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# Supplementary Text 1: Data sources and covariates

This section provides supplementary information on the data sources and some of the covariates used in this study.

**Data sources**

**Acute hospital records**

The Scottish Morbidity Record General/Acute Inpatient and Day Case dataset (SMR01) includes episode level information about inpatient and day case discharges from general and acute specialities from Scottish hospitals (all NHS hospitals and NHS beds in non-NHS institutions).(1) Data is available for research from 1981 onwards. Each record includes information on the person’s demographics, main diagnosis and up to five other diagnoses, recorded using ICD-9 codes up to April 1996, and subsequently using ICD-10 codes.

**Psychiatric hospital records**

The Scottish Mental Health Inpatient and Day Case dataset (SMR04) includes episode level information about inpatient and day case visits to mental health specialties in Scottish hospitals (all NHS hospitals and NHS beds in non-NHS institutions). Again data is available from 1981 onwards and records include information on the person’s demographics and diagnoses.

**Death records**

This study used Scottish death records from 1991 to 2018. The records include the person’s demographics, date of death, underlying cause of death and other conditions that may have contributed to their death.

**Stroke audit**

The Scottish Stroke Care Audit (SSCA)(2) was set up to monitor performance of hospitals against guideline based clinical standards. It includes information on stroke care in hospitals managing acute stroke in Scotland, with in-hospital data collection reaching national coverage from 2010 onwards.

**Diabetes register**

The Scottish Care Information – Diabetes (SCI-Diabetes) dataset is Scotland’s national diabetes register. It includes approximately 99% of all patients in Scotland diagnosed with diabetes since 2004.(3)

**Additional covariate information**

**Area-based deprivation**

Area-based deprivation was measured by the Carstairs Index in line with recommendations for the analysis of deprivation in Scotland where the time frame starts prior to 1996.(4) The Carstairs Index is based on four census variables (car ownership, male unemployment, household overcrowding and low occupational social class) and calculated at the postcode sector level.(5)

**Urbanicity**

Urbanicity was classified according to the Scottish Government six-fold urban rural indicator.(6)

# Supplementary Table 1: ICD-9 and ICD-10 codes used to identify mental health conditions.

|  |  |  |
| --- | --- | --- |
| **Mental health condition**a | **ICD-10 codes**  **(first 3 digits)** | **ICD-9 codes**  **(first 4 digits)** |
| Schizophrenia: schizophrenia and schizoaffective disorders | F20, F25 | 295.0-295.3,  295.6-295.9 |
| Other psychoses: schizotypal disorders, acute and transient psychosis, delusional disorders, and other psychotic disorders | F21-F24,  F28, F29 | 295.4, 295.5,  297.0-297.9  298.3, 298.4, 298.8, 298.9 |
| Bipolar disorder: manic episode or bipolar affective disorder | F30-F31 | 296.0  296.2-296.6 |
| Depression: depressive episode or recurrent depressive disorder | F32-F33 | 296.1  298.0, 300.4, 311 |
| Other mental health conditions: including other mood disorders, neuroses, dissociative disorders, somatoform disorders, eating disorders, non-organic sleep disorders and other behavioural syndromes associated with physiological disturbances and physical factors, disorders of adult personality and behaviour, disorders of psychological development, behavioural and emotional disorders with onset in childhood and adolescence and unspecified mental disorders | F34-F69,  F80-F99 | 293.8,  296.8, 296.9,  298.1, 298.2,  299.0-301.9,  302.1-302.9,  305.9,  306.0-309.9,  312.0-315.9  316 |

1. Further details on these codes can be found on the ICD-10 website (7) and in the ICD-9 book (8).

The orange rows represent the three SMI exposure groups. The comparison group comprised people with no hospitalisation record for any of the mental health conditions listed in the table.

# Supplementary Table 2: ICD-9 and ICD-10 codes used to identify alcohol use disorder

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ICD-10 Code | Description | ICD-9 Code | Description | |
| **Mental & behavioural disorders due to use of alcohol** | |  | |
| F10.1  F10.2  F10.3  F10.4  F10.6 | Harmful use  Dependence syndrome  Withdrawal state  Withdrawal state with delirium  Amnesic syndrome | 291.0  291.1  291.2  291.5  303 | Delirium tremens  Korsakov's psychosis, alcoholic  Other alcoholic dementia  Alcoholic jealousy  Alcohol dependence syndrome | |
| **Alcoholic liver disease** | |  | |
| K70.0  K70.1  K70.2  K70.3  K70.4  K70.9 | Alcoholic fatty liver  Alcoholic hepatitis  Alcoholic fibrosis and sclerosis of liver  Alcoholic cirrhosis of liver  Alcoholic hepatic failure  Alcoholic liver disease, unspecified | 571.0  571.1  571.2  571.3 | Alcoholic fatty liver  Acute alcoholic hepatitis  Alcoholic cirrhosis of liver  Alcoholic liver damage, unspecified | |
| **Other conditions** | | | | | |
| E24.4 | Alcohol induced Pseudo-Cushing’s syndrome |  | No equivalent code in ICD-9 | |
| E51.2 | Wernicke’s Encephalopathy |  | No equivalent code in ICD-9 | |
| G31.2 | Degeneration of nervous system due to alcohol |  | No equivalent alcohol-specific code included in ICD-9 | |
| G62.1 | Alcoholic polyneuropathy | 357.5 | Alcoholic polyneuropathy | |
| G72.1 | Alcoholic myopathy |  | No equivalent alcohol-specific code included in ICD-9 | |
| I42.6 | Alcoholic cardiomyopathy | 425.5 | Alcoholic cardiomyopathy | |
| K29.2 | Alcoholic gastritis | 535.3 | Alcoholic gastritis | |
| K85.2 | Alcohol-induced acute pancreatitis |  | No equivalent alcohol-specific code included in ICD-9 | |
| K86.0 | Alcohol-induced chronic pancreatitis |  | No equivalent alcohol-specific code included in ICD-9 | |
| O35.4 | Maternal care for (suspected) damage to foetus from alcohol |  | No equivalent alcohol-specific code included in ICD-9 | |
| Y57.3 | Drugs, medicaments and biological substances causing adverse effects in therapeutic use: alcohol deterrents | E947.3 | Drugs, medicaments and biological substances causing adverse effects in therapeutic use: alcohol deterrents | |
| Z50.2 | Alcohol rehabilitation |  | No equivalent alcohol-specific code included in ICD-9 | |
| Z71.4 | Alcohol abuse counselling and surveillance |  | No equivalent alcohol-specific code included in ICD-9 | |

# Supplementary Table 3: Comorbidities recorded during the incident stroke admission

|  |  |  |
| --- | --- | --- |
| **Comorbidity** | **ICD-10 codes** | **ICD-9 codes** |
| Atrial fibrillation | I48 | 427.3 |
| Diabetes | E10-14 | 250 |
| Hypertension | I10-I13, I15 | 401-405 |

# Supplementary Figure 1: Flow diagram for establishing the cohort

**Acute hospital admission records for adults**

**(1991-2014)**

243 958 individuals

with at least one stroke

238 001 individuals

with a first stroke

237 540 individuals

with valid data

461 individuals with a mismatch between their SMR01 and death records

5957 individuals with a stroke recorded in the previous 10 years

1461 individuals with missing data for area-based deprivation, urbanity or health board

228 699 individuals

in the cohort

7380 individuals with a history of another mental health conditiona

230 160 individuals with no history of a mental health condition or with a history of schizophrenia, bipolar disorder, depression

220 287 individuals with first stroke between 1991 and 2013b

175 487 individuals who survived more than 30 daysc

1. Including other psychoses, other mood disorders, disorders of adult personality and behaviour, eating disorders, neuroses, dissociative and somatoform disorders, behavioural and emotional disorders with onset in childhood and adolescence, non-organic sleep disorders, disorders of psychosocial development and unspecified mental disorders.
2. Restricted cohort for the analysis of five-year mortality.
3. Restricted cohort for the analysis time to recurrence outcomes.

# Supplementary Table 4: Number of individuals and events per group

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Outcome | No MHC | Schizophrenia | Bipolar disorder | Major depression | Total |
| Complete cases | 219 346 | 1186 | 859 | 7308 | 228 699 |
| 30-day mortality | 50 959 (23.2%) | 278 (23.4%) | 231 (26.9%) | 1744 (23.9%) | 53 212 (23.3%) |
| 1-year mortality | 86 532 (39.5%) | 454 (38.3%) | 372 (43.3%) | 3041 (41.6%) | 90 399 (39.5%) |
| All-cause mortality | 178 905 (81.6%) | 941 (79.3%) | 726 (84.5%) | 5991 (82.0%) | 186 563 (81.6%) |
| Complete cases  (stroke admissions up to 2013) | 211 370 | 1123 | 810 | 6984 | 220 287 |
| 5-year mortality | 129 241 (61.1%) | 666 (59.3%) | 520 (64.2%) | 4573 (65.5%) | 135 000 (61.3%) |
| Complete cases  (individuals who survived more than 30 days) | 168 387 | 908 | 628 | 5564 | 175 487 |
| Time to further stroke | 68 900 (40.9%) | 348 (38.3%) | 257 (40.9%) | 2214 (39.8%) | 71 719 (40.9%) |
| Time to further vascular event | 80 407 (47.8%) | 398 (43.8%) | 289 (46.0%) | 2594 (46.6%) | 83 688 (47.7%) |

# Supplementary Table 5: Number of individuals and events per group – sensitivity analysis (major depression based on psychiatric hospital admission records only)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Outcome | No MHC | Schizophrenia | Bipolar disorder | Major depression | Total |
| Complete cases | 222356 | 1186 | 859 | 3623 | 228024 |
| 30-day mortality | 51707 (23.3%) | 278 (23.4%) | 231 (26.9%) | 822 (22.7%) | 53038 (23.3%) |
| 1-year mortality | 87909 (39.5%) | 454 (38.3%) | 372 (43.3%) | 1385 (38.2%) | 90120 (39.5%) |
| All-cause mortality | 181450 (81.6%) | 941 (79.3%) | 726 (84.5%) | 2910 (80.3%) | 186027 (81.6%) |
| Complete cases  (stroke admissions up to 2013) | 214238 | 1123 | 810 | 3495 | 219666 |
| 5-year mortality | 131303 (61.3%) | 666 (59.3%) | 520 (64.2%) | 2111 (60.4%) | 134600 (61.3%) |
| Complete cases  (individuals who survived more than 30 days) | 170649 | 908 | 628 | 2801 | 174986 |
| Time to further stroke | 69829 (40.9%) | 348 (38.3%) | 257 (40.9%) | 1088 (38.8%) | 71522 (40.9%) |
| Time to further vascular event | 81474 (47.7%) | 398 (43.8%) | 289 (46.0%) | 1293 (46.2%) | 83454 (47.7%) |

# Supplementary Figure 2: Flow diagram for establishing the stroke audit sub-cohort

**Stroke audit records for adults**

**(2010-2014)**

39 297 individuals

with at least one stroke

3343 individuals with a stroke recorded in the previous 10 years

35 954 individuals

with a first stroke

6311 individuals without a concurrent stroke in their SMR01 records

29 643 individuals with a concurrent stroke in their SMR01 records

27 individuals with a mismatch between their stroke audit or SMR01 records and their death records

29 616 individuals

with valid data

862 individuals with a history of another mental health conditiona

28 754 individuals with no history of a mental health condition or with a history of schizophrenia, bipolar disorder or depression

1148 individuals with missing data for area-based deprivation, urbanicity, health board, stroke type or atrial fibrillation

27 606 individuals

in the cohort

23 579 individuals with no missing data for the six simple variables

1. Including other psychoses, other mood disorders, disorders of adult personality and behaviour, eating disorders, neuroses, dissociative and somatoform disorders, behavioural and emotional disorders with onset in childhood and adolescence, non-organic sleep disorders, disorders of psychosocial development and unspecified mental disorders.

# Supplementary Table 6: Baseline characteristics and outcomes for people who had a stroke in Scotland, 2010 – 2014, comparing people with each severe mental illness versus no admission for any mental health condition. Data from the stroke audit sub-cohort (excluding people with missing data in deprivation, urbanicity, health board, atrial fibrillation or stroke type)

|  | No mental health condition (N=26 259) | Schizophrenia (N=167) | Bipolar disorder (N=102) | Major depression (N=1078) |
| --- | --- | --- | --- | --- |
| **Median follow-up time (IQR), years** | 4.3 (0.8, 6.2) | 4.2 (1.1, 5.9) | 4.1 (0.3, 5.6) | 4.2 (0.9, 6.1) |
| **Sex, n (%)** |  |  |  |  |
| Female | 13 078 (49.8%) | 80 (47.9%) | 64 (62.7%) | 667 (61.9%) |
| Male | 13 181 (50.2%) | 87 (52.1%) | 38 (37.3%) | 411 (38.1%) |
| **Mean age at stroke (SD), years** |  |  |  |  |
| Mean (SD) | 73.2 (13.2) | 64.6 (13.4) | 68.3 (12.1) | 70.1 (13.8) |
| **Year of admission, n (%)** |  |  |  |  |
| 2010 | 5113 (19.5%) | 38 (22.8%) | 21 (20.6%) | 208 (19.3%) |
| 2011 | 5137 (19.6%) | 24 (14.4%) | 14 (13.7%) | 208 (19.3%) |
| 2012 | 4959 (18.9%) | 26 (15.6%) | 15 (14.7%) | 231 (21.4%) |
| 2013 | 5494 (20.9%) | 36 (21.6%) | 23 (22.5%) | 213 (19.8%) |
| 2014 | 5556 (21.2%) | 43 (25.7%) | 29 (28.4%) | 218 (20.2%) |
| **Deprivation quintile, n (%)** |  |  |  |  |
| 1 (most deprived) | 5510 (21.0%) | 54 (32.3%) | 17 (16.7%) | 267 (24.8%) |
| 2 | 5400 (20.6%) | 33 (19.8%) | 21 (20.6%) | 260 (24.1%) |
| 3 | 5122 (19.5%) | 34 (20.4%) | 20 (19.6%) | 208 (19.3%) |
| 4 | 5338 (20.3%) | 28 (16.8%) | 20 (19.6%) | 203 (18.8%) |
| 5 (least deprived) | 4889 (18.6%) | 18 (10.8%) | 24 (23.5%) | 140 (13.0%) |
| **Urbanity, n (%)** |  |  |  |  |
| Large urban area | 8669 (33.0%) | 69 (41.3%) | 38 (37.3%) | 387 (35.9%) |
| Other urban area | 9432 (35.9%) | 59 (35.3%) | 36 (35.3%) | 403 (37.4%) |
| Small town | 3581 (13.6%) | 20 (12.0%) | 11 (10.8%) | 152 (14.1%) |
| Rural | 4577 (17.4%) | 19 (11.4%) | 17 (16.7%) | 136 (12.6%) |
| **History of alcohol use disorder, n (%)** | 1110 (4.2%) | 36 (21.6%) | 13 (12.7%) | 233 (21.6%) |
| **Type of stroke** |  |  |  |  |
| Ischaemic | 23 266 (88.6%) | 147 (88.0%) | NA | 960 (89.1%) |
| Haemorrhagic | 2993 (11.4%) | 20 (12.0%) | NA | 118 (10.9%) |
| **Atrial fibrillation, n (%)** | 7381 (28.1%) | 26 (15.6%) | 17 (16.7%) | 242 (22.4%) |
| **Diabetes, n (%)** | 4801 (18.3%) | 35 (21.0%) | 22 (21.6%) | 210 (19.5%) |
| **Hypertension recorded at stroke admission, n (%)** | 8601 (32.8%) | 35 (21.0%) | 22 (21.6%) | 282 (26.2%) |
| **Case-mix variablesa** |  |  |  |  |
| N | 22 437 | 145 | 90 | 907 |
| Living alone before stroke, n (%) | 8789 (39.2%) | 59 (40.7%) | 37 (41.1%) | 420 (46.3%) |
| Independent in ADL before stroke, n (%) | 19 240 (85.8%) | 98 (67.6%) | 66 (73.3%) | 660 (72.8%) |
| Able to talk at first assessment, n (%) | 16 418 (73.2%) | 86 (59.3%) | 58 (64.4%) | 667 (73.5%) |
| Able to lift arms at first assessment, n (%) | 13 759 (61.3%) | 83 (57.2%) | 55 (61.1%) | 522 (57.6%) |
| Able to walk unassisted at first assessment, n (%) | 10 554 (47.0%) | 67 (46.2%) | 37 (41.1%) | 379 (41.8%) |
| **30-day mortality, n (%)** | 3432 (13.1%) | 25 (15.0%) | 17 (16.7%) | 142 (13.2%) |
| **1-year mortality, n (%)** | 7071 (26.9%) | 41 (24.6%) | 30 (29.4%) | 281 (26.1%) |
| **5-year mortality**b |  |  |  |  |
| N | 20 703 | 124 | 73 | 860 |
| n (%) | 10 275 (49.6%) | 67 (54.0%) | 40 (54.8%) | 449 (52.2%) |
| **Further events during follow-up**c |  |  |  |  |
| N | 22 827 | 142 | 85 | 936 |
| Stroke, n (%) | 6977 (30.6%) | 43 (30.3%) | 26 (30.6%) | 312 (33.3%) |
| Vascular event, n (%) | 7634 (33.4%) | 47 (33.1%) | 28 (32.9%) | 346 (37.0%) |
| **Brain imaging on day of admission**d |  |  |  |  |
| N | 25 943 | 164 | 102 | 1065 |
| n (%) | 15 996 (61.7%) | 97 (59.1%) | 65 (63.7%) | 634 (59.5%) |
| **Swallow screen on day of admission**e |  |  |  |  |
| N | 25 805 | 158 | 101 | 1061 |
| n (%) | 18 187 (70.5%) | 113 (71.5%) | 71 (70.3%) | 740 (69.7%) |
| **Admission to stroke unit within one dayf** |  |  |  |  |
| N | 25 792 | 164 | 102 | 1060 |
| n (%) | 19 251 (74.6%) | 112 (68.3%) | 79 (77.5%) | 775 (73.1%) |
| **Aspirin within one dayg** |  |  |  |  |
| N | 20694 | 130 | 91 | 861 |
| n (%) | 8686 (42.0%) | 48 (36.9%) | 41 (45.1%) | 349 (40.5%) |
| **Received thrombolysis, n (%)** | 3792 (14.4%) | 10 (6.0%) | 14 (13.7%) | 133 (12.3%) |

NA=Not available. Counts less than 10 are not available in order to protect the identity of individuals.

1. Based on the 23 579 individuals with complete information on the case-mix variables.
2. Based on the 21 760 individuals with their first stroke between 2010 and 2013.
3. Based on 23 990 individuals who survived more than 30 days.
4. Based on the 27 274 individuals who survived their day of admission and had sufficient brain imaging data.
5. Based on the 27 125 individuals who survived their day of admission and had sufficient swallow screen data.
6. Based on the 27 118 individuals who survived more than one day and had sufficient stroke unit data.
7. Based on the 21 776 individuals who survived more than one day, had an ischaemic stroke, didn't have a valid contraindication to aspirin and had sufficient aspirin data.

# Supplementary Table 7: Number of individuals and events per group for the stroke audit sub-cohort

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Outcome | No mental health condition | Schizophrenia | Bipolar disorder | Major depression | Total |
| Complete cases | 26 259 | 167 | 102 | 1078 | 27 606 |
| 30-day mortality | 3432 (13.1%) | 25 (15.0%) | 17 (16.7%) | 142 (13.2%) | 3616 (13.1%) |
| 1-year mortality | 7071 (26.9%) | 41 (24.6%) | 30 (29.4%) | 281 (26.1%) | 7423 (26.9%) |
| Mortality during follow-up | 14 575 (55.5%) | 93 (55.7%) | 58 (56.9%) | 636 (59.0%) | 15 362 (55.6%) |
| Complete cases  (stroke admissions up to 2013) | 20 703 | 124 | 73 | 860 | 21 760 |
| 5-year mortality | 10 275 (49.6%) | 67 (54.0%) | 40 (54.8%) | 449 (52.2%) | 10 831 (49.8%) |
| Complete cases  (individuals who survived more than 30 days) | 22 827 | 142 | 85 | 936 | 23 990 |
| Time to further stroke | 6977 (30.6%) | 43 (30.3%) | 26 (30.6%) | 312 (33.3%) | 7358 (30.7%) |
| Time to further vascular event | 7634 (33.4%) | 47 (33.1%) | 28 (32.9%) | 346 (37.0%) | 8055 (33.6%) |
| Complete cases (individuals who survived more than one day and had sufficient stroke unit data) | 25 792 | 164 | 102 | 1060 | 27 118 |
| Admission to stroke unit within  one day of admission | 19 251 (74.6%) | 112 (68.3%) | 79 (77.5%) | 775 (73.1%) | 20 217 (74.6%) |
| Complete cases (Individuals who survived their day of admission and had sufficient brain scan data) | 25 943 | 164 | 102 | 1065 | 27 274 |
| Brain scan on day of admission | 15 996 (61.7%) | 97 (59.1%) | 65 (63.7%) | 634 (59.5%) | 16 792 (61.6%) |
| Complete cases (Individuals who survived their day of admission and had sufficient swallow screen data) | 25 805 | 158 | 101 | 1061 | 27 125 |
| Swallow screen on day of  admission | 18 187 (70.5%) | 113 (71.5%) | 71 (70.3%) | 740 (69.7%) | 19111 (70.5%) |
| Complete cases (individuals who survived more than one day, had an ischaemic stroke, didn’t have a valid contraindication to aspirin and had sufficient aspirin data) | 20 694 | 130 | 91 | 861 | 21 776 |
| Aspirin within one day of  admission | 8686 (42.0%) | 48 (36.9%) | 41 (45.1%) | 349 (40.5%) | 9124 (41.9%) |

# Supplementary Table 8: Number of individuals and events per group for the stroke audit sub-cohort – sensitivity analysis (major depression based on psychiatric hospital admission records only)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Outcome | No mental health condition | Schizophrenia | Bipolar disorder | Major depression | Total |
| Complete cases | 26 715 | 167 | 102 | 476 | 27 460 |
| 30-day mortality | 3493 (13.1%) | 25 (15.0%) | 17 (16.7%) | 63 (13.2%) | 3598 (13.1%) |
| 1-year mortality | 7193 (26.9%) | 41 (24.6%) | 30 (29.4%) | 122 (25.6%) | 7386 (26.9%) |
| Mortality during follow-up | 14 853 (55.6%) | 93 (55.7%) | 58 (56.9%) | 262 (55.0%) | 15 266 (55.6%) |
| Complete cases  (stroke admissions up to 2013) | 21 065 | 124 | 73 | 389 | 21 651 |
| 5-year mortality | 10 472 (49.7%) | 67 (54.0%) | 40 (54.8%) | 189 (48.6%) | 10 768 (49.7%) |
| Complete cases  (individuals who survived more than 30 days) | 23 222 | 142 | 85 | 413 | 23 862 |
| Time to further stroke | 7114 (30.6%) | 43 (30.3%) | 26 (30.6%) | 121 (29.3%) | 7304 (30.6%) |
| Time to further vascular event | 7786 (33.5%) | 47 (33.1%) | 28 (32.9%) | 137 (33.2%) | 7998 (33.5%) |
| Complete cases (individuals who survived more than one day and had sufficient stroke unit data) | 26 236 | 164 | 102 | 471 | 26 973 |
| Admission to stroke unit within  one day of admission | 19 568 (74.6%) | 112 (68.3%) | 79 (77.5%) | 346 (73.5%) | 20 105 (74.5%) |
| Complete cases (Individuals who survived their day of admission and had sufficient brain scan data) | 26 390 | 164 | 102 | 472 | 27 128 |
| Brain scan on day of admission | 16 277 (61.7%) | 97 (59.1%) | 65 (63.7%) | 266 (56.4%) | 16 705 (61.6%) |
| Complete cases (Individuals who survived their day of admission and had sufficient swallow screen data) | 26 253 | 158 | 101 | 468 | 26 980 |
| Swallow screen on day of  admission | 18 498 (70.5%) | 113 (71.5%) | 71 (70.3%) | 319 (68.2%) | 19 001 (70.4%) |
| Complete cases (individuals who survived more than one day, had an ischaemic stroke, didn’t have a valid contraindication to aspirin and had sufficient aspirin data) | 21 058 | 130 | 91 | 381 | 21 660 |
| Aspirin within one day of  admission | 8844 (42.0%) | 48 (36.9%) | 41 (45.1%) | 134 (35.2%) | 9067 (41.9%) |

# Supplementary Table 9: Odds ratios and hazard ratios for outcomes following stroke in Scotland, 1991 – 2014. Ratios compare individuals with a severe mental illness to individuals without a history of a mental health condition. Sensitivity analysis for models 1 and 2 with major depression only identified using psychiatric hospital admission records

For each outcome, this table presents a summary of the results of the sensitivity analysis for models 1 and 2. In the sensitivity analysis, major depression is only identified using psychiatric hospital admission records. Thus fewer people are included in the major depression group, and the overall cohort is smaller. The results for schizophrenia and bipolar disorder differ slightly between the main analysis and the sensitivity analysis because the comparison group has changed (some people who were included in the major depression group for the main analysis are included in the no mental health admission group for the sensitivity analysis).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Outcome | Model | N | Schizophrenia | Bipolar disorder | Major depression |
| 30-day mortality,  OR (95% CI) | Model 1 | 228 024 | 1.33 (1.16 to 1.52) | 1.37 (1.17 to 1.60) | 1.09 (1.01 to 1.18) |
| Model 2 | 228 024 | 1.28 (1.11 to 1.47) | 1.35 (1.16 to 1.58) | 1.04 (0.96 to 1.13) |
| 1-year mortality,  OR (95% CI) | Model 1 | 228 024 | 1.48 (1.31 to 1.67) | 1.44 (1.25 to 1.65) | 1.16 (1.08 to 1.24) |
| Model 2 | 228 024 | 1.39 (1.23 to 1.58) | 1.41 (1.22 to 1.62) | 1.08 (1.00 to 1.16) |
| 5-year mortality,  OR (95% CI) | Model 1 | 219 666a | 1.79 (1.57 to 2.04) | 1.52 (1.30 to 1.78) | 1.34 (1.24 to 1.45) |
| Model 2 | 219 666a | 1.60 (1.41 to 1.83) | 1.46 (1.25 to 1.71) | 1.18 (1.09 to 1.27) |
| All-cause mortality,  HR (95% CI) | Model 1 | 228 024 | 1.44 (1.35 to 1.54) | 1.35 (1.26 to 1.45) | 1.22 (1.18 to 1.27) |
| Model 2 | 228 024 | 1.35 (1.27 to 1.44) | 1.32 (1.23 to 1.42) | 1.14 (1.10 to 1.18) |
| Time to further stroke,  HR (95% CI) | Model 1 | 174 986b | 1.28 (1.16 to 1.43) | 1.18 (1.05 to 1.34) | 1.11 (1.04 to 1.17) |
| Model 2 | 174 986b | 1.24 (1.11 to 1.37) | 1.16 (1.03 to 1.31) | 1.06 (1.00 to 1.12) |
| Time to further vascular event, HR (95% CI) | Model 1 | 174 986b | 1.26 (1.14 to 1.39) | 1.15 (1.03 to 1.29) | 1.14 (1.08 to 1.20) |
| Model 2 | 174 986b | 1.21 (1.09 to 1.33) | 1.14 (1.01 to 1.28) | 1.09 (1.03 to 1.15) |

Model 1 is adjusted for age, sex and year. Model 2 is adjusted for age, sex, year, history of alcohol use disorder, deprivation, urbanity and health board. HR=Hazard ratio. OR=Odds ratio.

1. Stroke admissions up to 2013 in order to ensure that all individuals have at least 5 years’ follow-up.
2. Individuals who survived more than 30 days.

# Supplementary Table 10: Odds ratios and hazard ratios for outcomes and processes of care following stroke in Scotland, 2010 – 2014, based on data from the stroke audit sub-cohort. Ratios compare individuals with a severe mental illness to individuals without a history of a mental health condition. Sensitivity analyses for models 1, 2 and 3 based on data from the stroke audit sub-cohort

For each outcome, this table presents a summary of the sensitivity analysis where major depression is only identified using psychiatric hospital admission records. For this sensitivity analysis, fewer people are included in the major depression group, and the overall cohort is smaller. The results for schizophrenia and bipolar disorder differ slightly between the main analysis and the sensitivity analysis because the comparison group has changed (some people who were included in the major depression group for the main analysis are included in the no mental health admission group for the sensitivity analysis).

| Outcome | Model | N | Schizophrenia | Bipolar disorder | Major depression |
| --- | --- | --- | --- | --- | --- |
| 30-day mortality,  OR (95% CI) | Model 1 | 27 460 | 1.89 (1.19 to 2.88) | 1.84 (1.04 to 3.06) | 1.24 (0.94 to 1.62) |
| Model 2 | 27 460 | 1.80 (1.12 to 2.77) | 2.05 (1.16 to 3.44) | 1.19 (0.89 to 1.57) |
| Model 3 | 23 449a | 1.05 (0.60 to 1.79) | 1.76 (0.90 to 3.25) | 1.14 (0.80 to 1.60) |
| 1-year mortality,  OR (95% CI) | Model 1 | 27 460 | 1.62 (1.10 to 2.34) | 1.73 (1.09 to 2.70) | 1.23 (0.98 to 1.54) |
| Model 2 | 27 460 | 1.50 (1.01 to 2.19) | 1.83 (1.14 to 2.85) | 1.17 (0.93 to 1.47) |
| Model 3 | 23 449a | 0.97 (0.60 to 1.52) | 1.51 (0.87 to 2.53) | 1.08 (0.82 to 1.41) |
| 5-year mortality,  OR (95% CI) | Model 1 | 21 651b | 2.70 (1.82 to 4.01) | 2.24 (1.35 to 3.73) | 1.47 (1.17 to 1.85) |
| Model 2 | 21 651b | 2.32 (1.55 to 3.47) | 2.23 (1.34 to 3.73) | 1.28 (1.01 to 1.61) |
| Model 3 | 18 132a,b | 1.69 (1.06 to 2.70) | 1.80 (0.99 to 3.28) | 1.24 (0.94 to 1.63) |
| Mortality during follow-up,  HR (95% CI) | Model 1 | 27 460 | 1.84 (1.50 to 2.26) | 1.51 (1.17 to 1.96) | 1.32 (1.17 to 1.50) |
| Model 2 | 27 460 | 1.71 (1.40 to 2.11) | 1.60 (1.24 to 2.08) | 1.24 (1.09 to 1.40) |
| Model 3 | 23 449a | 1.27 (1.01 to 1.59) | 1.46 (1.11 to 1.92) | 1.14 (0.99 to 1.30) |
| Time to further stroke, HR (95% CI) | Model 1 | 23 862c | 1.45 (1.08 to 1.96) | 1.22 (0.83 to 1.80) | 1.10 (0.92 to 1.32) |
| Model 2 | 23 862c | 1.33 (0.99 to 1.80) | 1.21 (0.82 to 1.79) | 1.04 (0.87 to 1.25) |
| Model 3 | 20 481a,c | 1.21 (0.88 to 1.67) | 1.06 (0.69 to 1.61) | 1.01 (0.83 to 1.23) |
| Time to further vascular event,  HR (95% CI) | Model 1 | 23 862c | 1.45 (1.09 to 1.94) | 1.22 (0.84 to 1.76) | 1.16 (0.98 to 1.37) |
| Model 2 | 23 862c | 1.34 (1.00 to 1.79) | 1.21 (0.83 to 1.75) | 1.10 (0.92 to 1.30) |
| Model 3 | 20 481a,c | 1.21 (0.89 to 1.64) | 1.03 (0.68 to 1.55) | 1.08 (0.89 to 1.29) |
| Admission to stroke unit within one day of admission, OR (95% CI) | Model 1 | 26 973d | 0.73 (0.53 to 1.03) | 1.16 (0.74 to 1.89) | 0.95 (0.77 to 1.17) |
| Model 2 | 26 973d | 0.78 (0.56 to 1.11) | 1.31 (0.83 to 2.16) | 0.97 (0.78 to 1.20) |
| Model 3 | 23 097a,d | 0.86 (0.60 to 1.26) | 1.24 (0.77 to 2.08) | 0.98 (0.78 to 1.24) |
| Brain imaging on day of admission,  OR (95% CI) | Model 1 | 27 128e | 0.79 (0.57 to 1.08) | 0.99 (0.66 to 1.50) | 0.76 (0.64 to 0.92) |
| Model 2 | 27 128e | 0.77 (0.56 to 1.07) | 0.96 (0.64 to 1.47) | 0.79 (0.65 to 0.96) |
| Model 3 | 23 189a,e | 0.73 (0.51 to 1.05) | 1.01 (0.64 to 1.62) | 0.81 (0.65 to 1.01) |
| Swallow screen on day of admission,  OR (95% CI) | Model 1 | 26 980f | 1.05 (0.74 to 1.50) | 0.95 (0.62 to 1.48) | 0.91 (0.75 to 1.11) |
| Model 2 | 26 980f | 1.13 (0.80 to 1.63) | 1.00 (0.65 to 1.56) | 0.90 (0.74 to 1.11) |
| Model 3 | 23 102a,f | 1.08 (0.75 to 1.60) | 1.12 (0.70 to 1.85) | 0.85 (0.68 to 1.07) |
| Aspirin within one day of admission,  OR (95% CI) | Model 1 | 21 660g | 0.76 (0.53 to 1.09) | 1.08 (0.71 to 1.63) | 0.75 (0.60 to 0.92) |
| Model 2 | 21 660g | 0.77 (0.53 to 1.10) | 1.06 (0.69 to 1.61) | 0.75 (0.60 to 0.93) |
| Model 3 | 18 583a,g | 0.77 (0.51 to 1.13) | 1.17 (0.75 to 1.82) | 0.70 (0.54 to 0.88) |

Model 1 is adjusted for age, sex and year. Model 2 is adjusted for age, sex, year, history of alcohol use disorder, deprivation, urbanity, health board, stroke type, diabetes, history of atrial fibrillation, and hypertension. Model 3 is adjusted for age, sex, year, history of alcohol use disorder, deprivation, urbanity, health board, stroke type, diabetes, history of atrial fibrillation, hypertension, living alone before the stroke, independence in activities of daily living before the stroke, ability to communicate verbally at first clinical assessment, ability to lift both arms at first clinical assessment and ability to walk without help from another person at first clinical assessment. For aspirin within one day of admission, models 2 and 3 do not adjust for stroke type because this process of care was only assessed amongst people with an ischaemic stroke. HR=Hazard ratio. OR=Odds ratio.

1. Records with complete data on the six simple variables (age, living alone before the stroke, independence in activities of daily living before the stroke, ability to communicate verbally at first clinical assessment, ability to lift both arms at first clinical assessment and ability to walk without help from another person at first clinical assessment).
2. Stroke audit records up to 2013 in order to ensure that all individuals have at least 5 years’ follow-up.
3. Individuals who survived more than 30 days.
4. Individuals who survived more than one day and had sufficient stroke unit data.
5. Individuals who survived their day of admission and had sufficient brain imaging data.
6. Individuals who survived their day of admission and had sufficient swallow screen data.
7. Individuals who survived more than one day, had an ischaemic stroke, didn't have a valid contraindication to aspirin and had sufficient aspirin data.

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