expected primary payer |  |  |  | 0.2 |
| Private | 1,930 (24%) | 1,930 (24%) | 0 (0%) |  |
| Medicaid | 925 (11%) | 925 (12%) | 0 (0%) |  |
| Medicare | 4,395 (55%) | 4,350 (54%) | 45 (90%) |  |
| Other | 800 (9.9%) | 795 (9.9%) | 5 (10%) |  |
| Level of urbanization |  |  |  | 0.059 |
| Central metro ≥1 million | 2,335 (29%) | 2,330 (29%) | 5 (10%) |  |
| Fringe metro ≥1 million | 1,630 (20%) | 1,630 (20%) | 0 (0%) |  |
| Metro 250,000-999,999 | 1,670 (21%) | 1,635 (20%) | 35 (70%) |  |
| Metro 50,000-249,999 | 795 (9.9%) | 790 (9.9%) | 5 (10%) |  |
| Micropolitan | 1,005 (12%) | 1,000 (13%) | 5 (10%) |  |
| Other | 605 (7.5%) | 605 (7.6%) | 0 (0%) |  |
| Hospital region |  |  |  | 0.011 |
| Midwest | 1,440 (18%) | 1,415 (18%) | 25 (50%) |  |
| Northeast | 1,225 (15%) | 1,210 (15%) | 15 (30%) |  |
| South | 3,510 (44%) | 3,505 (44%) | 5 (10%) |  |
| West | 1,890 (23%) | 1,885 (24%) | 5 (10%) |  |
| Hospital bedsize |  |  |  | 0.2 |
| Large | 3,715 (46%) | 3,690 (46%) | 25 (50%) |  |
| Medium | 2,630 (33%) | 2,625 (33%) | 5 (10%) |  |
| Small | 1,720 (21%) | 1,700 (21%) | 20 (40%) |  |
| Hospital location and teaching status |  |  |  | 0.8 |
| Rural | 760 (9.4%) | 755 (9.4%) | 5 (10%) |  |
| Urban, non-teaching | 1,515 (19%) | 1,510 (19%) | 5 (10%) |  |
| Urban, teaching | 5,790 (72%) | 5,750 (72%) | 40 (80%) |  |
| Charlson comorbidity index | 3.14 (1.95) | 3.13 (1.95) | 3.60 (1.71) | 0.2 |
| Hypertension | 6,535 (81%) | 6,500 (81%) | 35 (70%) | 0.4 |
| Chronic kidney disease | 1,895 (23%) | 1,875 (23%) | 20 (40%) | 0.2 |
| Obesity | 1,805 (22%) | 1,800 (22%) | 5 (10%) | 0.3 |
| Diabetes Mellitus | 3,365 (42%) | 3,345 (42%) | 20 (40%) | >0.9 |
| Chronic pulmonary disease | 1,705 (21%) | 1,700 (21%) | 5 (10%) | 0.4 |
| Liver Disease | 345 (4.3%) | 335 (4.2%) | 10 (20%) | 0.015 |
| Peripheral vascular disease | 955 (12%) | 955 (12%) | 0 (0%) | 0.2 |
| Hyperlipidemia | 5,350 (66%) | 5,310 (66%) | 40 (80%) | 0.4 |
| Congestive heart failure | 3,430 (43%) | 3,415 (43%) | 15 (30%) | 0.4 |
| Cancer | 205 (2.5%) | 200 (2.5%) | 5 (10%) | 0.13 |
| Obstructive sleep apnea | 635 (7.9%) | 635 (7.9%) | 0 (0%) | 0.3 |
| Arrhythmia | 2,930 (36%) | 2,920 (36%) | 10 (20%) | 0.3 |
| Valvular heart disease | 1,155 (14%) | 1,150 (14%) | 5 (10%) | 0.7 |
| Smoker | 1,755 (22%) | 1,750 (22%) | 5 (10%) | 0.4 |
| Prior stroke | 810 (10%) | 805 (10%) | 5 (10%) | >0.9 |
| Prior PCI | 1,490 (18%) | 1,485 (19%) | 5 (10%) | 0.5 |
| Prior CABG | 785 (9.7%) | 780 (9.7%) | 5 (10%) | >0.9 |
| *1*Mean (SD); n (%) | | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | | |

## Outcomes Table:

| **Characteristic** | **AMI without IBD** N = 8,015*1* | **AMI with IBD** N = 50*1* | **p-value***2* |
| --- | --- | --- | --- |
| In-hospital mortality | 380 (4.7%) | 0 (0%) | 0.5 |
| Length of stay (days) | 3.0 (2.0, 5.0) | 4.0 (2.0, 7.0) | 0.3 |
| Adjusted total charges | 75,670 (42,066, 126,630) | 52,652 (31,666, 106,937) | 0.3 |
| Cardiogenic shock | 580 (7.2%) | 0 (0%) | 0.4 |
| Stroke | 240 (3.0%) | 5 (10%) | 0.2 |
| Cardiac arrest | 240 (3.0%) | 0 (0%) | 0.6 |
| Percutaneous coronary intervention | 4,155 (52%) | 20 (40%) | 0.5 |
| Coronary artery bypass grafting | 595 (7.4%) | 0 (0%) | 0.4 |
| *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** |
| --- | --- | --- | --- |
| IBD |  |  |  |
| AMI without IBD | — | — |  |
| AMI with IBD | 0.00 | 0.00, 0.00 | <0.001 |
| Age, y | 1.02 | 0.99, 1.05 | 0.13 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.59 | 0.36, 0.97 | 0.036 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.91 | 0.59, 6.19 | 0.3 |
| Black | 1.73 | 0.71, 4.21 | 0.2 |
| Hispanic | 1.30 | 0.54, 3.15 | 0.6 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 1.23 | 0.43, 3.58 | 0.7 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.90 | 0.95, 3.79 | 0.068 |
| $66,000 - $87,999 | 1.89 | 0.81, 4.42 | 0.14 |
| $88,000 or more | 2.55 | 1.09, 5.98 | 0.031 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.76 | 0.19, 3.05 | 0.7 |
| Medicare | 2.22 | 0.94, 5.25 | 0.069 |
| Other | 3.21 | 1.20, 8.56 | 0.020 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | 0.77 | 0.36, 1.67 | 0.5 |
| Metro 250,000-999,999 | 0.98 | 0.45, 2.14 | >0.9 |
| Metro 50,000-249,999 | 1.80 | 0.70, 4.61 | 0.2 |
| Micropolitan | 1.14 | 0.39, 3.33 | 0.8 |
| Other | 2.05 | 0.69, 6.09 | 0.2 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.34 | 0.48, 3.77 | 0.6 |
| South | 1.58 | 0.66, 3.79 | 0.3 |
| West | 2.00 | 0.85, 4.72 | 0.11 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.95 | 0.56, 1.63 | 0.9 |
| Small | 0.39 | 0.16, 0.94 | 0.037 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.00 | 0.33, 3.02 | >0.9 |
| Urban, teaching | 0.80 | 0.27, 2.38 | 0.7 |
| Charlson comorbidity index | 0.99 | 0.71, 1.37 | >0.9 |
| Hypertension | 0.83 | 0.41, 1.69 | 0.6 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | 1.28 | 0.43, 3.82 | 0.7 |
| Obesity | 0.66 | 0.28, 1.55 | 0.3 |
| Diabetes Mellitus | 1.52 | 0.77, 3.00 | 0.2 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 1.03 | 0.51, 2.06 | >0.9 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 2.91 | 1.25, 6.78 | 0.014 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 0.54 | 0.20, 1.40 | 0.2 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.52 | 0.30, 0.89 | 0.018 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 2.08 | 1.08, 4.03 | 0.029 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | 1.24 | 0.35, 4.48 | 0.7 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.15 | 0.02, 1.31 | 0.086 |
| Arrhythmia |  |  |  |
| No | — | — |  |
| Yes | 2.94 | 1.61, 5.38 | <0.001 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 1.12 | 0.56, 2.21 | 0.8 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | 1.01 | 0.47, 2.17 | >0.9 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 0.77 | 0.32, 1.85 | 0.6 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | 0.84 | 0.39, 1.79 | 0.7 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | 0.74 | 0.28, 1.92 | 0.5 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Cardiogenic Shock:

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| IBD |  |  |  |
| AMI without IBD | — | — |  |
| AMI with IBD | 0.00 | 0.00, 0.00 | <0.001 |
| Age, y | 1.00 | 0.98, 1.03 | 0.8 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.01 | 0.65, 1.58 | >0.9 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.58 | 0.51, 4.95 | 0.4 |
| Black | 0.91 | 0.40, 2.09 | 0.8 |
| Hispanic | 0.91 | 0.37, 2.27 | 0.8 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 1.70 | 0.71, 4.03 | 0.2 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.54 | 0.89, 2.65 | 0.12 |
| $66,000 - $87,999 | 1.44 | 0.76, 2.74 | 0.3 |
| $88,000 or more | 1.93 | 0.97, 3.83 | 0.062 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.06 | 0.51, 2.22 | 0.9 |
| Medicare | 1.26 | 0.60, 2.65 | 0.5 |
| Other | 1.63 | 0.72, 3.69 | 0.2 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | 0.70 | 0.38, 1.30 | 0.3 |
| Metro 250,000-999,999 | 0.93 | 0.50, 1.74 | 0.8 |
| Metro 50,000-249,999 | 1.13 | 0.50, 2.55 | 0.8 |
| Micropolitan | 1.19 | 0.49, 2.89 | 0.7 |
| Other | 0.88 | 0.33, 2.37 | 0.8 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.69 | 0.29, 1.64 | 0.4 |
| South | 1.70 | 0.87, 3.33 | 0.12 |
| West | 1.16 | 0.55, 2.45 | 0.7 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.98 | 0.59, 1.62 | >0.9 |
| Small | 0.54 | 0.28, 1.05 | 0.069 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.43 | 0.40, 5.05 | 0.6 |
| Urban, teaching | 3.16 | 0.95, 10.5 | 0.060 |
| Charlson comorbidity index | 0.82 | 0.59, 1.15 | 0.2 |
| Hypertension | 0.73 | 0.44, 1.23 | 0.2 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | 1.27 | 0.46, 3.49 | 0.6 |
| Obesity | 0.70 | 0.38, 1.32 | 0.3 |
| Diabetes Mellitus | 1.54 | 0.78, 3.07 | 0.2 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.72 | 0.35, 1.49 | 0.4 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 5.66 | 2.78, 11.6 | <0.001 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 1.49 | 0.78, 2.86 | 0.2 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.68 | 0.44, 1.06 | 0.091 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 4.64 | 2.56, 8.41 | <0.001 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | 0.68 | 0.15, 3.19 | 0.6 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.22 | 0.05, 1.00 | 0.051 |
| Arrhythmia |  |  |  |
| No | — | — |  |
| Yes | 2.82 | 1.78, 4.49 | <0.001 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 1.51 | 0.89, 2.56 | 0.12 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | 0.98 | 0.56, 1.72 | >0.9 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 0.85 | 0.38, 1.88 | 0.7 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | 0.38 | 0.18, 0.82 | 0.014 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | 0.86 | 0.41, 1.84 | 0.7 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Cardiac Arrest:

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| IBD |  |  |  |
| AMI without IBD | — | — |  |
| AMI with IBD | 0.00 | 0.00, 0.00 | <0.001 |
| Age, y | 1.00 | 0.96, 1.03 | >0.9 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.35 | 0.67, 2.72 | 0.4 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.98 | 0.42, 9.22 | 0.4 |
| Black | 3.21 | 1.23, 8.39 | 0.017 |
| Hispanic | 1.03 | 0.25, 4.22 | >0.9 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 0.67 | 0.08, 5.43 | 0.7 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 2.34 | 0.94, 5.86 | 0.069 |
| $66,000 - $87,999 | 2.13 | 0.67, 6.78 | 0.2 |
| $88,000 or more | 3.30 | 1.04, 10.5 | 0.044 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.41 | 0.08, 2.04 | 0.3 |
| Medicare | 2.23 | 0.91, 5.48 | 0.080 |
| Other | 1.15 | 0.36, 3.70 | 0.8 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | 1.35 | 0.56, 3.21 | 0.5 |
| Metro 250,000-999,999 | 1.40 | 0.52, 3.80 | 0.5 |
| Metro 50,000-249,999 | 0.86 | 0.22, 3.35 | 0.8 |
| Micropolitan | 0.82 | 0.17, 3.99 | 0.8 |
| Other | 0.92 | 0.17, 5.00 | >0.9 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.96 | 0.32, 2.87 | >0.9 |
| South | 1.37 | 0.56, 3.35 | 0.5 |
| West | 1.42 | 0.56, 3.60 | 0.5 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.88 | 0.43, 1.80 | 0.7 |
| Small | 0.80 | 0.33, 1.97 | 0.6 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.24 | 0.22, 7.02 | 0.8 |
| Urban, teaching | 1.08 | 0.21, 5.63 | >0.9 |
| Charlson comorbidity index | 1.18 | 0.89, 1.55 | 0.2 |
| Hypertension | 0.63 | 0.27, 1.45 | 0.3 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | 0.78 | 0.27, 2.25 | 0.6 |
| Obesity | 2.42 | 1.07, 5.50 | 0.035 |
| Diabetes Mellitus | 1.16 | 0.50, 2.71 | 0.7 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.70 | 0.28, 1.72 | 0.4 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 2.34 | 0.82, 6.63 | 0.11 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 0.51 | 0.15, 1.76 | 0.3 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.41 | 0.20, 0.84 | 0.015 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 0.83 | 0.35, 1.94 | 0.7 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | 0.00 | 0.00, 0.00 | <0.001 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.18 | 0.02, 1.60 | 0.12 |
| Arrhythmia |  |  |  |
| No | — | — |  |
| Yes | 8.22 | 3.62, 18.7 | <0.001 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 0.75 | 0.29, 1.97 | 0.6 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | 0.82 | 0.32, 2.12 | 0.7 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 1.03 | 0.36, 2.96 | >0.9 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | 0.80 | 0.34, 1.91 | 0.6 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | 1.04 | 0.37, 2.95 | >0.9 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Stroke:

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| IBD |  |  |  |
| AMI without IBD | — | — |  |
| AMI with IBD | 9.76 | 1.50, 63.4 | 0.017 |
| Age, y | 1.01 | 0.97, 1.04 | 0.7 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.39 | 0.60, 3.21 | 0.4 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.07 | 0.00, 301 | 0.5 |
| Black | 1.22 | 0.38, 3.95 | 0.7 |
| Hispanic | 0.51 | 0.18, 1.45 | 0.2 |
| Native American | 0.00 | 0.00, 0.00 | <0.001 |
| Other | 13.1 | 3.81, 44.8 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.44 | 0.51, 4.08 | 0.5 |
| $66,000 - $87,999 | 1.07 | 0.32, 3.58 | >0.9 |
| $88,000 or more | 0.81 | 0.21, 3.06 | 0.8 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.65 | 0.16, 2.60 | 0.5 |
| Medicare | 0.55 | 0.16, 1.83 | 0.3 |
| Other | 1.22 | 0.25, 5.98 | 0.8 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | 0.70 | 0.20, 2.46 | 0.6 |
| Metro 250,000-999,999 | 1.33 | 0.36, 4.91 | 0.7 |
| Metro 50,000-249,999 | 0.98 | 0.20, 4.95 | >0.9 |
| Micropolitan | 0.66 | 0.16, 2.76 | 0.6 |
| Other | 0.96 | 0.15, 6.29 | >0.9 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.83 | 0.12, 5.78 | 0.8 |
| South | 1.78 | 0.52, 6.03 | 0.4 |
| West | 4.94 | 1.56, 15.7 | 0.007 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.65 | 0.25, 1.66 | 0.4 |
| Small | 1.15 | 0.42, 3.20 | 0.8 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 0.12 | 0.01, 1.06 | 0.057 |
| Urban, teaching | 0.84 | 0.12, 5.61 | 0.9 |
| Charlson comorbidity index | 2.82 | 2.14, 3.73 | <0.001 |
| Hypertension | 0.67 | 0.20, 2.28 | 0.5 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | 0.08 | 0.02, 0.29 | <0.001 |
| Obesity | 0.89 | 0.24, 3.29 | 0.9 |
| Diabetes Mellitus | 0.30 | 0.12, 0.78 | 0.014 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.24 | 0.07, 0.76 | 0.015 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 1.34 | 0.46, 3.86 | 0.6 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 1.14 | 0.46, 2.78 | 0.8 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.88 | 0.37, 2.14 | 0.8 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 0.71 | 0.23, 2.21 | 0.6 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | 0.36 | 0.04, 3.57 | 0.4 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 3.50 | 1.13, 10.8 | 0.030 |
| Arrhythmia |  |  |  |
| No | — | — |  |
| Yes | 1.42 | 0.61, 3.30 | 0.4 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 1.34 | 0.51, 3.51 | 0.6 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | 0.54 | 0.16, 1.82 | 0.3 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 40.9 | 18.2, 91.6 | <0.001 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | 1.49 | 0.54, 4.12 | 0.4 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | 0.52 | 0.15, 1.82 | 0.3 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

## Multivariable Linear Regression:

### Length of Stay:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| IBD |  |  |  |
| AMI without IBD | — | — |  |
| AMI with IBD | 0.38 | -1.2, 2.0 | 0.6 |
| Age, y | 0.00 | -0.02, 0.03 | 0.8 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | -0.04 | -0.49, 0.41 | 0.9 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.9 | -0.05, 3.8 | 0.056 |
| Black | 0.49 | -0.31, 1.3 | 0.2 |
| Hispanic | -0.28 | -0.90, 0.35 | 0.4 |
| Native American | 0.26 | -1.8, 2.3 | 0.8 |
| Other | 1.1 | -0.52, 2.8 | 0.2 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.33 | -0.19, 0.85 | 0.2 |
| $66,000 - $87,999 | 0.12 | -0.50, 0.75 | 0.7 |
| $88,000 or more | 0.17 | -0.64, 0.99 | 0.7 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.07 | -0.52, 0.66 | 0.8 |
| Medicare | 0.43 | -0.22, 1.1 | 0.2 |
| Other | 0.50 | -0.23, 1.2 | 0.2 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | -0.19 | -0.83, 0.45 | 0.6 |
| Metro 250,000-999,999 | -0.24 | -0.89, 0.40 | 0.5 |
| Metro 50,000-249,999 | 0.36 | -0.53, 1.3 | 0.4 |
| Micropolitan | 0.50 | -0.47, 1.5 | 0.3 |
| Other | -0.25 | -1.1, 0.56 | 0.5 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.25 | -0.51, 1.0 | 0.5 |
| South | 0.45 | -0.15, 1.1 | 0.14 |
| West | -0.40 | -1.0, 0.22 | 0.2 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -0.24 | -0.76, 0.28 | 0.4 |
| Small | -0.94 | -1.5, -0.37 | 0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 0.70 | -0.09, 1.5 | 0.084 |
| Urban, teaching | 1.9 | 1.1, 2.7 | <0.001 |
| Charlson comorbidity index | 0.62 | 0.22, 1.0 | 0.002 |
| Hypertension | 0.03 | -0.51, 0.57 | >0.9 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | -0.28 | -1.3, 0.76 | 0.6 |
| Obesity | 0.26 | -0.27, 0.79 | 0.3 |
| Diabetes Mellitus | -0.60 | -1.4, 0.21 | 0.14 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | -0.41 | -1.2, 0.35 | 0.3 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 0.78 | -0.81, 2.4 | 0.3 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | -0.08 | -0.94, 0.78 | 0.9 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -0.10 | -0.56, 0.36 | 0.7 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 0.78 | 0.18, 1.4 | 0.011 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | -0.91 | -2.6, 0.81 | 0.3 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.18 | -0.66, 1.0 | 0.7 |
| Arrhythmia |  |  |  |
| No | — | — |  |
| Yes | 1.5 | 0.99, 2.0 | <0.001 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 1.3 | 0.59, 1.9 | <0.001 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | -0.09 | -0.55, 0.37 | 0.7 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | -0.56 | -1.2, 0.09 | 0.089 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | -0.78 | -1.3, -0.26 | 0.004 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | -0.95 | -1.5, -0.40 | <0.001 |
| Abbreviation: CI = Confidence Interval | | | |

### Inflation Adjusted Total Charge:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| IBD |  |  |  |
| AMI without IBD | — | — |  |
| AMI with IBD | -14,961 | -41,689, 11,768 | 0.3 |
| Age, y | -490 | -1,187, 206 | 0.2 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 15,486 | 3,539, 27,433 | 0.011 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 23,928 | -22,197, 70,054 | 0.3 |
| Black | -443 | -18,754, 17,868 | >0.9 |
| Hispanic | -4,718 | -21,264, 11,828 | 0.6 |
| Native American | -710 | -61,478, 60,058 | >0.9 |
| Other | 45,464 | -5,513, 96,440 | 0.080 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 2,052 | -12,965, 17,069 | 0.8 |
| $66,000 - $87,999 | 5,016 | -12,352, 22,384 | 0.6 |
| $88,000 or more | 6,191 | -18,153, 30,534 | 0.6 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | -1,072 | -18,672, 16,528 | >0.9 |
| Medicare | 9,272 | -7,292, 25,836 | 0.3 |
| Other | 19,593 | -6,812, 45,998 | 0.15 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | -3,545 | -23,309, 16,219 | 0.7 |
| Metro 250,000-999,999 | 819 | -24,416, 26,054 | >0.9 |
| Metro 50,000-249,999 | -4,222 | -27,299, 18,855 | 0.7 |
| Micropolitan | -4,773 | -24,897, 15,351 | 0.6 |
| Other | -17,355 | -43,432, 8,721 | 0.2 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 9,418 | -8,831, 27,666 | 0.3 |
| South | 34,230 | 19,455, 49,006 | <0.001 |
| West | 37,989 | 19,900, 56,078 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -10,749 | -27,713, 6,215 | 0.2 |
| Small | -21,126 | -36,854, -5,397 | 0.009 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 16,331 | -3,012, 35,674 | 0.10 |
| Urban, teaching | 41,638 | 22,639, 60,638 | <0.001 |
| Charlson comorbidity index | 12,452 | 1,417, 23,487 | 0.027 |
| Hypertension | 3,411 | -8,694, 15,516 | 0.6 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | -23,245 | -44,998, -1,492 | 0.036 |
| Obesity | -945 | -15,155, 13,264 | 0.9 |
| Diabetes Mellitus | -11,926 | -36,507, 12,655 | 0.3 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | -4,368 | -23,755, 15,020 | 0.7 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 12,208 | -24,657, 49,072 | 0.5 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | -18,938 | -39,741, 1,865 | 0.074 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 7,517 | -4,082, 19,116 | 0.2 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 8,594 | -5,749, 22,938 | 0.2 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | -37,731 | -71,285, -4,177 | 0.028 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | -3,585 | -23,612, 16,443 | 0.7 |
| Arrhythmia |  |  |  |
| No | — | — |  |
| Yes | 31,654 | 19,492, 43,817 | <0.001 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 10,260 | -6,747, 27,266 | 0.2 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | -7,277 | -19,731, 5,177 | 0.3 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | -29,241 | -43,235, -15,248 | <0.001 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | -12,153 | -25,073, 768 | 0.065 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | -32,118 | -45,512, -18,724 | <0.001 |
| Abbreviation: CI = Confidence Interval | | | |