**Supplemental Material**

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**eTable 1. List of International Classification of Diseases 9 and 10 Codes for Alzheimer Diseases**

|  |  |  |  |
| --- | --- | --- | --- |
| **ICD-9 Description** | **ICD-9** | **ICD-10** | **ICD-10 Description** |
| Other cerebral degenerations | 331 |  |  |
| Alzheimer Disease | 331.0 | G30.0 | Alzheimer disease with early onset |
| G30.1 | Alzheimer disease with late onset |
| G30.8 | Other Alzheimer disease |
| G30.9 | Alzheimer disease, unspecified |

**Abbreviations:** ICD, International Classification of Diseases.

**eTable 2. List of International Classification of Diseases 9 and 10 Codes for Non-Alzheimer Dementia**

|  |  |  |  |
| --- | --- | --- | --- |
| **ICD-9 Description** | **ICD-9** | **ICD-10** | **ICD-10 Description** |
| Other and unspecified prion disease of central nervous system | 46.79 | A81.89 | Other atypical virus infections of central nervous system |
| Pre-senile dementia, uncomplicated | 290.1 |  |  |
| Presenile dementia | 290.10 |  |  |
| Pre-senile dementia with delusion features | 290.12 |  |  |
| Pre-senile dementia with depressive feature | 290.13 |  |  |
| Persistent mental disorders due to conditions classified elsewhere | 294 |  |  |
| Amnestic disord oth dis | 294.0 |  |  |
| Other persistent mental disorders due to conditions classified elsewhere | 294.8 |  |  |
| Mental disor NOS oth dis | 294.9 |  |  |
| Unspecified non-psychotic mental disorder following organic brain damage | 310.9 |  |  |
| Conduct disturbance NOS | 312.9 |  |  |
| Encephalopathy, not elsewhere classified | 348.3 |  |  |
| Nonpsych mntl disord NEC | 310.89 |  |  |
| Encephalopathy NOS | 348.30 |  |  |
| Encephalopathy NEC | 348.39 |  |  |
| Temporal sclerosis | 348.81 |  |  |
|  |  | F04 | Amnestic disorder due to known physiological condition Korsakov's psychosis or syndrome, nonalcoholic |
|  |  | F06.8 | Oth mental disorders due to known physiological condition |
|  |  | F07.89 | Other personality and behavioral disorders due to known physiological condition |
| Amyotrophic lateral sclerosis | 335.20 | G12.21 | Amyotrophic lateral sclerosis |
| Parkinson's disease | 331.82 | G20 | Parkinson's disease |
| Pick's disease | 331.11 | G31.01 | Pick's disease |
| Other frontotemporal dementia | 331.19 | G310.9 | Other frontotemporal dementia |
| Senile degeneration of | 331.12 |  |  |
| brain, not elsewhere |  |
| Classified |  |
| Dementia with Lewy | 331.82 | G31.83 | Dementia with Lewy |
| Bodies | Bodies |
|   |   | G31.84 | Mild cognitive impairment, so stated  |
| Corticobasal degeneration | 331.6 | G31.85 | Corticobasal degeneration |
|  |  | G93.4 | Other and unspecified encephalopathy |
|  |  | G93.40 | Encephalopathy, unspecified |
|  |  | G93.49 | Other encephalopathy |
| Hippocampal sclerosis |   | G93.81 | Temporal sclerosis |
| Altered mental status | 780.97 |  |  |

**Abbreviations:** ICD, International Classification of Diseases.

**eTable 3. List of International Classification of Diseases 9 and 10 Codes for Unspecified Dementia**

|  |  |  |  |
| --- | --- | --- | --- |
| **ICD-9 Description** | **ICD-9** | **ICD-10** | **ICD-10 Description** |
| Dementias | 290 | F03.90 | Unspecified dementia without behavioral disturbance |
| Senile dementia, uncomplicated | 290.0 |
| Pre-senile dementia, uncomplicated | 290.1 |
| Pre-senile dementia with | 290.12 |
| delusion features |
| Pre-senile dementia with depressive feature | 290.13 |
| Senile dementia with delusional features | 290.2 |
| Senile delusion | 290.20 |
| Senile dementia with depressive features | 290.21 |
| Senile delirium | 290.3 |
| Dementia, unspecified, without behavioral disturbance | 294.2 |
|  |  | F02.8 | Dementia in other diseases classified elsewhere |
| Dementia w/o behav dist | 294.10 |  |  |
| Dementia classified elsewhere without behavioral disturbance | 294.1 | F02.80 | Dementia in other diseases classified elsewhere without behavioral disturbance |
|  |
| Dementia classified elsewhere with behavioral disturbance | 294.11 | F02.81 | Dementia in other diseases classified elsewhere with behavioral disturbance |  |
|  |
|  |  | F03.9 | Unspecified dementia |  |
| Demen NOS w/o behv dstrb | 294.20 |  |  |  |
| Dementia, unspecified, with behavioral disturbanceAggressive behaviorCombative behaviorViolent behavior | 294.21 | F03.91 | Unspecified dementia with behavioral disturbance |  |
| Other persistent mental disorders due to conditions classified elsewhere | 294.8 | F06.0  | Psychotic disorder with hallucinations due to known physiological condition |  |
|  |
|  |  | G31.1 | Senile degeneration of brain, not elsewhere Classified |  |
| Senile degenerat brain | 331.2 |  |  |  |
| Other cerebral degenerations; Cerebral degeneration, unspecified  | 331.9 | G31.9 | Degenerative disease of nervous system, unspecified |  |
|  |
| Unspecified non-psychotic mental disorder following organic brain damage | 310.9 | F09 | Unspecified mental disorder due to known physiological condition |  |
| Pseudobulbar affect | 310.81 | F48.2 | Pseudobulbar affect |  |
| Altered mental status | 780.97 | R41.82 | Altered mental status, unspecified |  |
| Delirium due to conditions classified elsewhere | 293.0 | F05 | Delirium due to known physiological condition |  |
| Wandering in diseases classified elsewhere | V40.31 | Z91.83  | Wandering in diseases classified elsewhere |  |

**Abbreviations:** ICD, International Classification of Diseases.

**eTable 4. List of International Classification of Diseases 9 and 10 Codes for Vascular Dementia**

|  |  |  |  |
| --- | --- | --- | --- |
| **ICD-9 Description** | **ICD-9** | **ICD-10** | **ICD-10 Description** |
| Vascular dementia uncomplicated  | 290.4 | F01.50 | Vascular dementia without behavioral disturbance |
| Vascular dementia with delirium  | 290.41 | F01.51 | Vascular dementia with behavioral disturbance  |
| Delirium due to known physiological condition Vascular dementia with delusions  | 290.42 |
| Vascular dementia with depression  | 290.43 |
| Dementia following hypoxic-ischemic injury | 348.1 | G93.1 | Anoxic brain damage, not elsewhere classified |
|   |   | I69.010 | Attention and concentration deficit following nontraumatic subarachnoid hemorrhage |
|   |   | I69.011 | Memory deficit following ntrm subarachnoid hemorrhage |
|   |   | I69.012 | Vis def/sptl nglct following ntrm subarachnoid hemorrhage |
|   |   | I69.013 | Visuospatial deficit and spatial neglect following nontraumatic subarachnoid hemorrhage |
|   |   | I69.014 | Frontal lobe and executive function deficit following nontraumatic subarachnoid hemorrhage |
|   |   | I69.015 | Cognitive social or emotional deficit following nontraumatic subarachnoid hemorrhage |
|   |   | I69.018 | Other symptoms and signs involving cognitive functions following nontraumatic subarachnoid hemorrhage  |
|   |   | I69.019 |  Unspecified symptoms and signs involving cognitive functions following nontraumatic subarachnoid hemorrhage  |
| Late effects of cerebrovascular disease, cognitive deficits | 438.0 | I69.31 | Attention and concentration deficit following cerebral infarction |
| I69.311 | Memory deficit following cerebral infarction  |
| I69.312 | Visuospatial deficit and spatial neglect following cerebral infarction |
| I69.313 | Psychomotor deficit following cerebral infarction |
| I69.314 | Frontal lobe and executive function deficit following cerebral infarction |
| I69.315 | Cognitive social or emotional deficit following cerebral infarction |
| I69.318 | Other symptoms and signs involving cognitive functions following cerebral infarction |
| I69.319 | Unspecified symptoms and signs involving cognitive functions following cerebral infarction |
| Unspecified late effects of cerebrovascular disease  | 438.9 | I69.9 | Unspecified sequelae of unspecified cerebrovascular disease (Cognitive deficit due to preceding CVA) Late effects of cerebrovascular disease, cognitive deficits  |

**Abbreviations:** ICD, International Classification of Diseases.

**eTable 5. Baseline Demographics and Clinical Characteristics of the Definitions of Alzheimer Disease and Related Dementia Disorders in the Sensitivity Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Baseline characteristic** | **Total** **MCI-to-ADRD subgroup** | **MCI-to-ADRD Diagnosis code and medication** | **MCI-to-ADRD Diagnosis code without medication** | **MCI-to-ADRD Medication without diagnosis code** |
| **Total** | **1962** | **775** | **900** | **287** |
| **Age at index (continuous)** |  |   |   |   |
| Mean (SD) | 72.6 (11.9) | 75.4 (10.2) | 70.7 (13.1) | 71.3 (11.2) |
| **Age (categorical), years, No. (%)** |  |   |   |   |
| 50-64 | 627 (32.0) | 146 (18.8) | 385 (42.8) | 96 (33.4) |
| 65-79 | 660 (33.6) | 316 (40.8) | 233 (25.9) | 111 (38.7) |
| ≥ 80 | 675 (34.4) | 313 (40.4) | 282 (31.3) | 80 (27.9) |
| **Sex, No. (%)** |  |   |   |   |
| Male | 863 (44.0) | 345 (44.5) | 389 (43.2) | 129 (44.9) |
| Female | 1099 (56.0) | 430 (55.5) | 511 (56.8) | 158 (55.1) |
| **Charlson Comorbidity Index** |  |   |   |   |
| Mean (SD) | 1.75 (1.66) | 1.62 (1.54) | 1.94 (1.79) | 1.47 (1.49) |
| **Elixhauser Comorbidity Index** |  |   |   |   |
| Mean (SD) | 2.97 (2.18) | 2.82 (2.06) | 3.24 (2.32) | 2.51 (1.89) |

**Abbreviations:** ADRD, Alzheimer disease and related dementia disorders; MCI, mild cognitive impairment; SD, standard deviation.

**eTable 6. Adjusted All-Cause Mean Costs Per Patient Per Year in the 12-Months Post-Index for Individuals with ≥1 Encounter of the Definitions of Alzheimer Disease and Related Dementia Disorders in the Sensitivity Analysis, by Care Setting and Adjusted for Age Group and Sex\*,†**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Category** | **MCI-to-ADRD Diagnosis code and medication** | **Stable MCI** | ***P* value** | **MCI-to-ADRD Diagnosis code without medication** | **Stable MCI** | ***P* value** | **MCI-to-ADRD****Medication without diagnosis code** | **Stable MCI** | ***P* value** |
| **Total, No. (%)** | **775 (100.0)** | **3223 (100.0)** |  | **900 (100.0)** | **3223 (100.0)** |  | **287 (100.0)** | **3223 (100.0)** |  |
| **Total Cost** |  |  |   |  |  |   |  |  |   |
| **Individuals with ≥1 encounter, No. (%)** | 775 (100.0) | 3223 (100.0) |   | 900 (100.0) | 3223 (100.0) |   | 287 (100.0) | 3223 (100.0) |   |
| Mean ($) | $27 331  | $25 379  | .15 | $41 478  | $24 597  | <.001 | $31 342  | $25 558  | .007 |
| Mean ratio (95% CI) | 1.08 (0.97-1.19) | Ref. |   | 1.69 (1.54-1.84) | Ref. |   | 1.23 (1.06-1.42) | Ref. |   |
| **Inpatient cost** |  |  |   |  |  |   |  |  |   |
| **Individuals with ≥1 admission, No. (%)** | 146 (18.8) | 413 (12.8) |   | 263 (29.2) | 413 (12.8) |   | 37 (12.9) | 413 (12.8) |   |
| Mean ($) | $42 252  | $38 432  | .37 | $47 639  | $37 793  | .005 | $62 138  | $39 775  | .02 |
| Mean ratio (95% CI) | 1.10 (0.89-1.35) | Ref. |   | 1.26 (1.07-1.48) | Ref. |   | 1.56 (1.07-2.28) | Ref. |   |
| **ED cost** |  |  |   |  |  |   |  |  |   |
| **Individuals with ≥1 visit, No (%)** | 266 (34.3) | 771 (23.9) |   | 401 (44.6) | 771 (23.9) |   | 89 (31.0) | 771 (23.9) |   |
| Mean ($) | $5335  | $3737  | <.001 | $4442  | $3764  | .02 | $5370  | $3805  | .008 |
| Mean ratio (95% CI) | 1.43 (1.19-1.71) | Ref. |   | 1.18 (1.03-1.36) | Ref. |   | 1.41 (1.09-1.82) | Ref. |   |
| **Outpatient cost** |  |  |   |  |  |   |  |  |   |
| **Individuals with ≥1 visit, No. (%)** | 775 (100.0) | 3223 (100.0) |   | 900 (100.0) | 3223 (100.0) |   | 287 (100.0) | 3223 (100.0) |   |
| Mean ($) | $12 816  | $13 852  | .12 | $19 709  | $13 117  | <.001 | $16 522  | $13 479  | .005 |
| Mean ratio (95% CI) | 0.93 (0.84-1.02) | Ref. |   | 1.50 (1.38-1.64) | Ref. |   | 1.23 (1.06-1.41) | Ref. |   |
| **Pharmacy cost** |  |  |   |  |  |   |  |  |   |
| **Individuals with ≥1 prescription claim, No. (%)**  | 774 (99.9) | 3028 (93.9) |   | 835 (92.8) | 3028 (93.9) |   | 284 (99.0) | 3028 (93.9) |   |
| Mean ($) | $4573  | $4835  | .38 | $4888  | $4841  | .87 | $5534  | $4887  | .19 |
| Mean ratio (95% CI) | 0.95 (0.84-1.07) | Ref. |   | 1.01 (0.90-1.13) | Ref. |   | 1.13 (0.94-1.36) | Ref. |   |

**Abbreviations:** ADRD, Alzheimer disease and related dementia disorders; ED, emergency department; MCI, mild cognitive impairment; Ref, reference \* All results were adjusted to December 2019 United States Dollars based on the Medical Care cost component of the Consumer Price Index and rounded to the nearest dollar. † Means are estimated using a generalized linear model. |