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
* **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)

## Baseline Table:

| **Characteristic** | **Without NAFLD/NASH** N = 4,343,505*1* | **With NAFLD/NASH** N = 40,215*1* | **p-value***2* |
| --- | --- | --- | --- |
| Age, y | 71 (12) | 67 (12) | <0.001 |
| Sex |  |  | 0.14 |
| Female | 1,992,570 (46%) | 18,800 (47%) |  |
| Male | 2,350,770 (54%) | 21,415 (53%) |  |
| Race |  |  | <0.001 |
| White | 2,588,840 (61%) | 25,625 (65%) |  |
| Asian or Pacific Islander | 126,175 (3.0%) | 1,200 (3.0%) |  |
| Black | 948,255 (22%) | 6,650 (17%) |  |
| Hispanic | 458,255 (11%) | 4,800 (12%) |  |
| Native American | 32,120 (0.8%) | 280 (0.7%) |  |
| Other | 104,640 (2.5%) | 1,010 (2.6%) |  |
| Charlson comorbidity index | 6.24 (1.40) | 7.21 (1.35) | <0.001 |
| Residential income |  |  | 0.10 |
| $1 - $51,999 | 1,476,940 (34%) | 13,075 (33%) |  |
| $52,000 - $65,999 | 1,165,515 (27%) | 11,085 (28%) |  |
| $66,000 - $87,999 | 962,645 (22%) | 9,075 (23%) |  |
| $88,000 or more | 676,375 (16%) | 6,260 (16%) |  |
| Expected primary payer |  |  | <0.001 |
| Private | 486,110 (11%) | 6,385 (16%) |  |
| Medicaid | 360,235 (8.3%) | 4,355 (11%) |  |
| Medicare | 3,411,165 (79%) | 28,660 (71%) |  |
| Other | 82,175 (1.9%) | 780 (1.9%) |  |
| Hospital region |  |  | <0.001 |
| Midwest | 1,081,015 (25%) | 11,015 (27%) |  |
| Northeast | 745,180 (17%) | 5,380 (13%) |  |
| South | 1,765,610 (41%) | 15,675 (39%) |  |
| West | 751,700 (17%) | 8,145 (20%) |  |
| *1*Mean (SD); n (%) | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | |

## Outcomes Table:

| **Characteristic** | **Without NAFLD/NASH** N = 4,343,505*1* | **With NAFLD/NASH** N = 40,215*1* | **p-value***2* |
| --- | --- | --- | --- |
| Died during hospitalization | 224,385 (5.2%) | 1,610 (4.0%) | <0.001 |
| Length of stay (days) | 6.8 (7.4) | 7.0 (7.7) | <0.001 |
| Inflation-adjusted total charge ($) | 83,274 (128,162) | 87,446 (128,901) | <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***1* | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| NASH/NAFLD categories |  |  |  |
| Without NAFLD/NASH | — | — |  |
| With NAFLD/NASH | 0.77 | 0.68, 0.86 | <0.001 |
| Age, y | 1.02 | 1.02, 1.02 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 1.08 | 1.06, 1.10 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.17 | 1.11, 1.24 | <0.001 |
| Black | 0.97 | 0.94, 1.00 | 0.031 |
| Hispanic | 1.10 | 1.06, 1.14 | <0.001 |
| Native American | 1.14 | 1.01, 1.29 | 0.031 |
| Other | 1.22 | 1.15, 1.30 | <0.001 |
| Charlson comorbidity index | 1.10 | 1.10, 1.11 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 0.93 | 0.90, 0.95 | <0.001 |
| $66,000 - $87,999 | 0.93 | 0.90, 0.96 | <0.001 |
| $88,000 or more | 0.96 | 0.93, 0.99 | 0.016 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.88 | 0.83, 0.92 | <0.001 |
| Medicare | 0.88 | 0.85, 0.92 | <0.001 |
| Other | 1.58 | 1.45, 1.72 | <0.001 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.10 | 1.06, 1.15 | <0.001 |
| South | 1.01 | 0.98, 1.05 | 0.5 |
| West | 1.20 | 1.16, 1.25 | <0.001 |
| *1*OR = Odds Ratio, CI = Confidence Interval | | | |

## Multivariable Linear Regression:

### Length of Stay:

| **Characteristic** | **Beta** | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| NASH/NAFLD categories |  |  |  |
| Without NAFLD/NASH | — | — |  |
| With NAFLD/NASH | 0.08 | -0.10, 0.25 | 0.4 |
| Age, y | -0.02 | -0.03, -0.02 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 0.06 | 0.02, 0.09 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.28 | 0.15, 0.41 | <0.001 |
| Black | 0.31 | 0.24, 0.37 | <0.001 |
| Hispanic | 0.09 | 0.01, 0.18 | 0.038 |
| Native American | -0.16 | -0.37, 0.04 | 0.11 |
| Other | 0.54 | 0.40, 0.69 | <0.001 |
| Charlson comorbidity index | 0.07 | 0.06, 0.09 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -0.05 | -0.10, 0.00 | 0.051 |
| $66,000 - $87,999 | 0.09 | 0.03, 0.15 | 0.006 |
| $88,000 or more | 0.21 | 0.13, 0.29 | <0.001 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | 0.29 | 0.18, 0.40 | <0.001 |
| Medicare | -0.28 | -0.35, -0.20 | <0.001 |
| Other | -0.25 | -0.40, -0.10 | 0.001 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 0.75 | 0.63, 0.88 | <0.001 |
| South | 0.28 | 0.19, 0.38 | <0.001 |
| West | -0.06 | -0.18, 0.06 | 0.3 |
| *1*CI = Confidence Interval | | | |

### Inflation Adjusted Total Charge:

| **Characteristic** | **Beta** | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| NASH/NAFLD categories |  |  |  |
| Without NAFLD/NASH | — | — |  |
| With NAFLD/NASH | -740 | -3,550, 2,069 | 0.6 |
| Age, y | -676 | -718, -634 | <0.001 |
| Sex |  |  |  |
| Female | — | — |  |
| Male | 7,192 | 6,584, 7,800 | <0.001 |
| Race |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 17,132 | 12,835, 21,429 | <0.001 |
| Black | 2,374 | 892, 3,856 | 0.002 |
| Hispanic | 19,147 | 16,483, 21,811 | <0.001 |
| Native American | -14,143 | -17,783, -10,503 | <0.001 |
| Other | 26,968 | 22,357, 31,580 | <0.001 |
| Charlson comorbidity index | 1,345 | 1,048, 1,643 | <0.001 |
| Residential income |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 914 | -364, 2,193 | 0.2 |
| $66,000 - $87,999 | 4,145 | 2,619, 5,671 | <0.001 |
| $88,000 or more | 10,394 | 7,957, 12,830 | <0.001 |
| Expected primary payer |  |  |  |
| Private | — | — |  |
| Medicaid | -6,711 | -8,859, -4,562 | <0.001 |
| Medicare | -4,645 | -6,149, -3,141 | <0.001 |
| Other | -3,747 | -6,816, -677 | 0.017 |
| Hospital region |  |  |  |
| Midwest | — | — |  |
| Northeast | 20,244 | 16,481, 24,007 | <0.001 |
| South | 14,013 | 11,735, 16,291 | <0.001 |
| West | 44,147 | 39,272, 49,022 | <0.001 |
| *1*CI = Confidence Interval | | | |