**Supplemental Digital Content**

**Supplemental Table 1:** Univariate analysis of demographic, comorbidity, disease severity, and treatment intensity factors among ANI patients with and without delirium and unadjusted risk of mild cognitive impairment and / or dementia

**Supplemental Table 2 (a-d):** Proportion, Incidence Rate, and Hazard Ratio for development of mild cognitive impairment and various dementia subtypes among ANI subgroups for patients who did and did not experience in-hospital delirium

**Supplemental Figure 1 (a-d):** Multivariable Cox Proportional Hazard Model showing percent of patients with acute neurological injury subgroups (acute ischemic stroke (a), intracerebral hemorrhage (b), subarachnoid hemorrhage (c), and traumatic brain injury (d)) that are free of mild cognitive impairment or dementia (y-axis) for years of analysis (x-axis) for both those with (red line) and without (blue line) a delirium diagnosis during inpatient stay for acute neurological injury. Included are the associated adjusted hazard ratio and 95% confidence interval. Model is adjusted for multiple demographic factors, comorbidities, and complications.

**Supplemental Figure 2 (a-d):** Age-stratified incidence rate of MCID among ANI subgroups (acute ischemic stroke (a), primary intracerebral hemorrhage (b), subarachnoid hemorrhage (c), and traumatic brain injury (d)). Incidence is divided into patients that were diagnosed with delirium during initial hospitalization (blue) and those that were not (orange).

**Supplemental Table 1:** Univariate analysis of demographic, comorbidity, disease severity, and treatment intensity factors among ANI patients with and without delirium and unadjusted risk of mild cognitive impairment and / or dementia

|  | **Total (n = 911,380)** | **No Delirium (n = 863,628)** | **Delirium (n = 47,752)** | **OR**  **(95% CI)** | **HR (95% CI) for MCI/Dementia** |
| --- | --- | --- | --- | --- | --- |
| **Demographics** | | | | | |
| Age – mean (SD) | 64.2 (19.2) | 64.03 (19.25) | 67.34 (17.96) | 1.01  (1.01-1.01) | 1.06  (1.06-1.06) |
| Age groups (years) | | | | | |
| < 55 | 28.99 | 29.26 | 24.01 | Reference | Reference |
| 55-64 | 16.66 | 16.69 | 16.20 | 1.18  (1.15-1.22) | 3.06  (2.91-3.21) |
| 65-74 | 18.28 | 18.30 | 17.84 | 1.19  (1.15-1.22) | 6.07  (5.81-6.34) |
| 75-84 | 21.38 | 21.28 | 23.10 | 1.32  (1.29-1.36) | 11.20  (10.75-11.67) |
| ≥85 | 14.69 | 14.46 | 18.85 | 1.59  (1.54-1.63) | 17.60  (16.88-18.36) |
| Female | 46.19 | 46.28 | 44.51 | 0.93  (0.91-0.95) | 1.34  (1.31-1.36) |
| Race (%) | | | | | |
| White | 64.66 | 64.47 | 68.11 | Reference | Reference |
| Black | 13.24 | 13.27 | 12.70 | 0.91  (0.88-0.93) | 0.79  (0.77-0.81) |
| Hispanic | 13.57 | 13.64 | 12.20 | 0.85  (0.82-0.87) | 1.04  (1.02-1.07) |
| Other | 8.53 | 8.61 | 6.98 | 0.77  (0.74-0.80) | 0.99  (0.95-1.02) |
| Insurance | 93.45 | 93.40 | 94.34 | 1.18  (1.13-1.22) | 4.68  (4.36-5.03) |
| Patient County (%) | | | | | |
| Large Metropolitan Areas (≥ 1M Residents) | 69.30 | 69.37 | 68.14 | Reference | Reference |
| Small Metropolitan Areas (< 1M Residents) | 24.47 | 24.43 | 25.18 | 1.05  (1.03-1.07) | 0.90  (0.88-0.91) |
| Micropolitan Areas | 4.30 | 4.28 | 4.65 | 1.11  (1.06-1.16) | 0.83  (0.79-0.87) |
| Not Metropolitan or Micropolitan | 1.92 | 1.92 | 2.04 | 1.08  (1.01-1.16) | 0.77  (0.72-0.83) |
| Median Household Income for Patient ZIP Code (Quartile) | | | | | |
| First Quartile | 26.79 | 26.76 | 27.29 | Reference | Reference |
| Second Quartile | 25.59 | 25.58 | 25.87 | 0.99  (0.97-1.02) | 1.01  (0.98-1.03) |
| Third Quartile | 25.20 | 25.21 | 25.12 | 0.98  (0.95-1.00) | 1.02  (0.99-1.04) |
| Fourth Quartile | 22.42 | 22.46 | 21.72 | 0.95  (0.92-0.97) | 1.07  (1.05-1.10) |
| State (%) |  |  |  |  |  |
| California | 33.05 | 33.08 | 32.35 | Reference | Reference |
| Florida | 38.14 | 37.87 | 43.12 | 1.16  (1.14-1.19) | 0.74  (0.72-0.75) |
| New York | 28.81 | 29.05 | 24.52 | 0.86  (0.84-0.88) | 0.74  (0.72-0.76) |
| **Comorbidities (%)** | | | | | |
| Charlson Comorbidity Index – mean (SD) | 1.95 (1.86) | 1.93 (1.85) | 2.22 (2.04) | 1.08  (1.07-1.08) | 1.16  (1.15-1.16) |
| Charlson Comorbidity Index (%) | | | | | |
| 0-1 | 50.93 | 51.24 | 45.41 | Reference | Reference |
| 2-3 | 30.68 | 30.63 | 31.55 | 1.16  (1.14-1.19) | 1.54  (1.51-1.57) |
| ≥ 4 | 18.39 | 18.13 | 23.05 | 1.43  (1.40-1.47) | 1.81  (1.77-1.85) |
| Atrial Fibrillation | 16.36 | 16.12 | 20.76 | 1.36  (1.33-1.40) | 2.01  (1.97-2.05) |
| Congestive heart failure | 8.66 | 8.42 | 12.91 | 1.61  (1.57-1.66) | 1.85  (1.80-1.90) |
| Hypertension (combine uncomplicated and complicated) | 65.58 | 65.44 | 68.11 | 1.13  (1.11-1.15) | 2.05  (2.00-2.09) |
| Peripheral vascular disorders | 5.99 | 5.93 | 7.21 | 1.23  (1.19-1.28) | 1.42  (1.37-1.47) |
| Valvular disease | 7.13 | 7.09 | 7.71 | 1.09  (1.06-1.13) | 1.43  (1.39-1.48) |
| Deficiency anemias | 12.08 | 11.59 | 21.00 | 2.03  (1.98-2.08) | 1.54  (1.50-1.57) |
| Chronic blood loss anemia | 0.55 | 0.52 | 0.94 | 1.79  (1.63-1.98) | 1.07  (0.95-1.20) |
| Coagulopathy | 3.70 | 3.46 | 7.89 | 2.39  (2.31-2.47) | 1.19  (1.14-1.25) |
| Rheumatoid arthritis/collagen vascular diseases | 1.95 | 1.95 | 2.08 | 1.07  (1.00-1.14) | 1.13  (1.07-1.20) |
| Chronic pulmonary disease | 12.47 | 12.25 | 16.43 | 1.41  (1.37-1.44) | 1.18  (1.15-1.21) |
| Pulmonary circulation disorders | 2.07 | 2.01 | 3.15 | 1.58  (1.50-1.67) | 1.48  (1.40-1.57) |
| Liver disease | 1.75 | 1.62 | 4.10 | 2.61  (2.48-2.73) | 0.74  (0.69-0.81) |
| Peptic ulcer disease excluding bleeding | 0.03 | 0.03 | 0.04 | 1.49  (0.94-2.39) | 1.26  (0.80-1.98) |
| Renal failure | 8.79 | 8.53 | 13.45 | 1.67  (1.62-1.71) | 1.74  (1.70-1.79) |
| Fluid and electrolyte disorders | 20.03 | 18.94 | 39.64 | 2.81  (2.76-2.87) | 1.43  (1.40-1.46) |
| Diabetes, uncomplicated | 21.74 | 21.75 | 21.63 | 0.99  (0.97-1.02) | 1.28  (1.26-1.31) |
| Diabetes with chronic complications | 4.37 | 4.28 | 6.09 | 1.45  (1.40-1.51) | 1.36  (1.31-1.42) |
| Hypothyroidism | 10.21 | 10.14 | 11.38 | 1.14  (1.11-1.17) | 1.51  (1.48-1.55) |
| Hyperthyroidism | 0.36 | 0.35 | 0.39 | 1.09  (0.94-1.26) | 1.28  (1.12-1.47) |
| Acquired immune deficiency syndrome | 0.16 | 0.16 | 0.22 | 1.36  (1.11-1.66) | 0.83  (0.66-1.04) |
| Lymphoma | 0.48 | 0.47 | 0.65 | 1.37  (1.22-1.54) | 1.39  (1.22-1.57) |
| Metastatic cancer | 1.16 | 1.13 | 1.80 | 1.61  (1.50-1.73) | 1.42  (1.23-1.64) |
| Solid tumor without metastasis | 1.40 | 1.38 | 1.69 | 1.23  (1.14-1.32) | 1.43  (1.32-1.54) |
| Paralysis | 4.21 | 4.08 | 6.58 | 1.66  (1.60-1.72) | 1.15  (1.10-1.20) |
| Other neurological disorders | 2.33 | 1.95 | 9.31 | 5.18  (5.00-5.36) | 1.27  (1.20-1.34) |
| Depression | 7.94 | 7.74 | 11.54 | 1.55  (1.51-1.60) | 1.36  (1.32-1.39) |
| Psychoses | 3.55 | 3.29 | 8.25 | 2.64  (2.55-2.73) | 1.22  (1.17-1.27) |
| Obesity | 6.89 | 6.89 | 7.04 | 1.02  (0.99-1.06) | 0.67  (0.65-0.70) |
| Weight loss | 2.91 | 2.61 | 8.28 | 3.37  (3.25-3.49) | 1.55  (1.47-1.63) |
| Alcohol abuse | 9.97 | 9.45 | 19.37 | 2.30  (2.25-2.36) | 0.49  (0.47-0.51) |
| Drug abuse | 4.24 | 4.00 | 8.59 | 2.25  (2.18-2.33) | 0.30  (0.28-0.32) |
| Tobacco Use | 23.00 | 22.93 | 24.20 | 1.07  (1.05-1.10) | 0.66  (0.65-0.68) |
| **Acute Neurological Injury Subtype at Initial Admission** | | | | | |
| Intracerebral Hemorrhage (Non-Traumatic) | 6.25 | 6.09 | 9.23 | Reference | Reference |
| Acute Ischemic Stroke (Non-Traumatic) | 51.70 | 52.27 | 41.46 | 0.52  (0.51-0.54) | 0.95  (0.92-0.99) |
| Subarachnoid Hemorrhage (Non-Traumatic) | 2.82 | 2.76 | 3.89 | 0.93  (0.88-0.98) | 0.48  (0.44-0.52) |
| Traumatic Brain Injury | 39.22 | 38.88 | 45.42 | 0.77  (0.75-0.80) | 0.64  (0.62-0.66) |
| **Treatment Intensity and in-hospital outcomes (%)** | | | | | |
| IV tPA | 3.08 | 3.13 | 2.21 | 0.70  (0.66-0.75) | 0.92  (0.87-0.98) |
| IAT | 0.32 | 0.32 | 0.30 | 0.93  (0.79-1.11) | 0.95  (0.77-1.18) |
| Intensive Treatmenta | 6.23 | 5.83 | 13.47 | 2.52  (2.45-2.59) | 1.32  (1.27-1.36) |
| Length of Stay – Mean (SD) | 6.52 (10.35) | 6.25 (9.89) | 11.59 (15.74) | 1.02  (1.02 – 1.025) | 1.01  (1.00 – 1.01) |
| Discharge Disposition | | | | | |
| Home incl. Home with Home Health | 60.18 | 61.26 | 40.58 | Reference | Reference |
| Transfer (Hosp / SNF / ICF / Other) | 37.95 | 36.88 | 57.21 | 2.34  (2.30 – 2.39) | 2.48  (2.34 – 2.52) |
| Other | 1.87 | 1.85 | 2.21 | 1.81  (1.69 – 1.92) | 0.86  (0.79 – 0.94) |
| **In-Hospital Complications (%)** | | | | | |
| Sepsis | 1.65 | 1.40 | 6.33 | 4.78  (4.58-4.98) | 1.27  (1.19-1.36) |
| Acute Respiratory Distress Syndrome | 1.84 | 1.75 | 3.62 | 2.12  (2.01-2.23) | 0.53  (0.49-0.58) |
| Pneumonia | 4.08 | 3.76 | 9.84 | 2.8  (2.71-2.89) | 1.26  (1.21-1.32) |
| UTI | 9.93 | 9.28 | 21.58 | 2.69  (2.63-2.75) | 2.02  (1.97-2.07) |
| Seizure | 3.10 | 2.88 | 7.14 | 2.59  (2.5-2.69) | 1.26  (1.21-1.32) |

aIntensive Treatment defined hemicraniectomy, hemicraniotomy, gastric tube placement, extraventricular drain, tracheostomy, and / or ventilator support (invasive and noninvasive)

**Supplemental Table 2 (a):** Proportion, Incidence Rate, and Hazard Ratio for development of mild cognitive impairment and various dementia subtypes among **acute ischemic stroke** patients who did and did not experience in hospital delirium

| **Outcomes** | **Total**  **(n= 354,753)** | **No Delirium (n= 340,451)** | **Delirium**  **(n= 14,302)** |
| --- | --- | --- | --- |
| **Mild Cognitive Impairment and / or Dementia (MCID)** | | | |
| Patients with Outcome- no. (%) | 31,229 (8.80) | 29,086 (8.54) | 2,143 (14.98) |
| Follow Up Time (person-years) | 756,927 | 734,327 | 22,601 |
| Incidence Rate:a % (95% CI) | 41.26 (40.80-41.72) | 39.61 (39.16-40.07) | 94.82 (90.89-98.92) |
| Unadjusted HR (95% CI) |  | Reference | 2.61 (2.50-2.73) |
| Adjusted HRb (95% CI) | Reference | 1.76 (1.68 – 1.85) |
| **Mild Cognitive Impairment** | | | |
| Patients with Outcome- no. (%) | 4,118 (1.16) | 3,921 (1.15) | 197 (1.38) |
| Follow Up Time (person-years) | 770,595 | 747,110 | 23,484 |
| Incidence Ratea: % (95% CI) | 5.34 (5.18-5.51) | 5.25 (5.09-5.42) | 8.39 (7.3-9.65) |
| Unadjusted HR (95% CI) |  | Reference | 1.72 (1.49-1.98) |
| Adjusted HRb (95% CI) | Reference | 1.45 (1.25 – 1.69) |
| **Alzheimer Disease** | | | |
| Patients with Outcome- no. (%) | 11,898 (3.35) | 11,092 (3.26) | 806 (5.64) |
| Follow Up Time (person-years) | 768,243 | 744,981 | 23,262 |
| Incidence Ratea: % (95% CI) | 15.49 (15.21-15.77) | 14.89 (14.61-15.17) | 34.65 (32.34-37.13) |
| Unadjusted HR (95% CI) |  | Reference | 2.58 (2.40-2.77) |
| Adjusted HRb (95% CI) | Reference | 1.75 (1.62 – 1.88) |
| **Vascular Dementia** | | | |
| Patients with Outcome- no. (%) | 11,271 (3.18) | 10,390 (3.05) | 881 (6.16) |
| Follow Up Time (person-years) | 766,963 | 743,871 | 23,092 |
| Incidence Ratea: % (95% CI) | 14.70 (14.43-14.97) | 13.97 (13.70-14.24) | 38.15 (35.71-40.76) |
| Unadjusted HR (95% CI) |  | Reference | 2.89 (2.70-3.10) |
| Adjusted HRb (95% CI) | Reference | 1.93 (1.79 – 2.08) |
| **Lewy Body Dementia** | | | |
| Patients with Outcome- no. (%) | 2,394 (0.67) | 2,203 (0.65) | 191 (1.34) |
| Follow Up Time (person-years) | 773,719 | 750,167 | 23,552 |
| Incidence Ratea: % (95% CI) | 3.09 (2.97-3.22) | 2.94 (2.82-3.06) | 8.11 (7.04-9.35) |
| Unadjusted HR (95% CI) |  | Reference | 3.07 (2.65-3.56) |
| Adjusted HRb (95% CI) | Reference | 1.94 (1.66 – 2.27) |
| **Dementia Not Otherwise Specified** | | | |
| Patients with Outcome- no. (%) | 8,409 (2.37) | 7,851 (2.31) | 558 (3.9) |
| Follow Up Time (person-years) | 768,207 | 744,987 | 23,221 |
| Incidence Ratea: % (95% CI) | 10.95 (10.71-11.18) | 10.54 (10.31-10.77) | 24.03 (22.12-26.11) |
| Unadjusted HR (95% CI) |  | Reference | 2.41 (2.21-2.63) |
| Adjusted HRb (95% CI) | Reference | 1.58 (1.45 – 1.73) |

a *Incidence rate per 1,000 person-years*

b *Adjusted for (1) Demographics: age, gender, race, insurance (primary payer), patient location (urban-rural), income quartile of patient ZIP code, state, (2) Comorbidities including AHRQ comorbidity measures: Charlson Co-morbidity Index, Atrial Fibrillation, Alcohol abuse, Deficiency anemias, Rheumatoid arthritis/collagen vascular diseases, Chronic blood loss anemia, Congestive heart failure, Chronic pulmonary disease, Coagulopathy, Depression, Diabetes, uncomplicated, Diabetes with chronic complications, Drug abuse, Hypertension (combine uncomplicated and complicated), Hypothyroidism, Liver disease, Lymphoma, Fluid and electrolyte disorders, Metastatic cancer, Other neurological disorders, Obesity, Paralysis, Peripheral vascular disorders, Psychoses, Pulmonary circulation disorders, Renal failure, Solid tumor without metastasis, Peptic ulcer disease excluding bleeding, Valvular disease, Weight loss, Acquired immune deficiency syndrome, Hyperthyroidism, Tobacco use, (3) Treatment Severity: IV tPA, IAT, ICU use (Hemicraniectomy / Craniotomy, Extra Ventricular Drain Placement, Gastric Tube, Tracheostomy, Ventilator Support), (4) In hospital complications: Sepsis with organ failure, Pneumonia, ARDS, UTI, Seizures*, *(5) In hospital outcomes: length of stay, discharge disposition*

c *Adjusted estimated not suitable due to small number of patients and events*

**Supplemental Table 2 (b)**: Proportion, Incidence Rate, and Hazard Ratio for development of mild cognitive impairment and various dementia subtypes among **intracerebral hemorrhage** patients who did and did not experience in hospital delirium

| **Outcomes** | **Total**  **(n= 44,734)** | **No Delirium**  **(n= 41,466)** | **Delirium**  **(n= 3,268)** |
| --- | --- | --- | --- |
| **Mild Cognitive Impairment and / or Dementia (MCID)** | | | |
| Patients with Outcome- no. (%) | 3,848 (8.6) | 3,500 (8.44) | 348 (10.65) |
| Follow Up Time (person-years) | 87,010 | 81,722 | 5,287 |
| Incidence Ratea: % (95% CI) | 44.22 (42.85-45.64) | 42.83 (41.43-44.27) | 65.82 (59.25-73.11) |
| Unadjusted HR (95% CI) |  | Reference | 1.62 (1.45-1.81) |
| Adjusted HRb (95% CI) | Reference | 1.38 (1.22 – 1.55) |
| **Mild Cognitive Impairment (MCI)** | | | |
| Patients with Outcome- no. (%) | 539 (1.2) | 485 (1.17) | 54 (1.65) |
| Follow Up Time (person-years) | 88,884 | 83,454 | 5,430 |
| Incidence Ratea: % (95% CI) | 6.06 (5.57-6.60) | 5.81 (5.32-6.35) | 9.95 (7.62-12.99) |
| Unadjusted HR (95% CI) |  | Reference | 1.79 (1.35-2.37) |
| Adjusted HRb (95% CI) | Reference | 1.76 (1.31 – 2.37) |
| **Alzheimer Disease** | | | |
| Patients with Outcome- no. (%) | 1,384 (3.09) | 1,257 (3.03) | 127 (3.89) |
| Follow Up Time (person-years) | 88,587 | 83,159 | 5428 |
| Incidence Ratea: % (95% CI) | 15.62 (14.82-16.47) | 15.12 (14.3-15.97) | 23.4 (19.66-27.84) |
| Unadjusted HR (95% CI) |  | Reference | 1.64 (1.36-1.97) |
| Adjusted HRb (95% CI) | Reference | 1.43 (1.18 – 1.74) |
| **Vascular Dementia** | | | |
| Patients with Outcome- no. (%) | 1,431 (3.2) | 1,301 (3.14) | 130 (3.98) |
| Follow Up Time (person-years) | 88,314 | 82,934 | 5,380 |
| Incidence Ratea: % (95% CI) | 16.2 (15.39-17.07) | 15.69 (14.86-16.56) | 24.16 (20.35-28.7) |
| Unadjusted HR (95% CI) |  | Reference | 1.61 (1.34-1.93) |
| Adjusted HRb (95% CI) | Reference | 1.30 (1.08 – 1.58) |
| **Lewy Body Dementia** | | | |
| Patients with Outcome- no. (%) | 245 (0.55) | 223 (0.54) | 22 (0.67) |
| Follow Up Time (person-years) | 89,295 | 83,816 | 5,479 |
| Incidence Ratea: % (95% CI) | 2.74 (2.42-3.11) | 2.66 (2.33-3.03) | 4.02 (2.64-6.10) |
| Unadjusted HRc (95% CI) |  | Reference | 1.62 (1.05-2.51) |
| **Dementia Not Otherwise Specified** | | | |
| Patients with Outcome- no. (%) | 1,019 (2.28) | 925 (2.23) | 94 (2.88) |
| Follow Up Time (person-years) | 88,565 | 83,136 | 5,429 |
| Incidence Ratea: % (95% CI) | 11.51 (10.82-12.23) | 11.13 (10.43-11.87) | 17.31 (14.15-21.19) |
| Unadjusted HR (95% CI) |  | Reference | 1.61 (1.3-1.99) |
| Adjusted HRb (95% CI) | Reference | 1.38 (1.10 – 1.72) |

a *Incidence rate per 1,000 person-years*

b *Adjusted for (1) Demographics: age, gender, race, insurance (primary payer), patient location (urban-rural), income quartile of patient ZIP code, state, (2) Comorbidities including AHRQ comorbidity measures: Charlson Co-morbidity Index, Atrial Fibrillation, Alcohol abuse, Deficiency anemias, Rheumatoid arthritis/collagen vascular diseases, Chronic blood loss anemia, Congestive heart failure, Chronic pulmonary disease, Coagulopathy, Depression, Diabetes, uncomplicated, Diabetes with chronic complications, Drug abuse, Hypertension (combine uncomplicated and complicated), Hypothyroidism, Liver disease, Lymphoma, Fluid and electrolyte disorders, Metastatic cancer, Other neurological disorders, Obesity, Paralysis, Peripheral vascular disorders, Psychoses, Pulmonary circulation disorders, Renal failure, Solid tumor without metastasis, Peptic ulcer disease excluding bleeding, Valvular disease, Weight loss, Acquired immune deficiency syndrome, Hyperthyroidism, Tobacco use, ICU use (Hemicraniectomy / Craniotomy, Extra Ventricular Drain Placement, Gastric Tube, Tracheostomy, Ventilator Support), (4) In hospital complications: Sepsis with organ failure, Pneumonia, ARDS, UTI, Seizures*, *(5) In hospital outcomes: length of stay, discharge disposition*

c *Adjusted estimated not suitable due to small number of patients and events*

**Supplemental Table 2 (c)**: Proportion, Incidence Rate, and Hazard Ratio for development of mild cognitive impairment and various dementia subtypes among **subarachnoid hemorrhage** patients who did and did not experience in hospital delirium

| **Outcomes** | **Total**  **(n= 18,855)** | **No Delirium**  **(n= 17,462)** | **Delirium**  **(n= 1,393)** |
| --- | --- | --- | --- |
| **Mild Cognitive Impairment and / or Dementia (MCID)** | | | |
| Patients with Outcome- no. (%) | 847 (4.49) | 748 (4.28) | 99 (7.11) |
| Follow Up Time (person-years) | 38,428 | 35,959 | 2,469 |
| Incidence Ratea: % (95% CI) | 22.04 (20.61-23.58) | 20.8 (19.36-22.35) | 40.1 (32.93-48.83) |
| Unadjusted HR (95% CI) |  | Reference | 1.94 (1.57-2.39) |
| Adjusted HRb (95% CI) | Reference | 1.44 (1.15 – 1.81) |
| **Mild Cognitive Impairment (MCI)** | | | |
| Patients with Outcome- no. (%) | 261 (1.38) | 223 (1.28) | 38 (2.73) |
| Follow Up Time (person-years) | 38,757 | 36,256 | 2,501 |
| Incidence Ratea: % (95% CI) | 6.73 (5.96-7.60) | 6.15 (5.39-7.01) | 15.2 (11.06-20.88) |
| Unadjusted HRc (95% CI) |  | Reference | 2.47 (1.75-3.48) |
| **Alzheimer Disease** | | | |
| Patients with Outcome- no. (%) | 251 (1.33) | 219 (1.25) | 32 (2.3) |
| Follow Up Time (person-years) | 38,874 | 36,347 | 2,528 |
| Incidence Ratea: % (95% CI) | 6.46 (5.71-7.31) | 6.03 (5.28-6.88) | 12.66 (8.95-17.9) |
| Unadjusted HRc (95% CI) |  | Reference | 2.13 (1.47-3.08) |
| **Vascular Dementia** | | | |
| Patients with Outcome- no. (%) | 194 (1.03) | 167 (0.96) | 27 (1.94) |
| Follow Up Time (person-years) | 38,866 | 36,347 | 2,519 |
| Incidence Ratea: % (95% CI) | 4.99 (4.34-5.75) | 4.59 (3.95-5.35) | 10.72 (7.35-15.63) |
| Unadjusted HRc (95% CI) |  | Reference | 2.36 (1.57-3.54) |
| **Dementia Not Otherwise Specified** | | | |
| Patients with Outcome- no. (%) | 221 (1.17) | 203 (1.16) | 18 (1.29) |
| Follow Up Time (person-years) | 38,793 | 36,274 | 2,519 |
| Incidence Ratea: % (95% CI) | 5.7 (4.99-6.5) | 5.60 (4.88-6.42) | 7.15 (4.5-11.34) |
| Unadjusted HRc (95% CI) |  | Reference | 1.28 (0.79-2.07) |

a *Incidence rate per 1,000 person-years*

b *Adjusted for (1) Demographics: age, gender, race, insurance (primary payer), patient location (urban-rural), income quartile of patient ZIP code, state, (2) Comorbidities including AHRQ comorbidity measures: Charlson Co-morbidity Index, Atrial Fibrillation, Alcohol abuse, Deficiency anemias, Rheumatoid arthritis/collagen vascular diseases, Chronic blood loss anemia, Congestive heart failure, Chronic pulmonary disease, Coagulopathy, Depression, Diabetes, uncomplicated, Diabetes with chronic complications, Drug abuse, Hypertension (combine uncomplicated and complicated), Hypothyroidism, Liver disease, Lymphoma, Fluid and electrolyte disorders, Metastatic cancer, Other neurological disorders, Obesity, Paralysis, Peripheral vascular disorders, Psychoses, Pulmonary circulation disorders, Renal failure, Solid tumor without metastasis, Peptic ulcer disease excluding bleeding, Valvular disease, Weight loss, Acquired immune deficiency syndrome, Hyperthyroidism, Tobacco use, ICU use (Hemicraniectomy / Craniotomy, Extra Ventricular Drain Placement, Gastric Tube, Tracheostomy, Ventilator Support), (4) In hospital complications: Sepsis with organ failure, Pneumonia, ARDS, UTI, Seizures*, *(5) In hospital outcomes: length of stay, discharge disposition*

c *Adjusted estimated not suitable due to small number of patients and events*

**Supplemental Table 2 (d)**: Proportion, Incidence Rate, and Hazard Ratio for development of mild cognitive impairment and various dementia subtypes among **traumatic brain injury** patients who did and did not experience in hospital delirium

| **Outcomes** | **Total**  **(n= 245,306)** | **No Delirium**  **(n= 229,078)** | **Delirium**  **(n= 16,228)** |
| --- | --- | --- | --- |
| **Mild Cognitive Impairment and / or Dementia (MCID)** | | | |
| Patients with Outcome- no. (%) | 15,594 (6.36) | 14,134 (6.17) | 1,460 (9) |
| Follow Up Time (person-years) | 546,248 | 515,243 | 31,004 |
| Incidence Ratea: % (95% CI) | 28.55 (28.1-29) | 27.43 (26.98-27.89) | 47.09 (44.74-49.57) |
| Unadjusted HR (95% CI) |  | Reference | 1.78 (1.68-1.87) |
| Adjusted HRb (95% CI) | Reference | 1.31 (1.23 – 1.38) |
| **Mild Cognitive Impairments (MCI)** | | | |
| Patients with Outcome- no. (%) | 2,648 (1.08) | 2,362 (1.03) | 286 (1.76) |
| Follow Up Time (person-years) | 552,373 | 520,889 | 31,484 |
| Incidence Ratea: % (95% CI) | 4.79 (4.61-4.98) | 4.53 (4.36-4.72) | 9.08 (8.09-10.2) |
| Unadjusted HR (95% CI) |  | Reference | 2.05 (1.81-2.32) |
| Adjusted HRb (95% CI) | Reference | 1.39 (1.22 – 1.59) |
| **Alzheimer Disease** | | | |
| Patients with Outcome- no. (%) | 7,149 (2.91) | 6,532 (2.85) | 617 (3.8) |
| Follow Up Time (person-years) | 551,521 | 519,969 | 31,551 |
| Incidence Ratea: % (95% CI) | 12.96 (12.67-13.27) | 12.56 (12.26-12.87) | 19.56 (18.07-21.16) |
| Unadjusted HR (95% CI) |  | Reference | 1.62 (1.49-1.76) |
| Adjusted HRb (95% CI) | Reference | 1.35 (1.23 – 1.47) |
| **Vascular Dementia** | | | |
| Patients with Outcome- no. (%) | 2,277 (0.93) | 2,060 (0.9) | 217 (1.34) |
| Follow Up Time (person-years) | 553,580 | 521,905 | 31,675 |
| Incidence Ratea: % (95% CI) | 4.11 (3.95-4.29) | 3.95 (3.78-4.12) | 6.85 (6-7.83) |
| Unadjusted HR (95% CI) |  | Reference | 1.78 (1.55-2.05) |
| Adjusted HRb (95% CI) | Reference | 1.30 (1.12 – 1.51) |
| **Lewy Body Dementia** | | | |
| Patients with Outcome- no. (%) | 1,896 (0.77) | 1,715 (0.75) | 181 (1.12) |
| Follow Up Time (person-years) | 554,430 | 522,673 | 31,757 |
| Incidence Ratea: % (95% CI) | 3.42 (3.27-3.58) | 3.28 (3.13-3.44) | 5.7 (4.93-6.59) |
| Unadjusted HR (95% CI) |  | Reference | 1.81 (1.55-2.11) |
| Adjusted HRb (95% CI) | Reference | 1.11 (0.94 – 1.31) |
| **Dementia Not Otherwise Specified** | | | |
| Patients with Outcome- no. (%) | 4,907 (2) | 4,437 (1.94) | 470 (2.9) |
| Follow Up Time (person-years) | 551,269 | 519,794 | 31,474 |
| Incidence Ratea: % (95% CI) | 8.9 (8.66-9.15) | 8.54 (8.29-8.79) | 14.93 (13.64-16.35) |
| Unadjusted HR (95% CI) |  | Reference | 1.78 (1.62-1.96) |
| Adjusted HRb (95% CI) | Reference | 1.30 (1.18 – 1.44) |

a *Incidence rate per 1,000 person-years*

b *Adjusted for (1) Demographics: age, gender, race, insurance (primary payer), patient location (urban-rural), income quartile of patient ZIP code, state, (2) Comorbidities including AHRQ comorbidity measures: Charlson Co-morbidity Index, Atrial Fibrillation, Alcohol abuse, Deficiency anemias, Rheumatoid arthritis/collagen vascular diseases, Chronic blood loss anemia, Congestive heart failure, Chronic pulmonary disease, Coagulopathy, Depression, Diabetes, uncomplicated, Diabetes with chronic complications, Drug abuse, Hypertension (combine uncomplicated and complicated), Hypothyroidism, Liver disease, Lymphoma, Fluid and electrolyte disorders, Metastatic cancer, Other neurological disorders, Obesity, Paralysis, Peripheral vascular disorders, Psychoses, Pulmonary circulation disorders, Renal failure, Solid tumor without metastasis, Peptic ulcer disease excluding bleeding, Valvular disease, Weight loss, Acquired immune deficiency syndrome, Hyperthyroidism, Tobacco use, Concurrent Diagnosis of AIS, Concurrent Diagnosis of ICH, Concurrent Diagnosis of SAH, (3) Treatment Severity: ICU use (Hemicraniectomy / Craniotomy, Extra Ventricular Drain Placement, Gastric Tube, Tracheostomy, Ventilator Support), (4) In hospital complications: Sepsis with organ failure, Pneumonia, ARDS, UTI, Seizures*, *(5) In hospital outcomes: length of stay, discharge disposition*