Impact of BMI on In-Hospital Outcomes in Patients with Acute Pancreatitis

Analysis for RCOP NIS IM10

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## Preamble:

* **Reference Papers:**
  + [Salman et al. 2025](https://pubmed.ncbi.nlm.nih.gov/40326590/)
  + [Singla et al.2009](https://pubmed.ncbi.nlm.nih.gov/19768143/)
* **Study Objective**: Examine the impact of body mass index (BMI) on outcomes among inpatient admissions with Acute Pancreatitis.
* **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 Acute Pancreatitis.
* **BMI Categories**:
  + Underweight: BMI ≤19.9 kg/m²
  + Normal Weight: BMI 20.0 to 24.9 kg/m²
  + Overweight: BMI 25.0 to 29.9 kg/m²
  + Class I Obesity: BMI 30.0 to 34.9 kg/m²
  + Class II Obesity: BMI 35.0 to 39.9 kg/m²
  + Class III Obesity: BMI ≥40.0 kg/m²
* **Outcomes**:
  + In-hospital all-cause mortality
  + Total hospital length of stay (days)
  + Total charge, inflation adjusted to 2020 ($)
* **Statistical Analysis**: Multiple logistic and linear regression to determine the independent association of BMI categories with in-hospital mortality and length of stay, respectively, adjusted for:
  + Demographics: Age, sex, race, residential income, and insurance.
  + Medical History: Diabetes Mellitus, Hypertension, End stage renal disease, Smoking, Chronic obstructive pulmonary disease, Peripheral vascular disease, Cirrhosis, Atrial fibrillation, Hyperlipidemia, Anemia, Previous myocardial infarction, Previous heart failure
  + 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** | **Overall** N = 183,185*1* | **Normal weight (BMI 20.0-24.9kg/m²)** N = 13,970*1* | **Underweight (BMI ≤19.9kg/m²)** N = 20,945*1* | **Overweight (BMI 25.0-29.9kg/m²)** N = 18,295*1* | **Class I obesity (BMI 30.0-34.9kg/m²)** N = 44,115*1* | **Class II obesity (BMI 35.0-39.9kg/m²)** N = 36,980*1* | **Class III obesity (BMI ≥40.0kg/m²)** N = 48,880*1* | **p-value***2* |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Age, y | 51 (39, 62) | 55 (43, 66) | 54 (42, 63) | 53 (40, 66) | 52 (39, 62) | 49 (37, 61) | 48 (37, 59) | <0.001 |
| Sex |  |  |  |  |  |  |  | <0.001 |
| Female | 95,555 (52%) | 6,240 (45%) | 10,640 (51%) | 8,405 (46%) | 21,145 (48%) | 18,950 (51%) | 30,175 (62%) |  |
| Male | 87,620 (48%) | 7,725 (55%) | 10,305 (49%) | 9,890 (54%) | 22,970 (52%) | 18,025 (49%) | 18,705 (38%) |  |
| Race |  |  |  |  |  |  |  | <0.001 |
| Asian or Pacific Islander | 2,955 (1.7%) | 425 (3.1%) | 440 (2.2%) | 455 (2.5%) | 750 (1.7%) | 460 (1.3%) | 425 (0.9%) |  |
| Black | 30,125 (17%) | 2,375 (17%) | 4,785 (23%) | 2,935 (16%) | 5,965 (14%) | 5,375 (15%) | 8,690 (18%) |  |
| Hispanic | 24,845 (14%) | 1,065 (7.8%) | 1,100 (5.4%) | 2,885 (16%) | 7,545 (17%) | 5,670 (16%) | 6,580 (14%) |  |
| Native American | 1,485 (0.8%) | 65 (0.5%) | 115 (0.6%) | 115 (0.6%) | 330 (0.8%) | 380 (1.1%) | 480 (1.0%) |  |
| Other | 4,925 (2.8%) | 415 (3.1%) | 430 (2.1%) | 565 (3.2%) | 1,200 (2.8%) | 1,185 (3.3%) | 1,130 (2.4%) |  |
| White | 114,640 (64%) | 9,250 (68%) | 13,575 (66%) | 10,935 (61%) | 27,345 (63%) | 23,075 (64%) | 30,460 (64%) |  |
| Residential income |  |  |  |  |  |  |  | <0.001 |
| $1 - $51,999 | 58,075 (32%) | 4,150 (30%) | 7,335 (36%) | 5,325 (30%) | 13,075 (30%) | 11,480 (32%) | 16,710 (35%) |  |
| $52,000 - $65,999 | 49,180 (27%) | 3,700 (27%) | 5,640 (27%) | 4,675 (26%) | 11,695 (27%) | 10,080 (28%) | 13,390 (28%) |  |
| $66,000 - $87,999 | 43,700 (24%) | 3,385 (25%) | 4,525 (22%) | 4,395 (24%) | 10,925 (25%) | 9,195 (25%) | 11,275 (23%) |  |
| $88,000 or more | 29,555 (16%) | 2,490 (18%) | 3,040 (15%) | 3,620 (20%) | 7,845 (18%) | 5,640 (15%) | 6,920 (14%) |  |
| Expected primary payer |  |  |  |  |  |  |  | <0.001 |
| Medicaid | 44,490 (24%) | 3,945 (28%) | 7,185 (34%) | 4,300 (24%) | 9,620 (22%) | 7,960 (22%) | 11,480 (24%) |  |
| Medicare | 52,155 (29%) | 4,930 (35%) | 7,235 (35%) | 6,005 (33%) | 11,785 (27%) | 9,750 (26%) | 12,450 (25%) |  |
| Other | 21,295 (12%) | 1,645 (12%) | 2,370 (11%) | 2,195 (12%) | 5,600 (13%) | 4,360 (12%) | 5,125 (10%) |  |
| Private | 64,995 (36%) | 3,420 (25%) | 4,125 (20%) | 5,780 (32%) | 17,025 (39%) | 14,875 (40%) | 19,770 (40%) |  |
| Hospital region |  |  |  |  |  |  |  | <0.001 |
| Midwest | 46,605 (25%) | 3,875 (28%) | 5,925 (28%) | 4,195 (23%) | 10,910 (25%) | 9,230 (25%) | 12,470 (26%) |  |
| Northeast | 28,825 (16%) | 2,300 (16%) | 3,425 (16%) | 3,175 (17%) | 6,895 (16%) | 5,600 (15%) | 7,430 (15%) |  |
| South | 72,065 (39%) | 4,860 (35%) | 8,055 (38%) | 7,065 (39%) | 17,175 (39%) | 14,745 (40%) | 20,165 (41%) |  |
| West | 35,690 (19%) | 2,935 (21%) | 3,540 (17%) | 3,860 (21%) | 9,135 (21%) | 7,405 (20%) | 8,815 (18%) |  |
| Hospital bedsize |  |  |  |  |  |  |  | <0.001 |
| Large | 84,690 (46%) | 6,855 (49%) | 10,580 (51%) | 8,355 (46%) | 19,930 (45%) | 16,555 (45%) | 22,415 (46%) |  |
| Medium | 53,330 (29%) | 4,190 (30%) | 5,710 (27%) | 5,350 (29%) | 13,170 (30%) | 10,670 (29%) | 14,240 (29%) |  |
| Small | 45,165 (25%) | 2,925 (21%) | 4,655 (22%) | 4,590 (25%) | 11,015 (25%) | 9,755 (26%) | 12,225 (25%) |  |
| Hospital location and teaching status |  |  |  |  |  |  |  | <0.001 |
| Rural | 17,340 (9.5%) | 950 (6.8%) | 1,935 (9.2%) | 1,210 (6.6%) | 3,925 (8.9%) | 3,770 (10%) | 5,550 (11%) |  |
| Urban, non-teaching | 39,525 (22%) | 2,775 (20%) | 3,930 (19%) | 3,840 (21%) | 9,735 (22%) | 8,280 (22%) | 10,965 (22%) |  |
| Urban, teaching | 126,320 (69%) | 10,245 (73%) | 15,080 (72%) | 13,245 (72%) | 30,455 (69%) | 24,930 (67%) | 32,365 (66%) |  |
| Admission type |  |  |  |  |  |  |  | 0.001 |
| Elective | 4,355 (2.4%) | 480 (3.4%) | 430 (2.1%) | 525 (2.9%) | 995 (2.3%) | 840 (2.3%) | 1,085 (2.2%) |  |
| Non-elective | 178,740 (98%) | 13,485 (97%) | 20,510 (98%) | 17,765 (97%) | 43,095 (98%) | 36,120 (98%) | 47,765 (98%) |  |
| Charlson comorbidity index | 1.00 (0.00, 2.00) | 1.00 (0.00, 2.00) | 1.00 (0.00, 2.00) | 1.00 (0.00, 2.00) | 1.00 (0.00, 2.00) | 1.00 (0.00, 2.00) | 1.00 (0.00, 2.00) | <0.001 |
| Diabetes Mellitus | 67,465 (37%) | 3,105 (22%) | 3,250 (16%) | 6,125 (33%) | 17,280 (39%) | 16,135 (44%) | 21,570 (44%) | <0.001 |
| Hypertension | 96,905 (53%) | 6,450 (46%) | 8,690 (41%) | 9,545 (52%) | 24,500 (56%) | 20,795 (56%) | 26,925 (55%) | <0.001 |
| End stage renal disease | 2,850 (1.6%) | 305 (2.2%) | 380 (1.8%) | 265 (1.4%) | 575 (1.3%) | 485 (1.3%) | 840 (1.7%) | 0.004 |
| Smoking | 44,230 (24%) | 4,985 (36%) | 10,485 (50%) | 4,280 (23%) | 9,405 (21%) | 7,205 (19%) | 7,870 (16%) | <0.001 |
| Chronic obstructive pulmonary disease | 19,485 (11%) | 1,980 (14%) | 4,170 (20%) | 1,525 (8.3%) | 3,700 (8.4%) | 3,170 (8.6%) | 4,940 (10%) | <0.001 |
| Peripheral vascular disease | 4,205 (2.3%) | 515 (3.7%) | 1,110 (5.3%) | 470 (2.6%) | 930 (2.1%) | 570 (1.5%) | 610 (1.2%) | <0.001 |
| Cirrhosis | 6,475 (3.5%) | 870 (6.2%) | 1,370 (6.5%) | 705 (3.9%) | 1,275 (2.9%) | 1,055 (2.9%) | 1,200 (2.5%) | <0.001 |
| Atrial fibrillation | 12,525 (6.8%) | 1,010 (7.2%) | 1,210 (5.8%) | 1,450 (7.9%) | 3,000 (6.8%) | 2,315 (6.3%) | 3,540 (7.2%) | <0.001 |
| Hyperlipidemia | 73,195 (40%) | 3,885 (28%) | 3,850 (18%) | 7,450 (41%) | 21,065 (48%) | 17,230 (47%) | 19,715 (40%) | <0.001 |
| Anemia | 36,505 (20%) | 4,875 (35%) | 7,335 (35%) | 4,540 (25%) | 7,365 (17%) | 5,135 (14%) | 7,255 (15%) | <0.001 |
| Previous myocardial infarction | 6,840 (3.7%) | 470 (3.4%) | 820 (3.9%) | 720 (3.9%) | 1,970 (4.5%) | 1,310 (3.5%) | 1,550 (3.2%) | <0.001 |
| Previous heart failure | 9,445 (5.2%) | 715 (5.1%) | 1,075 (5.1%) | 745 (4.1%) | 1,960 (4.4%) | 1,780 (4.8%) | 3,170 (6.5%) | <0.001 |
| *1*Median (Q1, Q3); n (%) | | | | | | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | | | | | | |

## Outcomes Table:

| **Characteristic** | **Normal weight (BMI 20.0-24.9kg/m²)** N = 13,970*1* | **Underweight (BMI ≤19.9kg/m²)** N = 20,945*1* | **Overweight (BMI 25.0-29.9kg/m²)** N = 18,295*1* | **Class I obesity (BMI 30.0-34.9kg/m²)** N = 44,115*1* | **Class II obesity (BMI 35.0-39.9kg/m²)** N = 36,980*1* | **Class III obesity (BMI ≥40.0kg/m²)** N = 48,880*1* | **p-value***2* |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Died during hospitalization | 175 (1.3%) | 210 (1.0%) | 170 (0.9%) | 190 (0.4%) | 185 (0.5%) | 370 (0.8%) | <0.001 |
| Length of stay (days) | 4.0 (3.0, 8.0) | 4.0 (3.0, 6.0) | 4.0 (2.0, 6.0) | 3.0 (2.0, 5.0) | 3.0 (2.0, 5.0) | 3.0 (2.0, 5.0) | <0.001 |
| Inflation-adjusted total charge ($) | 35,826 (21,568, 67,725) | 31,236 (18,459, 54,782) | 35,332 (19,751, 66,314) | 31,885 (18,580, 57,076) | 31,335 (18,824, 53,645) | 31,814 (18,677, 55,528) | <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** |
| --- | --- | --- | --- |
| BMI category |  |  |  |
| Normal weight (BMI 20.0-24.9kg/m²) | — | — |  |
| Underweight (BMI ≤19.9kg/m²) | 0.90 | 0.55, 1.46 | 0.7 |
| Overweight (BMI 25.0-29.9kg/m²) | 0.93 | 0.56, 1.53 | 0.8 |
| Class I obesity (BMI 30.0-34.9kg/m²) | 0.58 | 0.35, 0.95 | 0.031 |
| Class II obesity (BMI 35.0-39.9kg/m²) | 0.88 | 0.52, 1.48 | 0.6 |
| Class III obesity (BMI ≥40.0kg/m²) | 1.38 | 0.87, 2.20 | 0.2 |
| Age, y | 1.05 | 1.03, 1.06 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 2.09 | 1.59, 2.74 | <0.001 |
| Race |  |  |  |
| Asian or Pacific Islander | — | — |  |
| Black | 0.81 | 0.28, 2.41 | 0.7 |
| Hispanic | 0.86 | 0.28, 2.65 | 0.8 |
| Native American | 2.95 | 0.64, 13.5 | 0.2 |
| Other | 2.35 | 0.71, 7.84 | 0.2 |
| White | 1.31 | 0.47, 3.67 | 0.6 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.65 | 0.45, 0.92 | 0.015 |
| $66,000 - $87,999 | 0.94 | 0.66, 1.32 | 0.7 |
| $88,000 or more | 0.84 | 0.56, 1.24 | 0.4 |
| Expected primary payer |  |  |  |
| Medicaid | — | — |  |
| Medicare | 0.75 | 0.49, 1.17 | 0.2 |
| Other | 0.90 | 0.50, 1.59 | 0.7 |
| Private | 1.00 | 0.66, 1.51 | >0.9 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.77 | 0.50, 1.17 | 0.2 |
| South | 1.03 | 0.75, 1.42 | 0.8 |
| West | 0.79 | 0.52, 1.19 | 0.3 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.86 | 0.64, 1.16 | 0.3 |
| Small | 0.49 | 0.34, 0.72 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 2.00 | 1.04, 3.84 | 0.037 |
| Urban, teaching | 2.28 | 1.25, 4.17 | 0.007 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | 3.24 | 0.83, 12.7 | 0.092 |
| Charlson comorbidity index | 1.24 | 1.16, 1.33 | <0.001 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | 0.57 | 0.41, 0.79 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.84 | 0.64, 1.12 | 0.2 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 1.29 | 0.69, 2.38 | 0.4 |
| Smoking |  |  |  |
| No | — | — |  |
| Yes | 0.65 | 0.44, 0.98 | 0.037 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.79 | 0.54, 1.15 | 0.2 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 1.22 | 0.68, 2.18 | 0.5 |
| Cirrhosis |  |  |  |
| No | — | — |  |
| Yes | 1.35 | 0.84, 2.16 | 0.2 |
| Atrial fibrillation |  |  |  |
| No | — | — |  |
| Yes | 1.88 | 1.32, 2.69 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.65 | 0.49, 0.88 | 0.005 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 2.05 | 1.53, 2.74 | <0.001 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | 1.04 | 0.62, 1.74 | 0.9 |
| Previous heart failure |  |  |  |
| No | — | — |  |
| Yes | 0.81 | 0.51, 1.29 | 0.4 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

## Multivariable Linear Regression:

### Length of Stay:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| BMI category |  |  |  |
| Normal weight (BMI 20.0-24.9kg/m²) | — | — |  |
| Underweight (BMI ≤19.9kg/m²) | -0.73 | -1.1, -0.39 | <0.001 |
| Overweight (BMI 25.0-29.9kg/m²) | -0.48 | -0.82, -0.15 | 0.004 |
| Class I obesity (BMI 30.0-34.9kg/m²) | -1.3 | -1.6, -1.1 | <0.001 |
| Class II obesity (BMI 35.0-39.9kg/m²) | -1.4 | -1.7, -1.1 | <0.001 |
| Class III obesity (BMI ≥40.0kg/m²) | -1.1 | -1.4, -0.83 | <0.001 |
| Age, y | 0.00 | -0.01, 0.00 | 0.8 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.49 | 0.36, 0.61 | <0.001 |
| Race |  |  |  |
| Asian or Pacific Islander | — | — |  |
| Black | -1.8 | -2.5, -1.1 | <0.001 |
| Hispanic | -1.2 | -1.9, -0.45 | 0.001 |
| Native American | -0.88 | -1.9, 0.18 | 0.10 |
| Other | -0.73 | -1.6, 0.12 | 0.091 |
| White | -0.96 | -1.7, -0.26 | 0.007 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.11 | -0.04, 0.27 | 0.2 |
| $66,000 - $87,999 | 0.00 | -0.18, 0.17 | >0.9 |
| $88,000 or more | 0.16 | -0.03, 0.34 | 0.11 |
| Expected primary payer |  |  |  |
| Medicaid | — | — |  |
| Medicare | -0.16 | -0.37, 0.05 | 0.13 |
| Other | -0.20 | -0.42, 0.01 | 0.066 |
| Private | -0.15 | -0.32, 0.02 | 0.094 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.25 | 0.04, 0.47 | 0.020 |
| South | 0.20 | 0.02, 0.38 | 0.026 |
| West | -0.37 | -0.56, -0.18 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -0.75 | -0.91, -0.59 | <0.001 |
| Small | -1.2 | -1.3, -1.0 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 0.65 | 0.48, 0.83 | <0.001 |
| Urban, teaching | 1.4 | 1.2, 1.5 | <0.001 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | -0.74 | -1.1, -0.33 | <0.001 |
| Charlson comorbidity index | 0.13 | 0.08, 0.19 | <0.001 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | -0.08 | -0.22, 0.06 | 0.3 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | -0.04 | -0.18, 0.11 | 0.6 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 0.86 | -0.46, 2.2 | 0.2 |
| Smoking |  |  |  |
| No | — | — |  |
| Yes | -0.48 | -0.63, -0.34 | <0.001 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 0.13 | -0.07, 0.33 | 0.2 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 0.35 | -0.13, 0.83 | 0.2 |
| Cirrhosis |  |  |  |
| No | — | — |  |
| Yes | 0.55 | 0.07, 1.0 | 0.023 |
| Atrial fibrillation |  |  |  |
| No | — | — |  |
| Yes | 1.4 | 0.99, 1.7 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -0.34 | -0.47, -0.21 | <0.001 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 2.6 | 2.4, 2.9 | <0.001 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | -0.66 | -0.94, -0.39 | <0.001 |
| Previous heart failure |  |  |  |
| No | — | — |  |
| Yes | -0.21 | -0.50, 0.08 | 0.2 |
| Abbreviation: CI = Confidence Interval | | | |

### Inflation Adjusted Total Charge:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| BMI category |  |  |  |
| Normal weight (BMI 20.0-24.9kg/m²) | — | — |  |
| Underweight (BMI ≤19.9kg/m²) | -5,539 | -9,893, -1,184 | 0.013 |
| Overweight (BMI 25.0-29.9kg/m²) | 586 | -3,579, 4,751 | 0.8 |
| Class I obesity (BMI 30.0-34.9kg/m²) | -5,932 | -9,495, -2,370 | 0.001 |
| Class II obesity (BMI 35.0-39.9kg/m²) | -5,165 | -8,796, -1,534 | 0.005 |
| Class III obesity (BMI ≥40.0kg/m²) | -333 | -4,394, 3,729 | 0.9 |
| Age, y | 45 | -33, 123 | 0.3 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 6,269 | 4,445, 8,092 | <0.001 |
| Race |  |  |  |
| Asian or Pacific Islander | — | — |  |
| Black | -29,287 | -40,328, -18,246 | <0.001 |
| Hispanic | -11,868 | -23,143, -593 | 0.039 |
| Native American | -25,122 | -40,468, -9,777 | 0.001 |
| Other | -8,508 | -21,570, 4,554 | 0.2 |
| White | -19,075 | -30,064, -8,085 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -607 | -2,839, 1,624 | 0.6 |
| $66,000 - $87,999 | -1,385 | -4,192, 1,421 | 0.3 |
| $88,000 or more | 3,013 | -260, 6,285 | 0.071 |
| Expected primary payer |  |  |  |
| Medicaid | — | — |  |
| Medicare | -121 | -2,947, 2,705 | >0.9 |
| Other | 4,098 | 835, 7,362 | 0.014 |
| Private | 2,852 | 499, 5,205 | 0.018 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 8,933 | 5,683, 12,182 | <0.001 |
| South | 9,226 | 6,726, 11,726 | <0.001 |
| West | 20,963 | 17,443, 24,482 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -7,848 | -10,467, -5,229 | <0.001 |
| Small | -14,222 | -16,652, -11,791 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 17,792 | 15,245, 20,338 | <0.001 |
| Urban, teaching | 22,761 | 20,716, 24,806 | <0.001 |
| Admission type |  |  |  |
| Elective | — | — |  |
| Non-elective | -5,297 | -10,443, -152 | 0.044 |
| Charlson comorbidity index | 1,210 | 424, 1,997 | 0.003 |
| Diabetes Mellitus |  |  |  |
| No | — | — |  |
| Yes | -1,359 | -3,709, 991 | 0.3 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | -1,385 | -3,594, 824 | 0.2 |
| End stage renal disease |  |  |  |
| No | — | — |  |
| Yes | 31,185 | 4,038, 58,332 | 0.024 |
| Smoking |  |  |  |
| No | — | — |  |
| Yes | -9,353 | -11,134, -7,571 | <0.001 |
| Chronic obstructive pulmonary disease |  |  |  |
| No | — | — |  |
| Yes | 1,152 | -1,340, 3,644 | 0.4 |
| Peripheral vascular disease |  |  |  |
| No | — | — |  |
| Yes | 2,810 | -3,972, 9,592 | 0.4 |
| Cirrhosis |  |  |  |
| No | — | — |  |
| Yes | 8,540 | 728, 16,351 | 0.032 |
| Atrial fibrillation |  |  |  |
| No | — | — |  |
| Yes | 18,169 | 11,842, 24,496 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -4,716 | -6,593, -2,839 | <0.001 |
| Anemia |  |  |  |
| No | — | — |  |
| Yes | 29,697 | 26,200, 33,193 | <0.001 |
| Previous myocardial infarction |  |  |  |
| No | — | — |  |
| Yes | -6,875 | -10,894, -2,856 | <0.001 |
| Previous heart failure |  |  |  |
| No | — | — |  |
| Yes | -5,769 | -9,735, -1,802 | 0.004 |
| Abbreviation: CI = Confidence Interval | | | |