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

Eliza Aisha

Mariam Shahabi

## Preamble:

* **Study Objective**: Examine the impact of irritable bowel disease on outcomes among inpatient admissions with acute myocardial infarction.
* **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 acute myocardial infarction.
* **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, income, insurance, urbanicity, hospital region, hospital bedsize, hospital location, and teaching status.
  + Medical History: Hypertension, diabetes mellitus, obesity, hyperlipidemia, coronary artery disease, peripheral vascular disease, heart failure, dementia, cancer, chronic kidney disease, chronic pulmonary disease, obstructive sleep apnea, dementia, liver disease, valvular heart disease, prior stroke, prior cardiac surgery, presence of pacemaker/defibrillator.
  + Comorbidities: Elixhauser 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 = 1,894,085*1* | **AMI without IBD** N = 1,875,545*1* | **AMI with IBD** N = 18,540*1* | **p-value***2* |
| --- | --- | --- | --- | --- |
| Age, y | 67 (13) | 67 (13) | 68 (13) | <0.001 |
| Sex |  |  |  | <0.001 |
| Female | 702,140 (37%) | 692,995 (37%) | 9,145 (49%) |  |
| Male | 1,191,870 (63%) | 1,182,475 (63%) | 9,395 (51%) |  |
| Race |  |  |  | <0.001 |
| White | 1,344,575 (73%) | 1,330,130 (73%) | 14,445 (80%) |  |
| Asian or Pacific Islander | 52,150 (2.8%) | 51,815 (2.8%) | 335 (1.9%) |  |
| Black | 210,180 (11%) | 208,730 (11%) | 1,450 (8.0%) |  |
| Hispanic | 165,055 (9.0%) | 163,755 (9.0%) | 1,300 (7.2%) |  |
| Native American | 11,255 (0.6%) | 11,165 (0.6%) | 90 (0.5%) |  |
| Other | 56,115 (3.1%) | 55,695 (3.1%) | 420 (2.3%) |  |
| Residential income |  |  |  | 0.042 |
| $1 - $51,999 | 571,020 (31%) | 565,780 (31%) | 5,240 (29%) |  |
| $52,000 - $65,999 | 515,845 (28%) | 510,705 (28%) | 5,140 (28%) |  |
| $66,000 - $87,999 | 435,120 (23%) | 430,760 (23%) | 4,360 (24%) |  |
| $88,000 or more | 338,635 (18%) | 335,100 (18%) | 3,535 (19%) |  |
| Expected primary payer |  |  |  | <0.001 |
| Private | 484,045 (26%) | 480,080 (26%) | 3,965 (21%) |  |
| Medicaid | 182,090 (9.6%) | 180,510 (9.6%) | 1,580 (8.5%) |  |
| Medicare | 1,068,990 (57%) | 1,057,085 (56%) | 11,905 (64%) |  |
| Other | 156,140 (8.3%) | 155,070 (8.3%) | 1,070 (5.8%) |  |
| Level of urbanization |  |  |  | 0.13 |
| Central metro ≥1 million | 466,490 (25%) | 462,070 (25%) | 4,420 (24%) |  |
| Fringe metro ≥1 million | 446,975 (24%) | 442,245 (24%) | 4,730 (26%) |  |
| Metro 250,000-999,999 | 388,475 (21%) | 384,785 (21%) | 3,690 (20%) |  |
| Metro 50,000-249,999 | 196,985 (10%) | 194,995 (10%) | 1,990 (11%) |  |
| Micropolitan | 217,925 (12%) | 215,830 (12%) | 2,095 (11%) |  |
| Other | 169,695 (9.0%) | 168,120 (9.0%) | 1,575 (8.5%) |  |
| Hospital region |  |  |  | 0.014 |
| Midwest | 423,035 (22%) | 418,545 (22%) | 4,490 (24%) |  |
| Northeast | 321,125 (17%) | 317,885 (17%) | 3,240 (17%) |  |
| South | 785,310 (41%) | 778,055 (41%) | 7,255 (39%) |  |
| West | 364,615 (19%) | 361,060 (19%) | 3,555 (19%) |  |
| Hospital bedsize |  |  |  | 0.008 |
| Large | 953,740 (50%) | 944,765 (50%) | 8,975 (48%) |  |
| Medium | 574,055 (30%) | 568,435 (30%) | 5,620 (30%) |  |
| Small | 366,290 (19%) | 362,345 (19%) | 3,945 (21%) |  |
| Hospital location and teaching status |  |  |  | 0.6 |
| Rural | 143,990 (7.6%) | 142,545 (7.6%) | 1,445 (7.8%) |  |
| Urban, non-teaching | 371,570 (20%) | 368,060 (20%) | 3,510 (19%) |  |
| Urban, teaching | 1,378,525 (73%) | 1,364,940 (73%) | 13,585 (73%) |  |
| Charlson comorbidity index | 4.36 (2.33) | 4.35 (2.33) | 4.79 (2.34) | <0.001 |
| Hypertension | 1,555,075 (82%) | 1,540,105 (82%) | 14,970 (81%) | 0.030 |
| Chronic kidney disease | 461,125 (24%) | 455,960 (24%) | 5,165 (28%) | <0.001 |
| Obesity | 404,375 (21%) | 401,070 (21%) | 3,305 (18%) | <0.001 |
| Diabetes Mellitus | 780,790 (41%) | 773,700 (41%) | 7,090 (38%) | <0.001 |
| Chronic pulmonary disease | 410,205 (22%) | 405,410 (22%) | 4,795 (26%) | <0.001 |
| Liver Disease | 78,835 (4.2%) | 77,610 (4.1%) | 1,225 (6.6%) | <0.001 |
| Dementia | 97,575 (5.2%) | 96,580 (5.1%) | 995 (5.4%) | 0.6 |
| Peripheral vascular disease | 213,740 (11%) | 211,320 (11%) | 2,420 (13%) | <0.001 |
| Hyperlipidemia | 1,298,925 (69%) | 1,286,920 (69%) | 12,005 (65%) | <0.001 |
| Congestive heart failure | 822,745 (43%) | 814,700 (43%) | 8,045 (43%) | >0.9 |
| Cancer | 47,635 (2.5%) | 47,040 (2.5%) | 595 (3.2%) | 0.007 |
| Obstructive sleep apnea | 164,185 (8.7%) | 162,615 (8.7%) | 1,570 (8.5%) | 0.7 |
| Valvular heart disease | 277,065 (15%) | 273,900 (15%) | 3,165 (17%) | <0.001 |
| Smoker | 379,505 (20%) | 376,030 (20%) | 3,475 (19%) | 0.049 |
| Prior stroke | 188,515 (10.0%) | 186,595 (9.9%) | 1,920 (10%) | 0.4 |
| Prior PCI | 330,160 (17%) | 327,100 (17%) | 3,060 (17%) | 0.14 |
| Prior CABG | 182,995 (9.7%) | 181,390 (9.7%) | 1,605 (8.7%) | 0.040 |
| *1*Mean (SD); n (%) | | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | | |

## Outcomes Table:

| **Characteristic** | **AMI without IBD** N = 1,875,545*1* | **AMI with IBD** N = 18,540*1* | **p-value***2* |
| --- | --- | --- | --- |
| In-hospital mortality | 87,515 (4.7%) | 775 (4.2%) | 0.2 |
| Length of stay (days) | 3.0 (2.0, 5.0) | 3.0 (2.0, 6.0) | <0.001 |
| Adjusted total charges | 72,376 (40,701, 126,172) | 67,643 (36,502, 122,312) | <0.001 |
| Cardiogenic shock | 124,780 (6.7%) | 1,120 (6.0%) | 0.14 |
| Stroke | 60,205 (3.2%) | 715 (3.9%) | 0.028 |
| Cardiac arrest | 57,560 (3.1%) | 400 (2.2%) | 0.002 |
| Percutaneous coronary intervention | 924,255 (49%) | 7,300 (39%) | <0.001 |
| Coronary artery bypass grafting | 167,340 (8.9%) | 1,310 (7.1%) | <0.001 |
| *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 | 0.69 | 0.58, 0.82 | <0.001 |
| Age, y | 1.04 | 1.04, 1.04 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.04 | 1.01, 1.08 | 0.025 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.19 | 1.08, 1.31 | <0.001 |
| Black | 0.97 | 0.91, 1.03 | 0.3 |
| Hispanic | 0.96 | 0.90, 1.02 | 0.2 |
| Native American | 1.07 | 0.86, 1.34 | 0.5 |
| Other | 1.19 | 1.09, 1.31 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.02 | 0.97, 1.06 | 0.5 |
| $66,000 - $87,999 | 1.01 | 0.96, 1.06 | 0.8 |
| $88,000 or more | 1.00 | 0.94, 1.06 | >0.9 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.03 | 0.95, 1.11 | 0.5 |
| Medicare | 1.04 | 0.99, 1.10 | 0.2 |
| Other | 1.31 | 1.21, 1.42 | <0.001 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | 0.94 | 0.89, 0.99 | 0.019 |
| Metro 250,000-999,999 | 1.05 | 0.99, 1.11 | 0.091 |
| Metro 50,000-249,999 | 1.05 | 0.98, 1.12 | 0.2 |
| Micropolitan | 1.08 | 1.01, 1.16 | 0.035 |
| Other | 1.09 | 1.01, 1.17 | 0.029 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.16 | 1.09, 1.23 | <0.001 |
| South | 0.98 | 0.93, 1.03 | 0.3 |
| West | 0.93 | 0.88, 0.99 | 0.018 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.93 | 0.89, 0.97 | <0.001 |
| Small | 0.81 | 0.77, 0.86 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.14 | 1.04, 1.24 | 0.004 |
| Urban, teaching | 1.27 | 1.17, 1.37 | <0.001 |
| Charlson comorbidity index | 1.46 | 1.45, 1.48 | <0.001 |
| Hypertension | 0.42 | 0.40, 0.44 | <0.001 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | 0.84 | 0.81, 0.88 | <0.001 |
| Obesity | 0.56 | 0.53, 0.59 | <0.001 |
| Diabetes Mellitus | 0.79 | 0.76, 0.82 | <0.001 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.67 | 0.64, 0.70 | <0.001 |
| Dementia |  |  |  |
| No | — | — |  |
| Yes | 1.11 | 1.04, 1.17 | <0.001 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 3.02 | 2.87, 3.19 | <0.001 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 0.81 | 0.77, 0.86 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.51 | 0.49, 0.53 | <0.001 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 1.02 | 0.98, 1.06 | 0.5 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | 0.82 | 0.75, 0.90 | <0.001 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.67 | 0.62, 0.72 | <0.001 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 0.57 | 0.54, 0.60 | <0.001 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | 0.79 | 0.75, 0.84 | <0.001 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 1.00 | 0.95, 1.06 | 0.9 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | 0.81 | 0.77, 0.85 | <0.001 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | 0.98 | 0.93, 1.04 | 0.5 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Cardiogenic Shock:

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| IBD |  |  |  |
| AMI without IBD | — | — |  |
| AMI with IBD | 0.74 | 0.64, 0.86 | <0.001 |
| Age, y | 1.01 | 1.00, 1.01 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.23 | 1.20, 1.27 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.36 | 1.26, 1.47 | <0.001 |
| Black | 0.74 | 0.69, 0.78 | <0.001 |
| Hispanic | 1.03 | 0.98, 1.10 | 0.3 |
| Native American | 1.29 | 1.07, 1.56 | 0.008 |
| Other | 1.34 | 1.24, 1.45 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.04 | 1.00, 1.08 | 0.075 |
| $66,000 - $87,999 | 1.07 | 1.02, 1.12 | 0.004 |
| $88,000 or more | 1.11 | 1.05, 1.17 | <0.001 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.88 | 0.83, 0.93 | <0.001 |
| Medicare | 0.95 | 0.91, 0.99 | 0.013 |
| Other | 0.98 | 0.92, 1.03 | 0.4 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | 1.00 | 0.95, 1.05 | >0.9 |
| Metro 250,000-999,999 | 1.01 | 0.96, 1.06 | 0.8 |
| Metro 50,000-249,999 | 1.01 | 0.94, 1.08 | 0.7 |
| Micropolitan | 1.10 | 1.03, 1.18 | 0.006 |
| Other | 0.99 | 0.92, 1.07 | 0.8 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.00 | 0.94, 1.07 | 0.9 |
| South | 0.94 | 0.89, 0.99 | 0.017 |
| West | 0.89 | 0.84, 0.95 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.80 | 0.76, 0.84 | <0.001 |
| Small | 0.65 | 0.62, 0.69 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.53 | 1.38, 1.70 | <0.001 |
| Urban, teaching | 1.98 | 1.79, 2.18 | <0.001 |
| Charlson comorbidity index | 1.44 | 1.43, 1.46 | <0.001 |
| Hypertension | 0.43 | 0.41, 0.45 | <0.001 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | 0.64 | 0.62, 0.67 | <0.001 |
| Obesity | 0.62 | 0.60, 0.64 | <0.001 |
| Diabetes Mellitus | 0.79 | 0.76, 0.82 | <0.001 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.58 | 0.55, 0.60 | <0.001 |
| Dementia |  |  |  |
| No | — | — |  |
| Yes | 0.71 | 0.66, 0.75 | <0.001 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 2.83 | 2.70, 2.96 | <0.001 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 0.77 | 0.73, 0.80 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.70 | 0.68, 0.73 | <0.001 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 2.05 | 1.98, 2.13 | <0.001 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | 0.63 | 0.57, 0.68 | <0.001 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.73 | 0.69, 0.77 | <0.001 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 0.67 | 0.65, 0.70 | <0.001 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | 0.97 | 0.94, 1.01 | 0.2 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 0.83 | 0.79, 0.88 | <0.001 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | 0.81 | 0.78, 0.84 | <0.001 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | 0.60 | 0.56, 0.63 | <0.001 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Cardiac Arrest:

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| IBD |  |  |  |
| AMI without IBD | — | — |  |
| AMI with IBD | 0.56 | 0.44, 0.71 | <0.001 |
| Age, y | 1.00 | 1.00, 1.00 | 0.7 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.34 | 1.29, 1.40 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.10 | 0.98, 1.23 | 0.12 |
| Black | 1.04 | 0.97, 1.12 | 0.2 |
| Hispanic | 0.92 | 0.85, 1.00 | 0.038 |
| Native American | 0.78 | 0.57, 1.07 | 0.12 |
| Other | 1.21 | 1.09, 1.35 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 1.03 | 0.97, 1.08 | 0.4 |
| $66,000 - $87,999 | 1.06 | 1.00, 1.13 | 0.054 |
| $88,000 or more | 1.10 | 1.03, 1.18 | 0.007 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.82 | 0.76, 0.89 | <0.001 |
| Medicare | 0.91 | 0.86, 0.97 | 0.002 |
| Other | 0.98 | 0.91, 1.06 | 0.7 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | 0.97 | 0.91, 1.03 | 0.3 |
| Metro 250,000-999,999 | 0.96 | 0.90, 1.02 | 0.2 |
| Metro 50,000-249,999 | 0.93 | 0.86, 1.01 | 0.089 |
| Micropolitan | 0.96 | 0.88, 1.05 | 0.3 |
| Other | 0.79 | 0.71, 0.87 | <0.001 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.94 | 0.87, 1.01 | 0.072 |
| South | 0.84 | 0.79, 0.89 | <0.001 |
| West | 0.74 | 0.68, 0.79 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 1.05 | 0.99, 1.10 | 0.10 |
| Small | 0.93 | 0.88, 0.99 | 0.032 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.12 | 1.00, 1.26 | 0.047 |
| Urban, teaching | 1.15 | 1.03, 1.28 | 0.010 |
| Charlson comorbidity index | 1.54 | 1.52, 1.56 | <0.001 |
| Hypertension | 0.46 | 0.44, 0.49 | <0.001 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | 0.61 | 0.58, 0.64 | <0.001 |
| Obesity | 0.58 | 0.55, 0.62 | <0.001 |
| Diabetes Mellitus | 0.61 | 0.58, 0.63 | <0.001 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.55 | 0.52, 0.58 | <0.001 |
| Dementia |  |  |  |
| No | — | — |  |
| Yes | 0.73 | 0.66, 0.80 | <0.001 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 1.46 | 1.36, 1.56 | <0.001 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 0.60 | 0.57, 0.65 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.69 | 0.66, 0.72 | <0.001 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 0.93 | 0.89, 0.98 | 0.004 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | 0.64 | 0.56, 0.72 | <0.001 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.79 | 0.73, 0.85 | <0.001 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 0.47 | 0.44, 0.50 | <0.001 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | 0.87 | 0.83, 0.92 | <0.001 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 0.94 | 0.87, 1.00 | 0.062 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | 0.83 | 0.78, 0.88 | <0.001 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | 0.97 | 0.90, 1.04 | 0.3 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Stroke:

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| IBD |  |  |  |
| AMI without IBD | — | — |  |
| AMI with IBD | 1.06 | 0.87, 1.29 | 0.6 |
| Age, y | 1.00 | 0.99, 1.00 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.02 | 0.98, 1.07 | 0.3 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.57 | 1.41, 1.75 | <0.001 |
| Black | 1.37 | 1.29, 1.46 | <0.001 |
| Hispanic | 1.17 | 1.08, 1.26 | <0.001 |
| Native American | 1.12 | 0.88, 1.44 | 0.4 |
| Other | 1.41 | 1.25, 1.58 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.99 | 0.94, 1.04 | 0.7 |
| $66,000 - $87,999 | 0.99 | 0.93, 1.05 | 0.7 |
| $88,000 or more | 0.95 | 0.89, 1.03 | 0.2 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 1.33 | 1.22, 1.45 | <0.001 |
| Medicare | 1.33 | 1.24, 1.42 | <0.001 |
| Other | 1.20 | 1.09, 1.33 | <0.001 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | 0.97 | 0.91, 1.03 | 0.3 |
| Metro 250,000-999,999 | 0.95 | 0.89, 1.02 | 0.13 |
| Metro 50,000-249,999 | 0.96 | 0.88, 1.04 | 0.3 |
| Micropolitan | 1.05 | 0.96, 1.15 | 0.3 |
| Other | 1.03 | 0.94, 1.14 | 0.5 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.20 | 1.12, 1.29 | <0.001 |
| South | 0.98 | 0.92, 1.04 | 0.5 |
| West | 0.99 | 0.92, 1.07 | 0.8 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.91 | 0.86, 0.96 | <0.001 |
| Small | 0.86 | 0.80, 0.91 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.09 | 0.97, 1.22 | 0.14 |
| Urban, teaching | 1.32 | 1.19, 1.46 | <0.001 |
| Charlson comorbidity index | 1.36 | 1.34, 1.38 | <0.001 |
| Hypertension | 0.71 | 0.67, 0.76 | <0.001 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | 0.72 | 0.68, 0.76 | <0.001 |
| Obesity | 0.65 | 0.61, 0.69 | <0.001 |
| Diabetes Mellitus | 0.96 | 0.92, 1.01 | 0.094 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.62 | 0.59, 0.66 | <0.001 |
| Dementia |  |  |  |
| No | — | — |  |
| Yes | 1.12 | 1.04, 1.21 | 0.002 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 1.10 | 1.00, 1.20 | 0.043 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 0.81 | 0.76, 0.86 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.82 | 0.78, 0.86 | <0.001 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 0.98 | 0.93, 1.03 | 0.4 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | 0.74 | 0.65, 0.84 | <0.001 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | 0.85 | 0.79, 0.92 | <0.001 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | 0.64 | 0.60, 0.68 | <0.001 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | 0.84 | 0.79, 0.89 | <0.001 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | 21.9 | 20.9, 22.9 | <0.001 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | 0.75 | 0.71, 0.79 | <0.001 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | 0.76 | 0.71, 0.81 | <0.001 |
| 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 | 0.20 | 0.02, 0.37 | 0.028 |
| Age, y | 0.01 | 0.00, 0.01 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.35 | 0.32, 0.39 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.54 | 0.39, 0.69 | <0.001 |
| Black | 0.01 | -0.06, 0.08 | 0.8 |
| Hispanic | 0.25 | 0.16, 0.34 | <0.001 |
| Native American | 0.09 | -0.16, 0.33 | 0.5 |
| Other | 0.30 | 0.16, 0.44 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -0.04 | -0.10, 0.01 | 0.13 |
| $66,000 - $87,999 | -0.09 | -0.15, -0.03 | 0.004 |
| $88,000 or more | -0.18 | -0.26, -0.11 | <0.001 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.26 | 0.18, 0.33 | <0.001 |
| Medicare | 0.03 | -0.02, 0.08 | 0.2 |
| Other | -0.06 | -0.12, 0.01 | 0.076 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | 0.02 | -0.06, 0.10 | 0.7 |
| Metro 250,000-999,999 | -0.10 | -0.19, -0.01 | 0.023 |
| Metro 50,000-249,999 | -0.08 | -0.19, 0.02 | 0.11 |
| Micropolitan | 0.12 | 0.02, 0.23 | 0.023 |
| Other | 0.11 | -0.01, 0.22 | 0.069 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.71 | 0.61, 0.81 | <0.001 |
| South | 0.17 | 0.08, 0.26 | <0.001 |
| West | -0.57 | -0.68, -0.47 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -0.70 | -0.78, -0.61 | <0.001 |
| Small | -1.2 | -1.3, -1.1 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 0.89 | 0.74, 1.0 | <0.001 |
| Urban, teaching | 1.6 | 1.5, 1.8 | <0.001 |
| Charlson comorbidity index | 0.87 | 0.84, 0.89 | <0.001 |
| Hypertension | -0.87 | -0.92, -0.81 | <0.001 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | -0.17 | -0.23, -0.11 | <0.001 |
| Obesity | -0.59 | -0.64, -0.54 | <0.001 |
| Diabetes Mellitus | -0.33 | -0.37, -0.28 | <0.001 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | -0.53 | -0.58, -0.48 | <0.001 |
| Dementia |  |  |  |
| No | — | — |  |
| Yes | -0.02 | -0.11, 0.07 | 0.7 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 1.1 | 0.91, 1.2 | <0.001 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | -0.58 | -0.65, -0.52 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -0.36 | -0.41, -0.31 | <0.001 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 0.78 | 0.73, 0.83 | <0.001 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | -0.43 | -0.55, -0.31 | <0.001 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | -0.11 | -0.17, -0.06 | <0.001 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | -0.44 | -0.50, -0.38 | <0.001 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | -0.37 | -0.42, -0.33 | <0.001 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | -0.12 | -0.18, -0.07 | <0.001 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | -0.57 | -0.61, -0.53 | <0.001 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | -1.0 | -1.0, -0.95 | <0.001 |
| Abbreviation: CI = Confidence Interval | | | |

### Inflation Adjusted Total Charge:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| IBD |  |  |  |
| AMI without IBD | — | — |  |
| AMI with IBD | -7,810 | -12,819, -2,802 | 0.002 |
| Age, y | -437 | -490, -384 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 18,953 | 17,959, 19,946 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 14,367 | 8,752, 19,981 | <0.001 |
| Black | -14,397 | -16,677, -12,117 | <0.001 |
| Hispanic | 11,063 | 7,534, 14,592 | <0.001 |
| Native American | -9,215 | -15,933, -2,496 | 0.007 |
| Other | 17,856 | 12,480, 23,231 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -335 | -2,223, 1,554 | 0.7 |
| $66,000 - $87,999 | -2,387 | -4,697, -77 | 0.043 |
| $88,000 or more | -1,210 | -4,352, 1,932 | 0.5 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | -6,342 | -8,549, -4,135 | <0.001 |
| Medicare | -1,670 | -3,348, 6.8 | 0.051 |
| Other | -1,958 | -3,962, 45 | 0.055 |
| Level of urbanization |  |  |  |
| Central metro ≥1 million | — | — |  |
| Fringe metro ≥1 million | -7,089 | -11,016, -3,163 | <0.001 |
| Metro 250,000-999,999 | -10,292 | -15,022, -5,563 | <0.001 |
| Metro 50,000-249,999 | -20,610 | -24,863, -16,356 | <0.001 |
| Micropolitan | -13,393 | -17,487, -9,300 | <0.001 |
| Other | -17,454 | -21,955, -12,952 | <0.001 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 15,301 | 10,643, 19,960 | <0.001 |
| South | 19,157 | 15,979, 22,335 | <0.001 |
| West | 31,222 | 26,188, 36,256 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -13,322 | -17,274, -9,371 | <0.001 |
| Small | -26,637 | -30,447, -22,827 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 30,273 | 25,254, 35,292 | <0.001 |
| Urban, teaching | 39,955 | 35,527, 44,382 | <0.001 |
| Charlson comorbidity index | 17,670 | 16,633, 18,707 | <0.001 |
| Hypertension | -17,742 | -19,573, -15,911 | <0.001 |
| Chronic kidney disease |  |  |  |
| No | — | — |  |
| Yes | -19,466 | -21,354, -17,577 | <0.001 |
| Obesity | -11,153 | -12,792, -9,513 | <0.001 |
| Diabetes Mellitus | -6,424 | -7,832, -5,015 | <0.001 |
| Chronic pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | -17,869 | -19,594, -16,144 | <0.001 |
| Dementia |  |  |  |
| No | — | — |  |
| Yes | -32,749 | -34,441, -31,058 | <0.001 |
| Liver Disease |  |  |  |
| No | — | — |  |
| Yes | 51,852 | 46,700, 57,004 | <0.001 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | -13,673 | -15,779, -11,568 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -342 | -1,665, 981 | 0.6 |
| Congestive heart failure |  |  |  |
| No | — | — |  |
| Yes | 8,935 | 7,343, 10,527 | <0.001 |
| Cancer |  |  |  |
| No | — | — |  |
| Yes | -18,991 | -22,160, -15,821 | <0.001 |
| Obstructive sleep apnea |  |  |  |
| No | — | — |  |
| Yes | -10,079 | -11,619, -8,539 | <0.001 |
| Valvular heart disease |  |  |  |
| No | — | — |  |
| Yes | -14,974 | -17,065, -12,884 | <0.001 |
| Smoker |  |  |  |
| No | — | — |  |
| Yes | -9,545 | -10,859, -8,232 | <0.001 |
| Prior stroke |  |  |  |
| No | — | — |  |
| Yes | -10,131 | -11,445, -8,816 | <0.001 |
| Prior PCI |  |  |  |
| No | — | — |  |
| Yes | -13,685 | -14,876, -12,494 | <0.001 |
| Prior CABG |  |  |  |
| No | — | — |  |
| Yes | -27,577 | -29,002, -26,151 | <0.001 |
| Abbreviation: CI = Confidence Interval | | | |