

Appendix 1: Demonstration of start and end dates of follow-up period

Appendix 2: Overview of source of utilisation data and unit cost

|  |  |  |
| --- | --- | --- |
| Types of utilisation | Source of utilisation data | Source of unit cost |
| Primary care |  |  |
|  GP consultation  | CPRD | PSSRU 2018 |
|  Practice nurse consultation  | CPRD | PSSRU 2018 |
|  Drug prescriptions | CPRD – BNF codes | PCA 2018 |
|  Diagnostic tests | CPRD – Read terms | Reference Costs 2017/18 |
| Secondary care |  |  |
|  Inpatient stay in general hospital | HES | Reference Costs 2017/18 |

Appendix 3: Types, HRG codes and unit costs of diagnostic test

|  |  |  |
| --- | --- | --- |
| Test | Reference Cost 2017/18 Code  | Reference Cost 2017/18Unit Cost |
| Full blood examination (FBE) | DAPS05 | £2.5058 |
| Urea, electrolytes & creatinine (UEC) | DAPS04 | £1.1091 |
| Liver function test (LFT) | DAPS05 | £2.5058 |
| Haematology | DAPS05 | £2.5058 |
| Clinical biochemistry | DAPS04 | £1.1091 |
| Lipids\_cholesterol | DAPS04 | £1.1091 |
| Glucose | DAPS04 | £1.1091 |
| Thyroid function test (TFT) | DAPS04 | £1.1091 |
| Microbiology | DAPS07 | £7.5854 |
| Cytology | DAPS01 | £12.0208 |
| Immunology | DAPS06 | £6.3659 |
| Histopathology, histology | DAPS02 | £32.7516 |
| Phlebotomy | DAPS08 | £2.8322 |
| Plain Xray | DAPF | £31.4858 |
| Electrocardiogram (ECG) | EC22Z | £57.8413 |
| Carbon monoxide transfer test | DZ56Z | £133.8350 |
| Echo | RD51A | £65.1778 |
| Ultrasound | RD40Z | £49.1028 |
| CT scan | RD20A | £79.3178 |
| Magnetic resonance imaging (MRI) | RD01A | £131.1462 |
| Gastroscopy | FE21Z | £299.4195 |
| Colonoscopy | FE32Z | £328.0856 |
| Sigmoidoscopy | FE35Z | £182.4452 |
| Arteriography | YR25Z | £85.2600 |
| Dual energy X-ray absorptiometry (DEXA) | RD50Z | £77.4755 |
| Contrast fluoroscopy | RD30Z | £118.2329 |
| Airflow studies | DZ59Z | £68.0000 |

Appendix 4: Types of non-mental health related admissions (n=21,552 spells)

|  |  |
| --- | --- |
| Type | Number of spells (%)  |
| Digestive system  | 3,684 (17.1%) |
| Urinary tract and male reproductive system  | 3,231 (15.0%) |
| Cardiac surgery and primary cardiac conditions | 2,266 (10.5%) |
| Musculoskeletal system  | 1,977 (9.2%) |
| Haematology, chemotherapy, radiotherapy and specialist palliative care  | 1,675 (7.8%) |
| Immunology, infectious diseases and other contacts with health services | 1,421 (6.6%) |
| Respiratory system | 1,411 (6.6%) |
| Eyes and periorbita  | 1,296 (6.0%) |
| Nervous system | 1,116 (5.2%) |
| Skin, breast and burns  | 796 (3.7%) |
| Mouth head neck and ears  | 577 (2.7%) |
| Vascular procedures and disorders and imaging interventions | 575 (2.7%) |
| Endocrine and metabolic system  | 538 (2.5%) |
| Hepatobiliary and pancreatic system  | 519 (2.4%) |
| Female reproductive system and assisted reproduction  | 379 (1.8%) |
| Multiple trauma, emergency medicine and rehabilitation  | 61 (0.3%) |
| Obstetrics  | 30 (0.1%) |

Appendix 5: Average resource use per person per year for people with SMI and T2DM (cases) and matched people with T2DM alone (controls) after removing extreme values

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Unadjusted |  |  |  | Adjusted(d) |  |  |  | P value(e)  |  |
|  | Total | Cases(T2DM+SMI) | Controls(T2DM only) |  | Total | Cases(T2DM+SMI) | Controls(T2DM only) |  |  |  |
| **Resource use, mean (SD)** |  |  |  |  |  |  |  |  |  |  |
|  Primary care contacts(a) | 15.7 (8.8) | 19.1 (9.8) | 14.5 (8.0) |  | 16.2 (5.7) | 19.9 (6.7) | 14.9 (4.8) |  | <.001\*\*\* |  |
|  Consultation only | 9.1 (5.6) | 11.5 (6.3) | 8.4 (5.0) |  | 9.4 (3.3) | 11.9 (3.8) | 8.5 (2.6) |  | <.001\*\*\* |  |
|  Medicine prescription related | 5.5 (3.9) | 6.3 (4.4) | 5.2 (3.7) |  | 5.7 (2.3) | 6.6 (2.6) | 5.3 (2.0) |  | 0.416 |  |
|  Test related | 1.2 (1.0) | 1.2 (1.0) | 1.1 (1.0) |  | 1.2 (0.4) | 1.4 (0.4) | 1.2 (0.4) |  | 0.836 |  |
|  Inpatient stays |  |  |  |  |  |  |  |  |  |  |
|  Annual no. of admissions(b) | 0.5 (0.7) | 0.6 (0.8) | 0.5 (0.7) |  | 0.8 (0.5) | 0.9 (0.6) | 0.7 (0.5) |  | 0.017\* |  |
|  Mental health related(c) | 0.0 (0.1) | 0.1 (0.1) | 0.0 (0.0) |  | 0.3 (0.2) | 0.4 (0.3) | 0.2 (0.2) |  | 0.028\* |  |
|  Non-mental health related | 0.5 (0.7) | 0.6 (0.8) | 0.5 (0.7) |  | 0.8 (0.5) | 0.9 (0.5) | 0.7 (0.5) |  | 0.047\* |  |
|  Annual no. of inpatient days | 3.4 (8.0( | 6.4 (11.5) | 2.4 (6.1) |  | 5.7 (8.6) | 12.3 (13.8) | 3.5 (3.9) |  | <.001\*\*\* |  |
|  Mental health related | 0.3 (1.7) | 1.0 (3.2) | 0.0 (0.7) |  | 4.2 (4.0) | 7.7 (5.7) | 3.0 (2.3) |  | <.001\*\*\* |  |
|  Non-mental health related | 2.8 (6.3) | 4.4 (8.3) | 2.2 (5.4) |  | 4.6 (6.2) | 8.4 (9.6) | 3.3 (3.7) |  | <.001\*\*\* |  |
| **Cost, mean (SD)** |  |  |  |  |  |  |  |  |  |  |
|  Total | £2,184 (3,066) | £3,077 (3,731) | £1,884 (2,743) |  | £2,314 (1,942) | £3,508 (2,629) | £1,913 (1,441) |  | <.001\*\*\* |  |
|  Primary care contacts | £580 (455) | £725 (519) | £531 (420) |  | £599 (272) | £767 (325) | £543 (225) |  | <.001\*\*\* |  |
|  Inpatient stays | £1,571 (2,825) | £2,273 (3,485) | £1,335 (2,522) |  | £1,752 (2063) | £2,832 (2994) | £1,388 (1467) |  | <.001\*\*\* |  |
|  Mental health related | £62 (458) | £207 (805) | £15 (239) |  | £193 (955) | £771 (1,312)  | £28 (169) |  | <.001\*\*\* |  |
|  Non-mental health related | £1,446 (2,603) | £1,853 (2,954) | £1,309 (2,459) |  | £1,589 (1,747) | £2,264 (2,352) | £1,362 (1,418) |  | <.001\*\*\* |  |
| (a) Including all the consultation records from medical staff with associated Read codes(b) Number of admissions is at the spell level. Hence, if a person transfers to another hospital, it will count as 2 admissions.(c) Episodes contain mental health related HRG codes. (d) Adjusted for age at diagnosis of T2DM, sex, ethnic group, time since diagnosis of T2DM, and characteristics at diagnosis of T2DM, including area deprivation, comorbid hypertension, comorbid CVD, number of Charlson comorbidities, medications (antidepressant and antidiabetes drugs) and financial year.(e) For difference between adjusted cases and controls. |

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Appendix6: GLMs of healthcare resource use and costs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Primary care contacts (n=6383) |  | Number of admissions (n=6383) |  | Inpatient days (n=6383) |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | coefficient | 95% CI |  | coefficient | 95% CI |  | coefficient | 95% CI |  |
| Intercept | 2.93\*\*\* | [2.45, 3.40] |  | -0.02 | [-0.48, 0.45] |  | 1.33 | [-1.30, 3.95] |  |
| Group |  |  |  |  |  |  |  |  |  |
|  Exposed | 0.15\*\*\* | [0.11, 0.20] |  | 0.31\*\*\* | [0.12, 0.50] |  | 1.66\*\*\* | [1.42, 1.91] |  |
|  Unexposed | Reference |  |  | Reference |  |  | Reference |  |  |
| Age at diagnosis of having both T2DM and SMI | 0.00 | [-0.00, 0.00] |  | 0.01\*\*\* | [0.01, 0.01] |  | 0.02\*\*\* | [0.01, 0.03] |  |
| Sex |  |  |  |  |  |  |  |  |  |
|  Male | Reference  |  |  | Reference |  |  | Reference |  |  |
|  Female | 0.14\*\*\* | [0.11, 0.17] |  | -0.04\*\* | [-0.07, -0.01] |  | 0.01 | [-0.15, 0.17] |  |
| Ethnic group |  |  |  |  |  |  |  |  |  |
|  White | Reference |  |  | Reference |  |  | Reference |  |  |
|  Non-white (Asian, black, other, mixed) | -0.04 | [-0.08, 0.01] |  | 0.36\*\*\* | [0.32, 0.40] |  | 0.16 | [-0.10, 0.42] |  |
|  Unknown | -0.33\*\*\* | [-0.39, -0.27] |  | -2.24\*\*\* | [-2.43, -2.06] |  | -2.68\*\*\* | [-3.03, -2.33] |  |
| Deprivation |  |  |  |  |  |  |  |  |  |
|  1st quintile (least deprived) | Reference |  |  | Reference |  |  | Reference |  |  |
|  2nd quintile | -0.27 | [-0.74, 0.19] |  | -0.04 | [-0.49, 0.41] |  | 0.46 | [-2.08, 3.00] |  |
|  3rd quintile | -0.23 | [-0.69, 0.23] |  | 0.14 | [-0.32, 0.59] |  | 0.58 | [-1.96, 3.11] |  |
|  4th quintile | -0.17 | [-0.63, 0.29] |  | 0.06 | [-0.39, 0.51] |  | 0.55 | [-1.99, 3.09] |  |
|  5th quintile (most deprived) | -0.17 | [-0.63, 0.29] |  | -0.01 | [-0.46, 0.44] |  | 0.69 | [-1.85, 3.22] |  |
|  Unknown | -0.17 | [-0.63, 0.29] |  | 0.12 | [-0.33, 0.57] |  | 0.54 | [-2.00, 3.08] |  |
| Comorbidities |  |  |  |  |  |  |  |  |  |
|  Cardiovascular disease | 0.01 | [-0.03, 0.04] |  | 0.03\* | [0.00, 0.06] |  | 0.08 | [-0.12, 0.27] |  |
|  Hypertension | 0.08\*\*\* | [0.05, 0.12] |  | 0.19\*\*\* | [0.16, 0.22] |  | 0.08 | [-0.11, 0.27] |  |
|  Number of Charlson comorbidities | 0.14\*\*\* | [0.12, 0.16] |  | 0.25\*\*\* | [0.23, 0.27] |  | 0.37\*\*\* | [0.26, 0.49] |  |
| Medication |  |  |  |  |  |  |  |  |  |
|  Antidepressants | 0.23\*\*\* | [0.19, 0.26] |  | 0.16\*\*\* | [0.13, 0.19] |  | 0.16 | [-0.03, 0.35] |  |
|  Antipsychotics |  |  |  |  |  |  |  |  |  |
|  First generation | 0.19\*\*\* | [0.12, 0.25] |  | -0.07\* | [-0.12, -0.02] |  | 0.12 | [-0.24, 0.48] |  |
|  Second generation | 0.07\* | [0.01, 0.12] |  | 0.04 | [-0.31, 0.17] |  | -0.25 | [-0.56, 0.06] |  |
|  Antidiabetes | 0.09\*\*\* | [0.05, 0.13] |  | 0.18\*\*\* | [0.15, 0.22] |  | 0.14 | [-0.10, 0.38] |  |
| Time since diagnosis of T2DM (years) | 0.15\*\*\* | [0.15, 0.16] |  | 0.07\*\*\* | [0.07, 0.08] |  | -0.03 | [-0.06, 0.01] |  |
|  |  |  |  |  |  |  |  |  |  |
| Family | Negative binomial |  | Poisson |  |  | Gamma |  |  |
| Link | Log |  |  | Log |  |  | Log |  |  |

Note: the financial year at T2DM diagnosis was adjusted in all the analyses

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Appendix 6 (continue)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Total costs (n=6383) |  | Primary care costs (n=6383) |  | Secondary care costs (n=6383) |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | coefficient | 95% CI |  | coefficient | 95% CI |  | coefficient | 95% CI |  |
| Intercept | 8.05\*\*\* | [6.65, 9.44] |  | 6.56\*\*\* | [5.89, 7.23] |  | 7.62\*\*\* | [5.50, 9.73] |  |
| Group |  |  |  |  |  |  |  |  |  |
|  Exposed | 0.61\*\*\* | [0.48, 0.73] |  | 0.14\*\*\* | [0.08, 0.20] |  | 0.79\*\*\* | [0.60, 0.98] |  |
|  Unexposed | Reference |  |  | Reference |  |  | Reference |  |  |
| Age at diagnosis of having both T2DM and SMI | 0.01\*\*\* | [0.01, 0.02] |  | -0.00 | [-0.00, 0.00] |  | 0.02\*\*\* | [0.01, 0.03] |  |
| Sex |  |  |  |  |  |  |  |  |  |
|  Male | Reference  |  |  | Reference |  |  | Reference |  |  |
|  Female | 0.04 | [-0.04, 0.13] |  | 0.18\*\*\* | [0.14, 0.22] |  | 0.03 | [-0.10, 0.16] |  |
| Ethnic group |  |  |  |  |  |  |  |  |  |
|  White | Reference |  |  | Reference |  |  | Reference |  |  |
|  Non-white (Asian, black, other, mixed) | 0.16\* | [0.02, 0.29] |  | 0.07\* | [0.00, 0.13] |  | 0.18 | [-0.03, 0.39] |  |
|  Unknown | -1.35\*\*\* | [-1.52, -1.17] |  | -0.43\*\*\* | [-0.51, -0.34] |  | -2.53\*\*\* | [-2.81, -2.26] |  |
| Deprivation |  |  |  |  |  |  |  |  |  |
|  1st quintile (least deprived) | Reference |  |  | Reference |  |  | Reference |  |  |
|  2nd quintile | -0.24 | [-1.60, 1.11] |  | -0.48 | [-1.12, 0.17] |  | -0.03 | [-2.08, 2.02] |  |
|  3rd quintile | -0.07 | [-1.42, 1.28] |  | -0.37 | [-1.02, 0.27] |  | 0.11 | [-1.94, 2.16] |  |
|  4th quintile | -0.10 | [-1.46, 1.25] |  | -0.32 | [-0.96, 0.33] |  | 0.08 | [-1.97, 2.13] |  |
|  5th quintile (most deprived) | -0.09 | [-1.44, 1.27] |  | -0.34 | [-0.99, 0.30] |  | 0.07 | [-1.97, 2.12] |  |
|  Unknown | -0.11 | [-1.47, 1.24] |  | -0.33 | [-0.98, 0.31] |  | 0.03 | [-2.02, 2.08] |  |
| Comorbidities |  |  |  |  |  |  |  |  |  |
|  Cardiovascular disease | 0.05 | [-0.05, 0.15] |  | 0.02 | [-0.02, 0.07] |  | 0.06 | [-0.09, 0.21] |  |
|  Hypertension | 0.11\* | [0.02, 0.21] |  | 0.12\*\*\* | [0.08, 0.17] |  | 0.12 | [-0.03, 0.26] |  |
|  Number of Charlson comorbidities | 0.29\*\*\* | [0.23, 0.35] |  | 0.21\*\*\* | [0.18, 0.24] |  | 0.33\*\*\* | [0.24, 0.43] |  |
| Medication |  |  |  |  |  |  |  |  |  |
|  Antidepressants | 0.26\*\*\* | [0.16, 0.36] |  | 0.41\*\*\* | [0.36, 0.45] |  | 0.20\*\* | [0.05, 0.36] |  |
|  Antipsychotics |  |  |  |  |  |  |  |  |  |
|  First generation | 0.12 | [-0.07, 0.31] |  | 0.30\*\*\* | [0.21, 0.40] |  | 0.06 | [-0.23, 0.35] |  |
|  Second generation | -0.06 | [-0.22, 0.11] |  | 0.13\*\* | [0.05, 0.20] |  | -0.11 | [-0.36, 0.13] |  |
|  Antidiabetes | 0.14\* | [0.02, 0.27] |  | 0.13\*\*\* | [0.08, 0.20] |  | 0.14 | [-0.06, 0.33] |  |
| Time since diagnosis of T2DM (years) | 0.06\*\*\* | [0.04, 0.08] |  | 0.16\*\*\* | [0.15, 0.17] |  | 0.02\* | [0.00, 0.04] |  |
|  |  |  |  |  |  |  |  |  |  |
| Family | Gamma |  |  | Gamma |  |  | Gamma |  |  |
| Link | Log |  |  | Log |  |  | Log |  |  |

Note: the financial year at T2DM diagnosis was adjusted in all the analyses

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05