**Supplementary Table S1** Translation of comorbidities of modified Charlson Comorbidity Index into ICD-9-CM codes and relative weight of mCCI items.

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Description** | **ICD9-CM** | **Weight** |
| **Age, years** |  |  |  |
| < 50 |  |  | 0 |
| 50-59 |  |  | 1 |
| 60-69 |  |  | 2 |
| 70-79 |  |  | 3 |
| ≥80 |  |  | 4 |
| **Comorbidity** |  |  |  |
| Myocardical infarction | Acute MI  History of MI | 410x, 412x | 1 |
| Congestive heart failure | Rheumatic HF  Hypertensive HF  Primitive cardiopathy with HF  Metabolic or deficiency HF  Alcoholic cardiopathy with HF  Other cardiopathy with HF | 398.91, 402.01  402.11, 402.91  404.01, 404.03  404.11, 404.13  404.91, 404.93  425.4-9, 428.x | 1 |
| Peripheral vascular disease | Aortic aneurisms  Artery atherosclerosis  Artery embolism  Artery dissection  Buerger disease  Eritromelalgia  Blood vessel replaced by prothesis  Other peripheral artery disease | 093.0, 437.3, 440.x, 441.x, 443.1-9, 47.1, 557.1, 557.9  V43.4 | 1 |
| Cerebrovascular disease | Retinal ischemic infarction  Subarachnoid hemorrhage  Ischemic stroke  Other CD  Other sequelae of CD | 362.34, 430.x-438.x | 1 |
| Dementia | Senile and presenile dementia | 290.x, 294.1, 331.2 | 1 |
| Chronic pulmonary disease | Asthmatic bronchitis  Chronic bronchitis  Emphysema  Pneumoconiosis  Other CPD | 416.8, 416.9  490.x-505.x, 506.4, 508.1, 508.8 | 1 |
| Connective tissue disease | LES  Sjogren syndrome  Systemic sclerosis  Dermatomyositis  Polymyositis  Rheumatoid arthritis  Rheumatic polymyalgia  Other connectivitis | 446.5  710.0-710.4  714.0-714.2  714.8, 725.x | 1 |
| Peptic ulcer | Acute or chronic gastroduodenal ulcer | 531.x-534.x | 1 |
| Mild liver disease | Chronic B hepatitis  Chronic C hepatitis  Acute liver failure  Alcoholic steatosis  Alcoholic hepatitis  Alcoholic cirrhosis  Biliary cirrhosis  Other cirrhosis  Unspecified hepatitis  Hepatic infarction  Liver transplant  Other liver disease  Other chronic hepatitis | 070.22, 070.23, 070.32, 070.33, 070.44, 070.54, 070.6, 070.9, 570.x, 571.x, 573.3, 573.4,  573.8, 573.9, V42.7 | 1 |
| Moderate or severe LD | Esophageal varices  Porta hypertension  Hepatic coma  Other sequelae of LD | 456.0-456.2  572.2  572.8 | 3 |
| Diabetes without chronic complications | Type I or II DM with or without acute metabolic disturbances | 250.0-250.3  250.8, 250.9 | 1 |
| Diabetes with chronic complications | Type I or II DM with renal, ophthalmic, neurological or peripheral artery manifestations | 250.4-250.7 | 2 |
| Moderate or severe CRD | Chronic glomerulonephritis  Nephritis and nephropathy  Chronic renal failure  Renal failure, unspecified  Disorders resulting from impaired renal function  Dialysis | 403.01, 403.11,  403.91, 404.02, 404.03, 404.12, 404.13, 404.92, 404.93, 582.x, 583.0-583.7, 585.x, 586.x, 588.0, V42.0, V45.1, V56x | 2 |
| Localized cancer including leukemia and lymphoma | Any malignances at exception with melanoma | 140x-172x  174x-195.8  200x-208x, 238.6 | 2 |
| Metastatic solid tumor | Secondary malignant neoplasm of lymph nodes and other organs | 196x-199x | 6 |
| HIV/AIDS | HIV with related specified conditions | 042x-044x | 6 |
| Hemiplegia | Pyramidal FSS ≥3 |  | 2 |

MI, myocardical infarction; HF, heart failure; CD, cerebrovascular disease; CPD, chronic pulmonary disease; LES, lupus erythematous systemic; LD, liver disease; DM, diabetes mellitus; CRD, chronic renal disease; HIV, human immunodeficiency virus; AIDS, acquired immunodeficiency syndrome; FSS, functional system subscore.

**Supplementary Table 2** Cut-off values of modified Charlson Comorbidity index and its sensitivity, specificity and Youden Index for the recognition of patients with EDSS 4.

| **Cut-off** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **NPV (%)** | **YI** |
| --- | --- | --- | --- | --- | --- |
| 1 | 100 | 0 | 46.01 | - | 0.00000 |
| 2 | 95.0 | 57.2 | 65.4 | 93.04 | 0.52 |
| 3 | 88.1 | 77.8 | 77.2 | 88.5 | 0.66 |
| 4 | 68.5 | 92.2 | 88.2 | 77.5 | 0.61 |
| 5 | 42.0 | 97.7 | 93.9 | 66.4 | 0.40 |
| 6 | 21.9 | 98.8 | 94.1 | 59.8 | 0.21 |
| 7 | 7.7 | 99.2 | 89.5 | 55.8 | 0.07 |
| 8 | 1.8 | 100 | 100 | 54.45 | 0.018 |
| 9 | 0.46 | 100 | 10% | 54.11 | 0.0046 |

PPV, predictive positive value; NPV, negative predictive value; YI, Youden Index.

**Supplementary Table 3** Cut-off values of modified Charlson Comorbidity index and its sensitivity, specificity and Youden Index for the recognition of patients with EDSS 6.

| **Cut-off** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **NPV (%)** | **YI** |
| --- | --- | --- | --- | --- | --- |
| 1 | 100 | 0 | 37.04 | - | 0.00000 |
| 2 | 99.53 | 44.2 | 51.21 | 99.38 | 0.43729 |
| 3 | 98.12 | 62.71 | 60.76 | 98.27 | 0.60829 |
| 4 | 83.1 | 80.66 | 71.66 | 89.0 | 0.63762 |
| 5 | 53.99 | 90.61 | 77.18 | 77 | 0.44598 |
| 6 | 31.46 | 95.86 | 81.71 | 70.39 | 0.27312 |
| 7 | 13.15 | 98.34 | 82.35 | 65.8 | 0.11488 |
| 8 | 5.16 | 99.72 | 91.67 | 64.12 | 0.04888 |
| 9 | 1.88 | 100 | 100 | 63.4 | 0.01878 |
| 10 | 0.94 | 100 | 100 | 63.18 | 0.00939 |

PPV, predictive positive value; NPV, negative predictive value; YI, Youden Index.

**Supplementary Table 4** Cut-off values of modified Charlson Comorbidity index and its sensitivity, specificity and Youden Index for the recognition of patients with SPMS.

| **Cut-off** | **Sensitivity (%)** | **Specificity (%)** | **PPV (%)** | **NPV (%)** | **YI** |
| --- | --- | --- | --- | --- | --- |
| 1 | 100 | 0 | 42.9 | - | 0.0 |
| 2 | 96.0 | 49.5 | 58.9 | 94.3 | 0.46 |
| 3 | 91.2 | 68.7 | 68.7 | 91.2 | 0.59 |
| 4 | 76.8 | 87.5 | 82.6 | 83.3 | 0.64 |
| 5 | 47.8 | 94.7 | 87.2 | 70.7 | 0.43 |
| 6 | 25.9 | 97.03 | 86.8 | 63.5 | 0.23 |
| 7 | 8.8 | 99.01 | 86.9 | 59.06 | 0.078 |
| 8 | 2.6 | 100 | 100 | 57.7 | 0.026 |
| 9 | 0.88 | 100 | 100 | 57.3 | 0.0088 |
| 10 | 0.44 | 100 | 100 | 57.2 | 0.0044 |

PPV, predictive positive value; NPV, negative predictive value; YI, Youden Index.