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

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## 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** | **No** N = 38,495*1* | **With NAFLD/NASH** N = 40,215*1* | **Without NAFLD/NASH** N = 4,343,505*1* | **p-value***2* |
| --- | --- | --- | --- | --- |
| Age, y | 69 (10) | 67 (12) | 71 (12) | <0.001 |
| Sex |  |  |  | <0.001 |
| Female | 22,530 (59%) | 18,800 (47%) | 1,992,570 (46%) |  |
| Male | 15,965 (41%) | 21,415 (53%) | 2,350,770 (54%) |  |
| Race |  |  |  | <0.001 |
| White | 28,695 (76%) | 25,625 (65%) | 2,588,840 (61%) |  |
| Asian or Pacific Islander | 725 (1.9%) | 1,200 (3.0%) | 126,175 (3.0%) |  |
| Black | 2,895 (7.7%) | 6,650 (17%) | 948,255 (22%) |  |
| Hispanic | 4,240 (11%) | 4,800 (12%) | 458,255 (11%) |  |
| Native American | 295 (0.8%) | 280 (0.7%) | 32,120 (0.8%) |  |
| Other | 860 (2.3%) | 1,010 (2.6%) | 104,640 (2.5%) |  |
| Charlson comorbidity index | 7.40 (1.67) | 7.21 (1.35) | 6.24 (1.40) | <0.001 |
| Residential income |  |  |  | <0.001 |
| $1 - $51,999 | 11,955 (32%) | 13,075 (33%) | 1,476,940 (34%) |  |
| $52,000 - $65,999 | 11,195 (30%) | 11,085 (28%) | 1,165,515 (27%) |  |
| $66,000 - $87,999 | 9,065 (24%) | 9,075 (23%) | 962,645 (22%) |  |
| $88,000 or more | 5,730 (15%) | 6,260 (16%) | 676,375 (16%) |  |
| Expected primary payer |  |  |  | <0.001 |
| Private | 5,445 (14%) | 6,385 (16%) | 486,110 (11%) |  |
| Medicaid | 2,850 (7.4%) | 4,355 (11%) | 360,235 (8.3%) |  |
| Medicare | 29,565 (77%) | 28,660 (71%) | 3,411,165 (79%) |  |
| Other | 615 (1.6%) | 780 (1.9%) | 82,175 (1.9%) |  |
| Hospital region |  |  |  | <0.001 |
| Midwest | 12,200 (32%) | 11,015 (27%) | 1,081,015 (25%) |  |
| Northeast | 5,320 (14%) | 5,380 (13%) | 745,180 (17%) |  |
| South | 15,285 (40%) | 15,675 (39%) | 1,765,610 (41%) |  |
| West | 5,690 (15%) | 8,145 (20%) | 751,700 (17%) |  |
| *1*Mean (SD); n (%) | | | | |
| *2*Design-based KruskalWallis test; Pearson's X^2: Rao & Scott adjustment | | | | |

## Outcomes Table:

| **Characteristic** | **No** N = 38,495*1* | **With NAFLD/NASH** N = 40,215*1* | **Without NAFLD/NASH** N = 4,343,505*1* | **p-value***2* |
| --- | --- | --- | --- | --- |
| Died during hospitalization | 2,425 (6.3%) | 1,610 (4.0%) | 224,385 (5.2%) | <0.001 |
| Length of stay (days) | 7.1 (6.7) | 7.0 (7.7) | 6.8 (7.4) | <0.001 |
| Inflation-adjusted total charge ($) | 80,705 (124,603) | 87,446 (128,901) | 83,274 (128,162) | <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 |  |  |  |
| No | — | — |  |
| With NAFLD/NASH | 0.64 | 0.55, 0.74 | <0.001 |
| Without NAFLD/NASH | 0.83 | 0.76, 0.92 | <0.001 |
| AGE | 1.02 | 1.02, 1.02 | <0.001 |
| FEMALE |  |  |  |
| Female | — | — |  |
| Male | 1.08 | 1.06, 1.10 | <0.001 |
| RACE |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 1.18 | 1.11, 1.24 | <0.001 |
| Black | 0.97 | 0.94, 1.00 | 0.060 |
| Hispanic | 1.10 | 1.06, 1.14 | <0.001 |
| Native American | 1.15 | 1.03, 1.30 | 0.017 |
| Other | 1.22 | 1.15, 1.29 | <0.001 |
| charlindex | 1.10 | 1.09, 1.11 | <0.001 |
| ZIPINC\_QRTL |  |  |  |
| $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 | 0.014 |
| Insurance |  |  |  |
| Private | — | — |  |
| Medicaid | 0.88 | 0.83, 0.92 | <0.001 |
| Medicare | 0.88 | 0.85, 0.91 | <0.001 |
| Other | 1.58 | 1.45, 1.72 | <0.001 |
| Hosp\_Census\_Region |  |  |  |
| Midwest | — | — |  |
| Northeast | 1.11 | 1.06, 1.15 | <0.001 |
| South | 1.01 | 0.98, 1.05 | 0.4 |
| 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 |  |  |  |
| No | — | — |  |
| With NAFLD/NASH | -0.22 | -0.45, 0.02 | 0.070 |
| Without NAFLD/NASH | -0.30 | -0.46, -0.14 | <0.001 |
| AGE | -0.02 | -0.03, -0.02 | <0.001 |
| FEMALE |  |  |  |
| Female | — | — |  |
| Male | 0.06 | 0.02, 0.09 | <0.001 |
| RACE |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 0.29 | 0.15, 0.42 | <0.001 |
| Black | 0.31 | 0.25, 0.38 | <0.001 |
| Hispanic | 0.09 | 0.01, 0.18 | 0.033 |
| Native American | -0.14 | -0.35, 0.06 | 0.2 |
| Other | 0.54 | 0.39, 0.68 | <0.001 |
| charlindex | 0.07 | 0.06, 0.09 | <0.001 |
| ZIPINC\_QRTL |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | -0.05 | -0.10, 0.00 | 0.051 |
| $66,000 - $87,999 | 0.09 | 0.02, 0.15 | 0.006 |
| $88,000 or more | 0.21 | 0.13, 0.29 | <0.001 |
| Insurance |  |  |  |
| Private | — | — |  |
| Medicaid | 0.30 | 0.19, 0.41 | <0.001 |
| Medicare | -0.27 | -0.34, -0.20 | <0.001 |
| Other | -0.25 | -0.40, -0.10 | 0.001 |
| Hosp\_Census\_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, 0.05 | 0.3 |
| *1*CI = Confidence Interval | | | |

### Inflation Adjusted Total Charge:

| **Characteristic** | **Beta** | **95% CI***1* | **p-value** |
| --- | --- | --- | --- |
| NASH\_NAFLD\_Categories |  |  |  |
| No | — | — |  |
| With NAFLD/NASH | 2,549 | -1,424, 6,523 | 0.2 |
| Without NAFLD/NASH | 3,253 | 382, 6,124 | 0.026 |
| AGE | -674 | -716, -633 | <0.001 |
| FEMALE |  |  |  |
| Female | — | — |  |
| Male | 7,217 | 6,612, 7,822 | <0.001 |
| RACE |  |  |  |
| White | — | — |  |
| Asian or Pacific Islander | 17,271 | 12,975, 21,568 | <0.001 |
| Black | 2,476 | 994, 3,958 | 0.001 |
| Hispanic | 19,198 | 16,546, 21,849 | <0.001 |
| Native American | -13,895 | -17,535, -10,255 | <0.001 |
| Other | 26,942 | 22,339, 31,545 | <0.001 |
| charlindex | 1,313 | 1,018, 1,609 | <0.001 |
| ZIPINC\_QRTL |  |  |  |
| $1 - $51,999 | — | — |  |
| $52,000 - $65,999 | 936 | -341, 2,214 | 0.2 |
| $66,000 - $87,999 | 4,138 | 2,617, 5,658 | <0.001 |
| $88,000 or more | 10,449 | 8,017, 12,881 | <0.001 |
| Insurance |  |  |  |
| Private | — | — |  |
| Medicaid | -6,577 | -8,721, -4,433 | <0.001 |
| Medicare | -4,645 | -6,145, -3,146 | <0.001 |
| Other | -3,733 | -6,803, -662 | 0.017 |
| Hosp\_Census\_Region |  |  |  |
| Midwest | — | — |  |
| Northeast | 20,112 | 16,352, 23,872 | <0.001 |
| South | 13,915 | 11,633, 16,196 | <0.001 |
| West | 44,023 | 39,155, 48,891 | <0.001 |
| *1*CI = Confidence Interval | | | |