Clinical Outcomes of NAFLD/NASH in HF-CKD-T2DM

Eliza Aisha

## Preamble:

* **Data Source**: Cross-sectional analysis of the National Inpatient Sample (NIS) from 2018 to 2020.
* **Patient Selection**: Included all inpatient admissions with HF-CKD-T2DM.
* **HF-CKD-T2DM + NAFLD/NASH Categories**:
  + HF-CKD-T2DM with NAFLD/NASH
  + HF-CKD-T2DM without NAFLD/NASH
* **ICD Codes**:
  + NASH = K75.81
  + NAFLD = K76.0
* **Primary Outcomes**:
  + In-hospital all-cause mortality
  + Total hospital length of stay (days)
  + Total charge, inflation adjusted to 2020 ($)
* **Software:** All analyses were performed using R Version 4.4.1 (R Foundation for Statistical Computing, Vienna, Austria)

## NAFLD/NASH Outcomes:

### Baseline Table:

| **Characteristic** | **Without NAFLD/NASH** N = 1,227,485*1* | **With NAFLD/NASH** N = 16,420*1* | **p-value***2* |
| --- | --- | --- | --- |
| Age, y | 68 (12) | 64 (11) | <0.001 |
| Sex |  |  | 0.017 |
| Female | 634,260 (52%) | 8,130 (50%) |  |
| Male | 593,225 (48%) | 8,290 (50%) |  |
| Race |  |  | <0.001 |
| White | 771,125 (63%) | 11,185 (68%) |  |
| Asian or Pacific Islander | 23,495 (1.9%) | 320 (1.9%) |  |
| Black | 290,225 (24%) | 2,800 (17%) |  |
| Hispanic | 110,815 (9.0%) | 1,675 (10%) |  |
| Native American | 7,565 (0.6%) | 100 (0.6%) |  |
| Other | 24,260 (2.0%) | 340 (2.1%) |  |
| Elixhauser comorbidity index | 8.22 (1.75) | 9.41 (1.77) | <0.001 |
| Residential income |  |  | 0.033 |
| $1 - $51,999 | 434,240 (35%) | 5,470 (33%) |  |
| $52,000 - $65,999 | 342,295 (28%) | 4,910 (30%) |  |
| $66,000 - $87,999 | 276,585 (23%) | 3,785 (23%) |  |
| $88,000 or more | 174,365 (14%) | 2,255 (14%) |  |
| Expected primary payer |  |  | <0.001 |
| Private | 160,180 (13%) | 2,960 (18%) |  |
| Medicaid | 118,280 (9.6%) | 2,015 (12%) |  |
| Medicare | 926,875 (76%) | 11,135 (68%) |  |
| Other | 22,150 (1.8%) | 310 (1.9%) |  |
| Hospital region |  |  | <0.001 |
| Midwest | 362,095 (29%) | 5,360 (33%) |  |
| Northeast | 191,105 (16%) | 1,980 (12%) |  |
| South | 488,050 (40%) | 6,065 (37%) |  |
| West | 186,235 (15%) | 3,015 (18%) |  |
| Hospital bedsize |  |  | 0.009 |
| Large | 612,375 (50%) | 8,675 (53%) |  |
| Medium | 351,210 (29%) | 4,475 (27%) |  |
| Small | 263,900 (21%) | 3,270 (20%) |  |
| Hospital location and teaching status |  |  | 0.5 |
| Rural | 104,395 (8.5%) | 1,295 (7.9%) |  |
| Urban, non-teaching | 235,985 (19%) | 3,250 (20%) |  |
| Urban, teaching | 887,105 (72%) | 11,875 (72%) |  |
| Hypertension | 106,515 (8.7%) | 1,145 (7.0%) | <0.001 |
| Hyperlipidemia | 789,020 (64%) | 11,295 (69%) | <0.001 |
| Coronary artery disease | 605,140 (49%) | 7,765 (47%) | 0.025 |
| Hyperlipidemia | 109,390 (8.9%) | 1,445 (8.8%) | 0.8 |
| Hyperlipidemia | 408,185 (33%) | 5,225 (32%) | 0.10 |
| Hyperlipidemia |  |  | <0.001 |
| Class I obesity (BMI 30.0-34.9kg/m²) | 219,520 (18%) | 2,515 (15%) |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | 229,070 (19%) | 3,310 (20%) |  |
| Class III obesity (BMI ≥40.0kg/m²) | 591,235 (48%) | 9,385 (57%) |  |
| Normal weight (BMI 20.0-24.9kg/m²) | 49,525 (4.0%) | 250 (1.5%) |  |
| Overweight (BMI 25.0-29.9kg/m²) | 83,265 (6.8%) | 750 (4.6%) |  |
| Underweight (BMI ≤19.9kg/m²) | 54,870 (4.5%) | 210 (1.3%) |  |
| Presence of pacemaker | 148,670 (12%) | 1,665 (10%) | <0.001 |
| previous MI | 182,660 (15%) | 2,390 (15%) | 0.6 |
| Hypothyroidism | 239,210 (19%) | 3,445 (21%) | 0.030 |
| Malnutrition | 155,165 (13%) | 1,180 (7.2%) | <0.001 |
| Fluid and electrolyte imbalance | 611,630 (50%) | 8,500 (52%) | 0.024 |
| History of cancer | 112,445 (9.2%) | 1,405 (8.6%) | 0.2 |
| *1*Mean (SD); n (%) | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | |

### Outcomes Table:

| **Characteristic** | **Without NAFLD/NASH** N = 1,227,485*1* | **With NAFLD/NASH** N = 16,420*1* | **p-value***2* |
| --- | --- | --- | --- |
| Died during hospitalization | 50,775 (4.1%) | 530 (3.2%) | 0.010 |
| Length of stay (days) | 7.1 (7.4) | 7.0 (6.8) | 0.7 |
| Inflation-adjusted total charge ($) | 83,813 (123,896) | 82,394 (98,840) | <0.001 |
| *1*n (%); Mean (SD) | | | |
| *2*Pearson's X^2: Rao & Scott adjustment; Design-based KruskalWallis test | | | |

### Multivariable Logistic Regression:

#### All-Cause Mortality:

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| NASH\_NAFLD\_Categories |  |  |  |
| Without NAFLD/NASH | — | — |  |
| With NAFLD/NASH | 0.69 | 0.56, 0.84 | <0.001 |
| Age, y | 1.02 | 1.02, 1.03 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.11 | 1.06, 1.16 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.04 | 0.91, 1.19 | 0.6 |
| Black | 0.88 | 0.83, 0.93 | <0.001 |
| Hispanic | 1.10 | 1.02, 1.18 | 0.016 |
| Native American | 1.31 | 1.04, 1.65 | 0.024 |
| Other | 1.07 | 0.93, 1.24 | 0.3 |
| Elixhauser comorbidity index | 1.24 | 1.22, 1.25 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.93 | 0.88, 0.98 | 0.007 |
| $66,000 - $87,999 | 0.93 | 0.88, 0.99 | 0.014 |
| $88,000 or more | 0.95 | 0.89, 1.02 | 0.15 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.82 | 0.74, 0.90 | <0.001 |
| Medicare | 0.89 | 0.83, 0.95 | <0.001 |
| Other | 1.30 | 1.12, 1.51 | <0.001 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.17 | 1.08, 1.26 | <0.001 |
| South | 0.99 | 0.93, 1.05 | 0.8 |
| West | 1.01 | 0.94, 1.09 | 0.7 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.91 | 0.86, 0.97 | 0.001 |
| Small | 0.84 | 0.79, 0.89 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.19 | 1.07, 1.31 | <0.001 |
| Urban, teaching | 1.27 | 1.16, 1.39 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.64 | 0.58, 0.70 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.62 | 0.59, 0.64 | <0.001 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 0.89 | 0.85, 0.93 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.81 | 0.75, 0.87 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 1.01 | 0.96, 1.05 | 0.7 |
| Hyperlipidemia |  |  |  |
| Class I obesity (BMI 30.0-34.9kg/m²) | — | — |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | 1.02 | 0.95, 1.11 | 0.5 |
| Class III obesity (BMI ≥40.0kg/m²) | 1.37 | 1.28, 1.46 | <0.001 |
| Normal weight (BMI 20.0-24.9kg/m²) | 1.20 | 1.08, 1.34 | <0.001 |
| Overweight (BMI 25.0-29.9kg/m²) | 1.12 | 1.02, 1.23 | 0.016 |
| Underweight (BMI ≤19.9kg/m²) | 1.70 | 1.54, 1.87 | <0.001 |
| Presence of pacemaker |  |  |  |
| No | — | — |  |
| Yes | 0.75 | 0.70, 0.81 | <0.001 |
| previous MI |  |  |  |
| No | — | — |  |
| Yes | 0.89 | 0.84, 0.95 | <0.001 |
| Hypothyroidism |  |  |  |
| No | — | — |  |
| Yes | 0.70 | 0.66, 0.74 | <0.001 |
| Malnutrition |  |  |  |
| No | — | — |  |
| Yes | 1.76 | 1.65, 1.89 | <0.001 |
| Fluid and electrolyte imbalance |  |  |  |
| No | — | — |  |
| Yes | 2.20 | 2.09, 2.32 | <0.001 |
| History of cancer |  |  |  |
| No | — | — |  |
| Yes | 0.75 | 0.69, 0.81 | <0.001 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Multivariable Linear Regression:

#### Length of Stay:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| NASH\_NAFLD\_Categories |  |  |  |
| Without NAFLD/NASH | — | — |  |
| With NAFLD/NASH | -0.57 | -0.79, -0.35 | <0.001 |
| Age, y | -0.01 | -0.01, 0.00 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.15 | 0.09, 0.21 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.30 | 0.03, 0.58 | 0.029 |
| Black | 0.09 | 0.00, 0.19 | 0.043 |
| Hispanic | -0.01 | -0.14, 0.12 | >0.9 |
| Native American | 0.04 | -0.32, 0.40 | 0.8 |
| Other | 0.30 | 0.06, 0.53 | 0.014 |
| Elixhauser comorbidity index | 0.40 | 0.38, 0.43 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -0.07 | -0.15, 0.02 | 0.11 |
| $66,000 - $87,999 | 0.01 | -0.08, 0.10 | 0.8 |
| $88,000 or more | 0.12 | 0.00, 0.24 | 0.051 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.13 | -0.02, 0.29 | 0.10 |
| Medicare | -0.35 | -0.45, -0.26 | <0.001 |
| Other | -0.18 | -0.41, 0.06 | 0.14 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.1 | 0.91, 1.2 | <0.001 |
| South | 0.44 | 0.33, 0.56 | <0.001 |
| West | -0.43 | -0.59, -0.28 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -0.86 | -0.97, -0.75 | <0.001 |
| Small | -1.4 | -1.5, -1.3 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 0.97 | 0.82, 1.1 | <0.001 |
| Urban, teaching | 1.8 | 1.7, 2.0 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | -0.19 | -0.29, -0.08 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -0.95 | -1.0, -0.88 | <0.001 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | -0.22 | -0.29, -0.16 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -0.10 | -0.21, 0.00 | 0.048 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.10 | 0.03, 0.16 | 0.003 |
| Hyperlipidemia |  |  |  |
| Class I obesity (BMI 30.0-34.9kg/m²) | — | — |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | 0.08 | 0.00, 0.16 | 0.039 |
| Class III obesity (BMI ≥40.0kg/m²) | 0.94 | 0.86, 1.0 | <0.001 |
| Normal weight (BMI 20.0-24.9kg/m²) | -1.0 | -1.2, -0.85 | <0.001 |
| Overweight (BMI 25.0-29.9kg/m²) | -0.18 | -0.32, -0.05 | 0.006 |
| Underweight (BMI ≤19.9kg/m²) | -0.34 | -0.59, -0.09 | 0.008 |
| Presence of pacemaker |  |  |  |
| No | — | — |  |
| Yes | -0.89 | -0.97, -0.81 | <0.001 |
| previous MI |  |  |  |
| No | — | — |  |
| Yes | -0.53 | -0.60, -0.46 | <0.001 |
| Hypothyroidism |  |  |  |
| No | — | — |  |
| Yes | -0.56 | -0.63, -0.48 | <0.001 |
| Malnutrition |  |  |  |
| No | — | — |  |
| Yes | 3.5 | 3.3, 3.7 | <0.001 |
| Fluid and electrolyte imbalance |  |  |  |
| No | — | — |  |
| Yes | 1.9 | 1.9, 2.0 | <0.001 |
| History of cancer |  |  |  |
| No | — | — |  |
| Yes | -0.66 | -0.74, -0.57 | <0.001 |
| Abbreviation: CI = Confidence Interval | | | |

#### Inflation Adjusted Total Charge:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| NASH\_NAFLD\_Categories |  |  |  |
| Without NAFLD/NASH | — | — |  |
| With NAFLD/NASH | -11,298 | -14,646, -7,949 | <0.001 |
| Age, y | -461 | -521, -401 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 6,496 | 5,476, 7,517 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 9,979 | 2,561, 17,396 | 0.008 |
| Black | -2,897 | -4,630, -1,164 | 0.001 |
| Hispanic | 15,926 | 12,882, 18,970 | <0.001 |
| Native American | -8,254 | -14,329, -2,179 | 0.008 |
| Other | 25,157 | 18,784, 31,530 | <0.001 |
| Elixhauser comorbidity index | 6,180 | 5,503, 6,856 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -53 | -1,637, 1,530 | >0.9 |
| $66,000 - $87,999 | 36 | -1,900, 1,973 | >0.9 |
| $88,000 or more | 4,487 | 1,662, 7,311 | 0.002 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | -8,105 | -10,863, -5,347 | <0.001 |
| Medicare | -6,211 | -8,269, -4,153 | <0.001 |
| Other | -1,613 | -6,607, 3,381 | 0.5 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 22,887 | 18,865, 26,910 | <0.001 |
| South | 17,301 | 14,770, 19,831 | <0.001 |
| West | 41,301 | 36,000, 46,603 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -14,076 | -17,097, -11,056 | <0.001 |
| Small | -24,068 | -27,070, -21,065 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 27,941 | 25,227, 30,654 | <0.001 |
| Urban, teaching | 40,491 | 38,087, 42,895 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 320 | -1,550, 2,189 | 0.7 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -9,793 | -11,025, -8,560 | <0.001 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 6,020 | 4,943, 7,096 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 15,381 | 13,302, 17,459 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 2,551 | 1,362, 3,740 | <0.001 |
| Hyperlipidemia |  |  |  |
| Class I obesity (BMI 30.0-34.9kg/m²) | — | — |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | -313 | -1,706, 1,081 | 0.7 |
| Class III obesity (BMI ≥40.0kg/m²) | 5,684 | 4,277, 7,090 | <0.001 |
| Normal weight (BMI 20.0-24.9kg/m²) | -22,443 | -25,789, -19,097 | <0.001 |
| Overweight (BMI 25.0-29.9kg/m²) | -5,925 | -8,154, -3,696 | <0.001 |
| Underweight (BMI ≤19.9kg/m²) | -7,801 | -12,360, -3,243 | <0.001 |
| Presence of pacemaker |  |  |  |
| No | — | — |  |
| Yes | -15,886 | -17,420, -14,351 | <0.001 |
| previous MI |  |  |  |
| No | — | — |  |
| Yes | -9,516 | -10,768, -8,265 | <0.001 |
| Hypothyroidism |  |  |  |
| No | — | — |  |
| Yes | -10,191 | -11,531, -8,852 | <0.001 |
| Malnutrition |  |  |  |
| No | — | — |  |
| Yes | 43,852 | 40,128, 47,577 | <0.001 |
| Fluid and electrolyte imbalance |  |  |  |
| No | — | — |  |
| Yes | 22,949 | 21,717, 24,180 | <0.001 |
| History of cancer |  |  |  |
| No | — | — |  |
| Yes | -10,146 | -11,424, -8,868 | <0.001 |
| Abbreviation: CI = Confidence Interval | | | |

## NASH only Outcomes:

### Baseline Table:

| **Characteristic** | **Without NASH** N = 1,243,835*1* | **With NASH** N = 70*1* | **p-value***2* |
| --- | --- | --- | --- |
| Age, y | 68 (12) | 71 (12) | 0.3 |
| Sex |  |  | 0.048 |
| Female | 642,335 (52%) | 55 (79%) |  |
| Male | 601,500 (48%) | 15 (21%) |  |
| Race |  |  | 0.8 |
| White | 782,265 (63%) | 45 (64%) |  |
| Asian or Pacific Islander | 23,810 (1.9%) | 5 (7.1%) |  |
| Black | 293,015 (24%) | 10 (14%) |  |
| Hispanic | 112,480 (9.0%) | 10 (14%) |  |
| Native American | 7,665 (0.6%) | 0 (0%) |  |
| Other | 24,600 (2.0%) | 0 (0%) |  |
| Elixhauser comorbidity index | 8.24 (1.76) | 9.64 (2.27) | 0.010 |
| Residential income |  |  | 0.6 |
| $1 - $51,999 | 439,695 (35%) | 15 (21%) |  |
| $52,000 - $65,999 | 347,185 (28%) | 20 (29%) |  |
| $66,000 - $87,999 | 280,345 (23%) | 25 (36%) |  |
| $88,000 or more | 176,610 (14%) | 10 (14%) |  |
| Expected primary payer |  |  | 0.8 |
| Private | 163,135 (13%) | 5 (7.1%) |  |
| Medicaid | 120,285 (9.7%) | 10 (14%) |  |
| Medicare | 937,955 (75%) | 55 (79%) |  |
| Other | 22,460 (1.8%) | 0 (0%) |  |
| Hospital region |  |  | 0.2 |
| Midwest | 367,450 (30%) | 5 (7.1%) |  |
| Northeast | 193,075 (16%) | 10 (14%) |  |
| South | 494,070 (40%) | 45 (64%) |  |
| West | 189,240 (15%) | 10 (14%) |  |
| Hospital bedsize |  |  | 0.5 |
| Large | 621,010 (50%) | 40 (57%) |  |
| Medium | 355,660 (29%) | 25 (36%) |  |
| Small | 267,165 (21%) | 5 (7.1%) |  |
| Hospital location and teaching status |  |  | 0.3 |
| Rural | 105,685 (8.5%) | 5 (7.1%) |  |
| Urban, non-teaching | 239,210 (19%) | 25 (36%) |  |
| Urban, teaching | 898,940 (72%) | 40 (57%) |  |
| Hypertension | 107,640 (8.7%) | 20 (29%) | 0.010 |
| Hyperlipidemia | 800,285 (64%) | 30 (43%) | 0.070 |
| Coronary artery disease | 612,895 (49%) | 10 (14%) | 0.010 |
| Hyperlipidemia | 110,825 (8.9%) | 10 (14%) | 0.5 |
| Hyperlipidemia | 413,400 (33%) | 10 (14%) | 0.14 |
| Hyperlipidemia |  |  | 0.3 |
| Class I obesity (BMI 30.0-34.9kg/m²) | 222,035 (18%) | 0 (0%) |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | 232,350 (19%) | 30 (43%) |  |
| Class III obesity (BMI ≥40.0kg/m²) | 600,590 (48%) | 30 (43%) |  |
| Normal weight (BMI 20.0-24.9kg/m²) | 49,770 (4.0%) | 5 (7.1%) |  |
| Overweight (BMI 25.0-29.9kg/m²) | 84,010 (6.8%) | 5 (7.1%) |  |
| Underweight (BMI ≤19.9kg/m²) | 55,080 (4.4%) | 0 (0%) |  |
| Presence of pacemaker | 150,335 (12%) | 0 (0%) | 0.2 |
| previous MI | 185,050 (15%) | 0 (0%) | 0.14 |
| Hypothyroidism | 242,645 (20%) | 10 (14%) | 0.6 |
| Malnutrition | 156,335 (13%) | 10 (14%) | 0.8 |
| Fluid and electrolyte imbalance | 620,085 (50%) | 45 (64%) | 0.3 |
| History of cancer | 113,850 (9.2%) | 0 (0%) | 0.3 |
| *1*Mean (SD); n (%) | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | |

### Outcomes Table:

| **Characteristic** | **Without NASH** N = 1,243,835*1* | **With NASH** N = 70*1* | **p-value***2* |
| --- | --- | --- | --- |
| Died during hospitalization | 51,295 (4.1%) | 10 (14%) | 0.059 |
| Length of stay (days) | 7.1 (7.4) | 9.1 (5.9) | 0.083 |
| Inflation-adjusted total charge ($) | 83,792 (123,599) | 132,647 (104,508) | <0.001 |
| *1*n (%); Mean (SD) | | | |
| *2*Pearson's X^2: Rao & Scott adjustment; Design-based KruskalWallis test | | | |

### Multivariable Logistic Regression:

#### All-Cause Mortality:

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| NASH\_Categories |  |  |  |
| Without NASH | — | — |  |
| With NASH | 2.18 | 0.47, 10.1 | 0.3 |
| Age, y | 1.02 | 1.02, 1.03 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.11 | 1.06, 1.16 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.04 | 0.91, 1.19 | 0.6 |
| Black | 0.88 | 0.83, 0.93 | <0.001 |
| Hispanic | 1.10 | 1.02, 1.18 | 0.016 |
| Native American | 1.31 | 1.04, 1.65 | 0.024 |
| Other | 1.07 | 0.93, 1.24 | 0.3 |
| Elixhauser comorbidity index | 1.23 | 1.22, 1.25 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.93 | 0.88, 0.98 | 0.007 |
| $66,000 - $87,999 | 0.93 | 0.88, 0.98 | 0.014 |
| $88,000 or more | 0.95 | 0.89, 1.02 | 0.14 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.82 | 0.74, 0.90 | <0.001 |
| Medicare | 0.89 | 0.83, 0.95 | 0.001 |
| Other | 1.31 | 1.12, 1.52 | <0.001 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.17 | 1.08, 1.26 | <0.001 |
| South | 0.99 | 0.93, 1.05 | 0.8 |
| West | 1.01 | 0.94, 1.09 | 0.7 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.91 | 0.86, 0.97 | 0.001 |
| Small | 0.84 | 0.79, 0.89 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.19 | 1.07, 1.31 | <0.001 |
| Urban, teaching | 1.27 | 1.16, 1.39 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.64 | 0.58, 0.70 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.62 | 0.59, 0.64 | <0.001 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 0.89 | 0.85, 0.93 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.81 | 0.76, 0.88 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 1.01 | 0.97, 1.06 | 0.7 |
| Hyperlipidemia |  |  |  |
| Class I obesity (BMI 30.0-34.9kg/m²) | — | — |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | 1.02 | 0.95, 1.10 | 0.6 |
| Class III obesity (BMI ≥40.0kg/m²) | 1.36 | 1.28, 1.45 | <0.001 |
| Normal weight (BMI 20.0-24.9kg/m²) | 1.20 | 1.08, 1.34 | <0.001 |
| Overweight (BMI 25.0-29.9kg/m²) | 1.12 | 1.02, 1.23 | 0.015 |
| Underweight (BMI ≤19.9kg/m²) | 1.70 | 1.54, 1.87 | <0.001 |
| Presence of pacemaker |  |  |  |
| No | — | — |  |
| Yes | 0.75 | 0.70, 0.81 | <0.001 |
| previous MI |  |  |  |
| No | — | — |  |
| Yes | 0.89 | 0.84, 0.95 | <0.001 |
| Hypothyroidism |  |  |  |
| No | — | — |  |
| Yes | 0.70 | 0.66, 0.74 | <0.001 |
| Malnutrition |  |  |  |
| No | — | — |  |
| Yes | 1.77 | 1.65, 1.89 | <0.001 |
| Fluid and electrolyte imbalance |  |  |  |
| No | — | — |  |
| Yes | 2.21 | 2.10, 2.32 | <0.001 |
| History of cancer |  |  |  |
| No | — | — |  |
| Yes | 0.75 | 0.69, 0.81 | <0.001 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Multivariable Linear Regression:

#### Length of Stay:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| NASH\_Categories |  |  |  |
| Without NASH | — | — |  |
| With NASH | 0.53 | -3.0, 4.0 | 0.8 |
| Age, y | -0.01 | -0.01, 0.00 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.15 | 0.09, 0.21 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.30 | 0.03, 0.58 | 0.030 |
| Black | 0.10 | 0.01, 0.19 | 0.036 |
| Hispanic | -0.01 | -0.14, 0.12 | >0.9 |
| Native American | 0.04 | -0.32, 0.40 | 0.8 |
| Other | 0.30 | 0.06, 0.53 | 0.014 |
| Elixhauser comorbidity index | 0.40 | 0.37, 0.43 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -0.07 | -0.15, 0.02 | 0.11 |
| $66,000 - $87,999 | 0.01 | -0.08, 0.10 | 0.8 |
| $88,000 or more | 0.12 | 0.00, 0.23 | 0.052 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.13 | -0.02, 0.29 | 0.093 |
| Medicare | -0.35 | -0.45, -0.25 | <0.001 |
| Other | -0.17 | -0.41, 0.06 | 0.15 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.1 | 0.91, 1.2 | <0.001 |
| South | 0.44 | 0.33, 0.56 | <0.001 |
| West | -0.43 | -0.59, -0.28 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -0.86 | -0.97, -0.75 | <0.001 |
| Small | -1.4 | -1.5, -1.3 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 0.97 | 0.82, 1.1 | <0.001 |
| Urban, teaching | 1.8 | 1.7, 2.0 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | -0.18 | -0.29, -0.08 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -0.95 | -1.0, -0.89 | <0.001 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | -0.22 | -0.29, -0.16 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -0.10 | -0.20, 0.00 | 0.056 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.10 | 0.04, 0.17 | 0.002 |
| Hyperlipidemia |  |  |  |
| Class I obesity (BMI 30.0-34.9kg/m²) | — | — |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | 0.08 | 0.00, 0.16 | 0.042 |
| Class III obesity (BMI ≥40.0kg/m²) | 0.94 | 0.86, 1.0 | <0.001 |
| Normal weight (BMI 20.0-24.9kg/m²) | -1.0 | -1.2, -0.85 | <0.001 |
| Overweight (BMI 25.0-29.9kg/m²) | -0.18 | -0.32, -0.05 | 0.006 |
| Underweight (BMI ≤19.9kg/m²) | -0.34 | -0.59, -0.08 | 0.009 |
| Presence of pacemaker |  |  |  |
| No | — | — |  |
| Yes | -0.89 | -0.97, -0.81 | <0.001 |
| previous MI |  |  |  |
| No | — | — |  |
| Yes | -0.53 | -0.60, -0.46 | <0.001 |
| Hypothyroidism |  |  |  |
| No | — | — |  |
| Yes | -0.55 | -0.62, -0.48 | <0.001 |
| Malnutrition |  |  |  |
| No | — | — |  |
| Yes | 3.5 | 3.3, 3.8 | <0.001 |
| Fluid and electrolyte imbalance |  |  |  |
| No | — | — |  |
| Yes | 1.9 | 1.9, 2.0 | <0.001 |
| History of cancer |  |  |  |
| No | — | — |  |
| Yes | -0.66 | -0.74, -0.58 | <0.001 |
| Abbreviation: CI = Confidence Interval | | | |

#### Inflation Adjusted Total Charge:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| NASH\_Categories |  |  |  |
| Without NASH | — | — |  |
| With NASH | 29,518 | -28,714, 87,750 | 0.3 |
| Age, y | -457 | -517, -397 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 6,481 | 5,460, 7,501 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 9,970 | 2,559, 17,382 | 0.008 |
| Black | -2,831 | -4,564, -1,098 | 0.001 |
| Hispanic | 15,917 | 12,873, 18,961 | <0.001 |
| Native American | -8,221 | -14,296, -2,145 | 0.008 |
| Other | 25,153 | 18,779, 31,527 | <0.001 |
| Elixhauser comorbidity index | 6,095 | 5,423, 6,768 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -66 | -1,650, 1,518 | >0.9 |
| $66,000 - $87,999 | 26 | -1,910, 1,963 | >0.9 |
| $88,000 or more | 4,479 | 1,655, 7,303 | 0.002 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | -8,057 | -10,814, -5,299 | <0.001 |
| Medicare | -6,168 | -8,226, -4,109 | <0.001 |
| Other | -1,565 | -6,558, 3,427 | 0.5 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 22,881 | 18,860, 26,903 | <0.001 |
| South | 17,319 | 14,788, 19,849 | <0.001 |
| West | 41,308 | 36,008, 46,609 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -14,063 | -17,084, -11,043 | <0.001 |
| Small | -24,049 | -27,052, -21,047 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 27,924 | 25,212, 30,636 | <0.001 |
| Urban, teaching | 40,480 | 38,077, 42,883 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 347 | -1,522, 2,216 | 0.7 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -9,817 | -11,049, -8,584 | <0.001 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 6,031 | 4,954, 7,108 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 15,449 | 13,373, 17,526 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 2,634 | 1,444, 3,823 | <0.001 |
| Hyperlipidemia |  |  |  |
| Class I obesity (BMI 30.0-34.9kg/m²) | — | — |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | -342 | -1,736, 1,052 | 0.6 |
| Class III obesity (BMI ≥40.0kg/m²) | 5,655 | 4,249, 7,060 | <0.001 |
| Normal weight (BMI 20.0-24.9kg/m²) | -22,442 | -25,788, -19,096 | <0.001 |
| Overweight (BMI 25.0-29.9kg/m²) | -5,926 | -8,155, -3,697 | <0.001 |
| Underweight (BMI ≤19.9kg/m²) | -7,779 | -12,337, -3,220 | <0.001 |
| Presence of pacemaker |  |  |  |
| No | — | — |  |
| Yes | -15,816 | -17,352, -14,280 | <0.001 |
| previous MI |  |  |  |
| No | — | — |  |
| Yes | -9,514 | -10,766, -8,263 | <0.001 |
| Hypothyroidism |  |  |  |
| No | — | — |  |
| Yes | -10,118 | -11,456, -8,780 | <0.001 |
| Malnutrition |  |  |  |
| No | — | — |  |
| Yes | 43,919 | 40,193, 47,645 | <0.001 |
| Fluid and electrolyte imbalance |  |  |  |
| No | — | — |  |
| Yes | 23,035 | 21,806, 24,263 | <0.001 |
| History of cancer |  |  |  |
| No | — | — |  |
| Yes | -10,152 | -11,430, -8,873 | <0.001 |
| Abbreviation: CI = Confidence Interval | | | |

## NAFLD only Outcomes:

### Baseline Table:

| **Characteristic** | **Without NAFLD** N = 1,227,485*1* | **With NAFLD** N = 16,420*1* | **p-value***2* |
| --- | --- | --- | --- |
| Age, y | 68 (12) | 64 (11) | <0.001 |
| Sex |  |  | 0.017 |
| Female | 634,260 (52%) | 8,130 (50%) |  |
| Male | 593,225 (48%) | 8,290 (50%) |  |
| Race |  |  | <0.001 |
| White | 771,125 (63%) | 11,185 (68%) |  |
| Asian or Pacific Islander | 23,495 (1.9%) | 320 (1.9%) |  |
| Black | 290,225 (24%) | 2,800 (17%) |  |
| Hispanic | 110,815 (9.0%) | 1,675 (10%) |  |
| Native American | 7,565 (0.6%) | 100 (0.6%) |  |
| Other | 24,260 (2.0%) | 340 (2.1%) |  |
| Elixhauser comorbidity index | 8.22 (1.75) | 9.41 (1.77) | <0.001 |
| Residential income |  |  | 0.033 |
| $1 - $51,999 | 434,240 (35%) | 5,470 (33%) |  |
| $52,000 - $65,999 | 342,295 (28%) | 4,910 (30%) |  |
| $66,000 - $87,999 | 276,585 (23%) | 3,785 (23%) |  |
| $88,000 or more | 174,365 (14%) | 2,255 (14%) |  |
| Expected primary payer |  |  | <0.001 |
| Private | 160,180 (13%) | 2,960 (18%) |  |
| Medicaid | 118,280 (9.6%) | 2,015 (12%) |  |
| Medicare | 926,875 (76%) | 11,135 (68%) |  |
| Other | 22,150 (1.8%) | 310 (1.9%) |  |
| Hospital region |  |  | <0.001 |
| Midwest | 362,095 (29%) | 5,360 (33%) |  |
| Northeast | 191,105 (16%) | 1,980 (12%) |  |
| South | 488,050 (40%) | 6,065 (37%) |  |
| West | 186,235 (15%) | 3,015 (18%) |  |
| Hospital bedsize |  |  | 0.009 |
| Large | 612,375 (50%) | 8,675 (53%) |  |
| Medium | 351,210 (29%) | 4,475 (27%) |  |
| Small | 263,900 (21%) | 3,270 (20%) |  |
| Hospital location and teaching status |  |  | 0.5 |
| Rural | 104,395 (8.5%) | 1,295 (7.9%) |  |
| Urban, non-teaching | 235,985 (19%) | 3,250 (20%) |  |
| Urban, teaching | 887,105 (72%) | 11,875 (72%) |  |
| Hypertension | 106,515 (8.7%) | 1,145 (7.0%) | <0.001 |
| Hyperlipidemia | 789,020 (64%) | 11,295 (69%) | <0.001 |
| Coronary artery disease | 605,140 (49%) | 7,765 (47%) | 0.025 |
| Hyperlipidemia | 109,390 (8.9%) | 1,445 (8.8%) | 0.8 |
| Hyperlipidemia | 408,185 (33%) | 5,225 (32%) | 0.10 |
| Hyperlipidemia |  |  | <0.001 |
| Class I obesity (BMI 30.0-34.9kg/m²) | 219,520 (18%) | 2,515 (15%) |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | 229,070 (19%) | 3,310 (20%) |  |
| Class III obesity (BMI ≥40.0kg/m²) | 591,235 (48%) | 9,385 (57%) |  |
| Normal weight (BMI 20.0-24.9kg/m²) | 49,525 (4.0%) | 250 (1.5%) |  |
| Overweight (BMI 25.0-29.9kg/m²) | 83,265 (6.8%) | 750 (4.6%) |  |
| Underweight (BMI ≤19.9kg/m²) | 54,870 (4.5%) | 210 (1.3%) |  |
| Presence of pacemaker | 148,670 (12%) | 1,665 (10%) | <0.001 |
| previous MI | 182,660 (15%) | 2,390 (15%) | 0.6 |
| Hypothyroidism | 239,210 (19%) | 3,445 (21%) | 0.030 |
| Malnutrition | 155,165 (13%) | 1,180 (7.2%) | <0.001 |
| Fluid and electrolyte imbalance | 611,630 (50%) | 8,500 (52%) | 0.024 |
| History of cancer | 112,445 (9.2%) | 1,405 (8.6%) | 0.2 |
| *1*Mean (SD); n (%) | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | |

### Outcomes Table:

| **Characteristic** | **Without NAFLD** N = 1,227,485*1* | **With NAFLD** N = 16,420*1* | **p-value***2* |
| --- | --- | --- | --- |
| Died during hospitalization | 50,775 (4.1%) | 530 (3.2%) | 0.010 |
| Length of stay (days) | 7.1 (7.4) | 7.0 (6.8) | 0.7 |
| Inflation-adjusted total charge ($) | 83,813 (123,896) | 82,394 (98,840) | <0.001 |
| *1*n (%); Mean (SD) | | | |
| *2*Pearson's X^2: Rao & Scott adjustment; Design-based KruskalWallis test | | | |

### Multivariable Logistic Regression:

#### All-Cause Mortality:

| **Characteristic** | **OR** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| NAFLD\_Categories |  |  |  |
| Without NAFLD | — | — |  |
| With NAFLD | 0.69 | 0.56, 0.84 | <0.001 |
| Age, y | 1.02 | 1.02, 1.03 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.11 | 1.06, 1.16 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.04 | 0.91, 1.19 | 0.6 |
| Black | 0.88 | 0.83, 0.93 | <0.001 |
| Hispanic | 1.10 | 1.02, 1.18 | 0.016 |
| Native American | 1.31 | 1.04, 1.65 | 0.024 |
| Other | 1.07 | 0.93, 1.24 | 0.3 |
| Elixhauser comorbidity index | 1.24 | 1.22, 1.25 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.93 | 0.88, 0.98 | 0.007 |
| $66,000 - $87,999 | 0.93 | 0.88, 0.99 | 0.014 |
| $88,000 or more | 0.95 | 0.89, 1.02 | 0.15 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.82 | 0.74, 0.90 | <0.001 |
| Medicare | 0.89 | 0.83, 0.95 | <0.001 |
| Other | 1.30 | 1.12, 1.51 | <0.001 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.17 | 1.08, 1.26 | <0.001 |
| South | 0.99 | 0.93, 1.05 | 0.8 |
| West | 1.01 | 0.94, 1.09 | 0.7 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | 0.91 | 0.86, 0.97 | 0.001 |
| Small | 0.84 | 0.79, 0.89 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 1.19 | 1.07, 1.31 | <0.001 |
| Urban, teaching | 1.27 | 1.16, 1.39 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 0.64 | 0.58, 0.70 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.62 | 0.59, 0.64 | <0.001 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 0.89 | 0.85, 0.93 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.81 | 0.75, 0.87 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 1.01 | 0.96, 1.05 | 0.7 |
| Hyperlipidemia |  |  |  |
| Class I obesity (BMI 30.0-34.9kg/m²) | — | — |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | 1.02 | 0.95, 1.11 | 0.5 |
| Class III obesity (BMI ≥40.0kg/m²) | 1.37 | 1.28, 1.46 | <0.001 |
| Normal weight (BMI 20.0-24.9kg/m²) | 1.20 | 1.08, 1.34 | <0.001 |
| Overweight (BMI 25.0-29.9kg/m²) | 1.12 | 1.02, 1.23 | 0.016 |
| Underweight (BMI ≤19.9kg/m²) | 1.70 | 1.54, 1.87 | <0.001 |
| Presence of pacemaker |  |  |  |
| No | — | — |  |
| Yes | 0.75 | 0.70, 0.81 | <0.001 |
| previous MI |  |  |  |
| No | — | — |  |
| Yes | 0.89 | 0.84, 0.95 | <0.001 |
| Hypothyroidism |  |  |  |
| No | — | — |  |
| Yes | 0.70 | 0.66, 0.74 | <0.001 |
| Malnutrition |  |  |  |
| No | — | — |  |
| Yes | 1.76 | 1.65, 1.89 | <0.001 |
| Fluid and electrolyte imbalance |  |  |  |
| No | — | — |  |
| Yes | 2.20 | 2.09, 2.32 | <0.001 |
| History of cancer |  |  |  |
| No | — | — |  |
| Yes | 0.75 | 0.69, 0.81 | <0.001 |
| Abbreviations: CI = Confidence Interval, OR = Odds Ratio | | | |

### Multivariable Linear Regression:

#### Length of Stay:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| NAFLD\_Categories |  |  |  |
| Without NAFLD | — | — |  |
| With NAFLD | -0.57 | -0.79, -0.35 | <0.001 |
| Age, y | -0.01 | -0.01, 0.00 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.15 | 0.09, 0.21 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.30 | 0.03, 0.58 | 0.029 |
| Black | 0.09 | 0.00, 0.19 | 0.043 |
| Hispanic | -0.01 | -0.14, 0.12 | >0.9 |
| Native American | 0.04 | -0.32, 0.40 | 0.8 |
| Other | 0.30 | 0.06, 0.53 | 0.014 |
| Elixhauser comorbidity index | 0.40 | 0.38, 0.43 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -0.07 | -0.15, 0.02 | 0.11 |
| $66,000 - $87,999 | 0.01 | -0.08, 0.10 | 0.8 |
| $88,000 or more | 0.12 | 0.00, 0.24 | 0.051 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.13 | -0.02, 0.29 | 0.10 |
| Medicare | -0.35 | -0.45, -0.26 | <0.001 |
| Other | -0.18 | -0.41, 0.06 | 0.14 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.1 | 0.91, 1.2 | <0.001 |
| South | 0.44 | 0.33, 0.56 | <0.001 |
| West | -0.43 | -0.59, -0.28 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -0.86 | -0.97, -0.75 | <0.001 |
| Small | -1.4 | -1.5, -1.3 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 0.97 | 0.82, 1.1 | <0.001 |
| Urban, teaching | 1.8 | 1.7, 2.0 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | -0.19 | -0.29, -0.08 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -0.95 | -1.0, -0.88 | <0.001 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | -0.22 | -0.29, -0.16 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -0.10 | -0.21, 0.00 | 0.048 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 0.10 | 0.03, 0.16 | 0.003 |
| Hyperlipidemia |  |  |  |
| Class I obesity (BMI 30.0-34.9kg/m²) | — | — |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | 0.08 | 0.00, 0.16 | 0.039 |
| Class III obesity (BMI ≥40.0kg/m²) | 0.94 | 0.86, 1.0 | <0.001 |
| Normal weight (BMI 20.0-24.9kg/m²) | -1.0 | -1.2, -0.85 | <0.001 |
| Overweight (BMI 25.0-29.9kg/m²) | -0.18 | -0.32, -0.05 | 0.006 |
| Underweight (BMI ≤19.9kg/m²) | -0.34 | -0.59, -0.09 | 0.008 |
| Presence of pacemaker |  |  |  |
| No | — | — |  |
| Yes | -0.89 | -0.97, -0.81 | <0.001 |
| previous MI |  |  |  |
| No | — | — |  |
| Yes | -0.53 | -0.60, -0.46 | <0.001 |
| Hypothyroidism |  |  |  |
| No | — | — |  |
| Yes | -0.56 | -0.63, -0.48 | <0.001 |
| Malnutrition |  |  |  |
| No | — | — |  |
| Yes | 3.5 | 3.3, 3.7 | <0.001 |
| Fluid and electrolyte imbalance |  |  |  |
| No | — | — |  |
| Yes | 1.9 | 1.9, 2.0 | <0.001 |
| History of cancer |  |  |  |
| No | — | — |  |
| Yes | -0.66 | -0.74, -0.57 | <0.001 |
| Abbreviation: CI = Confidence Interval | | | |

#### Inflation Adjusted Total Charge:

| **Characteristic** | **Beta** | **95% CI** | **p-value** |
| --- | --- | --- | --- |
| NAFLD\_Categories |  |  |  |
| Without NAFLD | — | — |  |
| With NAFLD | -11,298 | -14,646, -7,949 | <0.001 |
| Age, y | -461 | -521, -401 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 6,496 | 5,476, 7,517 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 9,979 | 2,561, 17,396 | 0.008 |
| Black | -2,897 | -4,630, -1,164 | 0.001 |
| Hispanic | 15,926 | 12,882, 18,970 | <0.001 |
| Native American | -8,254 | -14,329, -2,179 | 0.008 |
| Other | 25,157 | 18,784, 31,530 | <0.001 |
| Elixhauser comorbidity index | 6,180 | 5,503, 6,856 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -53 | -1,637, 1,530 | >0.9 |
| $66,000 - $87,999 | 36 | -1,900, 1,973 | >0.9 |
| $88,000 or more | 4,487 | 1,662, 7,311 | 0.002 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | -8,105 | -10,863, -5,347 | <0.001 |
| Medicare | -6,211 | -8,269, -4,153 | <0.001 |
| Other | -1,613 | -6,607, 3,381 | 0.5 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 22,887 | 18,865, 26,910 | <0.001 |
| South | 17,301 | 14,770, 19,831 | <0.001 |
| West | 41,301 | 36,000, 46,603 | <0.001 |
| Hospital bedsize |  |  |  |
| Large | — | — |  |
| Medium | -14,076 | -17,097, -11,056 | <0.001 |
| Small | -24,068 | -27,070, -21,065 | <0.001 |
| Hospital location and teaching status |  |  |  |
| Rural | — | — |  |
| Urban, non-teaching | 27,941 | 25,227, 30,654 | <0.001 |
| Urban, teaching | 40,491 | 38,087, 42,895 | <0.001 |
| Hypertension |  |  |  |
| No | — | — |  |
| Yes | 320 | -1,550, 2,189 | 0.7 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | -9,793 | -11,025, -8,560 | <0.001 |
| Coronary artery disease |  |  |  |
| No | — | — |  |
| Yes | 6,020 | 4,943, 7,096 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 15,381 | 13,302, 17,459 | <0.001 |
| Hyperlipidemia |  |  |  |
| No | — | — |  |
| Yes | 2,551 | 1,362, 3,740 | <0.001 |
| Hyperlipidemia |  |  |  |
| Class I obesity (BMI 30.0-34.9kg/m²) | — | — |  |
| Class II obesity (BMI 35.0-39.9kg/m²) | -313 | -1,706, 1,081 | 0.7 |
| Class III obesity (BMI ≥40.0kg/m²) | 5,684 | 4,277, 7,090 | <0.001 |
| Normal weight (BMI 20.0-24.9kg/m²) | -22,443 | -25,789, -19,097 | <0.001 |
| Overweight (BMI 25.0-29.9kg/m²) | -5,925 | -8,154, -3,696 | <0.001 |
| Underweight (BMI ≤19.9kg/m²) | -7,801 | -12,360, -3,243 | <0.001 |
| Presence of pacemaker |  |  |  |
| No | — | — |  |
| Yes | -15,886 | -17,420, -14,351 | <0.001 |
| previous MI |  |  |  |
| No | — | — |  |
| Yes | -9,516 | -10,768, -8,265 | <0.001 |
| Hypothyroidism |  |  |  |
| No | — | — |  |
| Yes | -10,191 | -11,531, -8,852 | <0.001 |
| Malnutrition |  |  |  |
| No | — | — |  |
| Yes | 43,852 | 40,128, 47,577 | <0.001 |
| Fluid and electrolyte imbalance |  |  |  |
| No | — | — |  |
| Yes | 22,949 | 21,717, 24,180 | <0.001 |
| History of cancer |  |  |  |
| No | — | — |  |
| Yes | -10,146 | -11,424, -8,868 | <0.001 |
| Abbreviation: CI = Confidence Interval | | | |