**Supplementary Materials**

Risk of mortality and complications in patients with schizophrenia and diabetes mellitus

a population-based cohort study

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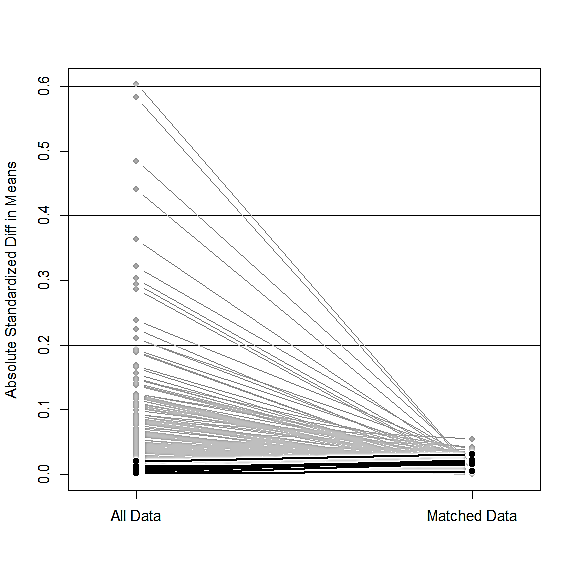
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**Table S1**. ICD9-CM, ICD10 and ICPC-2 codes for diagnoses

|  |  |
| --- | --- |
| Items | Operational definition |
| **Physical diseases** | ICD9-CM and ICPC-2 codes |
| Diabetes mellitus | ICD9-CM: 250, 357.2, 366.41, 362.01–362.07  ICPC-2: T90 |
| Diabetes complications | ICD9-CM codes |
| Cerebrovascular disease | 431, 433, 434, 435, 436 |
| Cardiovascular disease | 410, 411, 413, 414, 427.1, 427.3–427.5, 428, 440, 440.23, 440.24, 441 |
| Peripheral vascular disease | 250.7, 442.3, 443.81, 443.9, 444.22, 707.1, 785.4, 892.1 |
| Retinopathy | 250.5, 361, 362.01, 362.02, 362.1, 362.53, 362.81, 362.82, 362.83, 369, 379.23 |
| Nephropathy | 250.4, 580, 581, 581.81, 582, 583, 585, 586, 593.9 |
| Neuropathy | 250.6, 337.0, 337.1, 354.0 – 355.9, 356.9, 357.2, 358.1, 536.3, 564.5, 596.54, 713.5, 951.0, 951.1, 951.3 |
| Metabolic complications | 250.1, 250.2, 250.3 |
| Physical comorbidities | ICD9-CM codes |
| Myocardial infarction | 410–410.9, 412 |
| Congestive heart failure | 428–428.9 |
| Peripheral vascular disease | 441, 443.9, 785.4, V43.4 |
| Cerebrovascular disease | 430–438 |
| Dementia | 290 |
| Chronic pulmonary disease | 490–496, 500–505, 506.4 |
| Rheumatological disease | 710.0, 710.1, 710.4, 714.0–714.2, 714.8, 725 |
| Peptic ulcer disease | 531–534 |
| Mild liver disease | 571.2, 571.4, 571.5–571.6 |
| Hemiplegia or paraplegia | 322, 344.1 |
| Renal disease | 582–583, 585–586, 588 |
| Any malignancy including leukemia or lymphoma | 140–172, 174–195, 200–208 |
| Moderate or severe liver disease | 572.2–572.8 |
| Metastatic cancers | 196–198, 199.0–199.1 |
| Hypertension | 401, 405 |
| Dyslipidemia | 272 |
| **Psychiatric disorders** | ICD10 codes |
| Schizophrenia | F20 |
| Schizoaffective disorder | F25 |
| Persistent delusional disorder | F22 |
| Acute and transient psychotic disorders | F23 |
| Other / unspecified nonorganic psychosis | F28–29 |
| Mania | F30 |
| Bipolar affective disorder | F31 |
| Alcohol use disorder | F10 |
| Substance use disorder | F11–19 |



Absolute standardized difference in means

**Fig. S1**. Absolute standardized difference in means before and after propensity-score

matching (with <0.1 indicating good balance of covariates after matching).

**Table S2**. Diabetes complications in patients with or without schizophrenia by sex

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Menb | | | |  | Womenc | | | |
| Complicationsa | Schizophrenia | Comparison group | Adjusted OR  (95% CI)d | *P* |  | Schizophrenia | Comparison group | Adjusted OR  (95% CI)e | *P* |
| Macrovascular complications | 235 (7.6) | 2882 (9.6) | 0.78 (0.68-0.90) | 0.001 |  | 233 (6.0) | 2100 (5.5) | 1.10 (0.96-1.27) | 0.177 |
| Cardiovascular disease | 118 (3.9) | 1697 (5.8) | 0.67 (0.56-0.82) | <0.001 |  | 113 (3.0) | 1220 (3.2) | 0.91 (0.75-1.11) | 0.353 |
| Cerebrovascular disease | 46 (1.6) | 479 (1.6) | 0.98 (0.72-1.33) | 0.892 |  | 57 (1.5) | 404 (1.1) | 1.41 (1.07-1.87) | 0.016 |
| Peripheral vascular disease | 18 (0.6) | 212 (0.7) | 0.82 (0.51-1.34) | 0.430 |  | 20 (0.5) | 146 (0.4) | 1.33 (0.83-2.13) | 0.231 |
| Microvascular complications | 119 (3.8) | 1477 (4.9) | 0.78 (0.64-0.94) | 0.010 |  | 95 (2.4) | 1314 (3.4) | 0.71 (0.57-0.87) | 0.001 |
| Retinopathy | 23 (0.7) | 598 (2.0) | 0.38 (0.25-0.58) | <0.001 |  | 31 (0.8) | 503 (1.3) | 0.60 (0.42-0.87) | 0.006 |
| Nephropathy | 55 (1.8) | 643 (2.1) | 0.83 (0.63-1.10) | 0.201 |  | 36 (0.9) | 534 (1.4) | 0.66 (0.47-0.92) | 0.015 |
| Neuropathy | 28 (0.9) | 269 (0.9) | 1.00 (0.67-1.48) | 0.991 |  | 11 (0.3) | 196 (0.5) | 0.55 (0.30-1.01) | 0.052 |
| Metabolic complications | 76 (2.5) | 288 (1.0) | 2.49 (1.92-3.23) | <0.001 |  | 44 (1.1) | 296 (0.8) | 1.44 (1.05-1.98) | 0.025 |
| DCSI complication count ≥ 2f | 39 (1.3) | 488 (1.7) | 0.79 (0.57-1.10) | 0.160 |  | 33 (0.9) | 390 (1.0) | 0.83 (0.58-1.18) | 0.292 |

DCSI, Diabetes Complications Severity Index.

Patients with medical conditions corresponding to the complication(s) of interest prior to study entry were excluded from analysis.

a Diabetes complications are ascertained according to the diagnoses included for calculating Diabetes Complication Severity Index.

b 3096 patients in schizophrenia group were included in analyses, except for cardiovascular disease (*n* = 3053), cerebrovascular disease (*n* = 3069), peripheral vascular disease (*n* = 3094), nephropathy (*n* = 3072) and DCSI complication count (*n* = 3006); 30178 patients in comparison group were included in analyses, except for cardiovascular disease (*n* = 29734), cerebrovascular disease (*n* = 29960), peripheral vascular disease (*n* = 30158), nephropathy (*n* = 29979) and DCSI complication count (*n* = 29350).

c 3895 patients in schizophrenia group were included in analyses, except for cardiovascular diseases (*n* = 3859), cerebrovascular diseases (*n* = 3866), peripheral vascular diseases (*n* = 3893), nephropathy (*n* = 3870) and DCSI complication count (*n* = 3810); 38504 patients in comparison group were included in analyses, except for cardiovascular disease (*n* = 38199), cerebrovascular disease (*n* = 38312), peripheral vascular disease (*n* = 38483), nephropathy (*n* = 38288) and DCSI complication count (*n* = 37818).

d Adjusted for age, alcohol and substance use disorders.

e Adjusted for hypertension, alcohol and substance use disorders.

f DCSI complication count is a count of any complication in the 7 categories (retinopathy, nephropathy, neuropathy, cardiovascular disease, cerebrovascular disease, peripheral vascular diseases, and metabolic complications) and ranges from 0 to 7.

**Table S3**. Diabetes complications in patients with or without schizophrenia by age groups

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | < 50 yearsb | |  | 50 – 69 yearsc | |  | ≥ 70 yearsd | |  |
| Complicationsa | SCZ | Comparison  group | Adjusted OR  (95% CI)e | SCZ | Comparison  group | Adjusted OR  (95% CI)f | SCZ | Comparison  group | Adjusted OR  (95% CI)g |
| Macrovascluar | 70 (2.7) | 894 (3.7) | 0.72 (0.56-0.92) | 235 (6.6) | 2476 (6.9) | 0.95 (0.83-1.09) | 163 (19.1) | 1612 (18.4) | 1.02 (0.85-1.23) |
| Cardiovascular | 38 (1.5) | 521 (2.2) | 0.66 (0.47-0.93) | 110 (3.1) | 1456 (4.1) | 0.75 (0.62-0.91) | 83 (10.6) | 940 (11.5) | 0.92 (0.72-1.17) |
| Cerebrovascular | 10 (0.4) | 147 (0.6) | 0.65 (0.34-1.24) | 64 (1.9) | 494 (1.4) | 1.30 (1.00-1.70) | 29 (4.0) | 242 (3.1) | 1.43 (0.96-2.12) |
| Peripheral vascular | 9 (0.4) | 91 (0.4) | 0.94 (0.47-1.88) | 20 (0.6) | 179 (0.5) | 1.11 (0.70-1.76) | 9 (1.1) | 88 (1.0) | 1.15 (0.58-2.31) |
| Microvascular | 56 (2.2) | 920 (3.8) | 0.58 (0.44-0.76) | 100 (2.8) | 1331 (3.7) | 0.74 (0.60-0.91) | 58 (6.8) | 540 (6.2) | 1.04 (0.78-1.39) |
| Retinopathy | 11 (0.4) | 410 (1.7) | 0.26 (0.14-0.47) | 36 (1.0) | 614 (1.7) | 0.58 (0.41-0.81) | 7 (0.8) | 77 (0.9) | 0.92 (0.42-2.00) |
| Nephropathy | 32 (1.2) | 387 (1.6) | 0.77 (0.54-1.11) | 40 (1.1) | 516 (1.4) | 0.77 (0.56-1.06) | 19 (2.3) | 274 (3.2) | 0.73 (0.46-1.18) |
| Neuropathy | 12 (0.5) | 123 (0.5) | 0.92 (0.51-1.67) | 21 (0.6) | 276 (0.8) | 0.76 (0.48-1.18) | 6 (0.7) | 66 (0.8) | 0.92 (0.40-2.13) |
| Metabolic | 53 (2.1) | 369 (1.5) | 1.35 (1.01-1.81) | 57 (1.6) | 168 (0.5) | 3.40 (2.51-4.60) | 10 (1.2) | 47 (0.5) | 2.25 (1.13-4.49) |
| DCSI count≥2h | 16 (0.6) | 235 (1.0) | 0.64 (0.38-1.06) | 39 (1.1) | 437 (1.2) | 0.89 (0.64-1.23) | 17 (2.2) | 206 (2.5) | 0.94 (0.57-1.55) |

DCSI, Diabetes Complications Severity Index; SCZ, Schizophrenia group.

Patients with medical conditions corresponding to the complication(s) of interest prior to study entry were excluded from analysis.

a Diabetes complications are ascertained according to the diagnoses included for calculating Diabetes Complication Severity Index.

b 2573 patients in schizophrenia group were included in analyses, except for cardiovascular disease (*n* = 2562), cerebrovascular disease (*n* = 2569), peripheral vascular disease (*n* = 2573), nephropathy (*n* = 2566) and DCSI complication count (*n* = 2573); 24012 patients in comparison group were included in analyses, except for cardiovascular disease (*n* = 23898), cerebrovascular disease (*n* = 23972), peripheral vascular disease (*n* = 24007), nephropathy (*n* = 23879) and DCSI complication count (*n* = 23729).

c 3564 patients in schizophrenia group were included in analyses, except for cardiovascular disease (*n* = 3537), cerebrovascular disease (*n* = 3537), peripheral vascular disease (*n* = 3562), nephropathy (*n* = 3550) and DCSI complication count (*n* = 3495); 35913 patients in comparison group were included in analyses, except for cardiovascular disease (*n* = 35626), cerebrovascular disease (*n* = 35701), peripheral vascular disease (*n* = 35902), nephropathy (*n* = 35783) and DCSI complication count (*n* = 35300).

d 854 patients in schizophrenia group were included in analyses, except for cardiovascular disease (*n* = 813), cerebrovascular disease (*n* = 829), peripheral vascular disease (*n* = 852), nephropathy (*n* = 826) and DCSI complication count (*n* = 767); 8757 patients in comparison group were included in analyses, except for cardiovascular disease (*n* = 8409), cerebrovascular disease (*n* = 8599), peripheral vascular disease (*n* = 8732), nephropathy (*n* = 8605) and DCSI complication count (*n* = 8139).

e Adjusted for aged, Charlson comorbidity index (CCI), dyslipidemia, alcohol and substance use disorder.

f Adjusted for dyslipidemia

g Adjusted for age, CCI, hypertension and dyslipidemia.

h DCSI complication count is a count of any complication in the 7 categories (retinopathy, nephropathy, neuropathy, cardiovascular disease, cerebrovascular disease, peripheral vascular diseases, and metabolic complications) and ranges from 0 to 7.