**Supplementary Materials**

**Methods of collection of patient-level information from administrative, clinical, and social services databases housed at the Manitoba Centre for Health Policy**

Study eligibility was determined using the Manitoba Health Population Registry, which stores basic demographic information (i.e., date of birth, gender, neighborhood of residence) with the dates and reasons for initiation and termination of healthcare coverage for all insured Manitobans.Household income quintiles were determined using 2006 Canadian census data and measured at the level of Census Dissemination areas.Information was collected on diseases and health conditions, such as diagnosis, service, and procedure codes. Codes were based on the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) until April 2004, and ICD-10-CA (Canadian Adaptation) and Canadian Classification of Health Interventions (CCI) after April 2004.30-32 Information on hospitalizations was obtained by linking to Manitoba Health’s Hospital Abstract Database.Information on Intensive Care Unit (ICU) admissions was taken from WRHA’s Critical Care Database.Emergency Department (ED) services were measured using WRHA’s Emergency Department Information System (EDIS).Outpatient physician services were determined using Manitoba Health’s Medical Services Database.The Drug Program Information Network (DPIN) database was used to capture data from pharmacy claims for formulary drugs dispensed to all Manitobans; as information is submitted electronically at point-of-sale, patients without prescription drug coverage were still included and complete prescription drug information was captured.The number of days receiving long-term care was obtained from Manitoba Health’s Chronic and Rehabilitative Services database and WRHA’s Long-Term Care database. Months spent receiving Employment and Income Assistance (EIA) was measured using MF’s Social Allowances Management Information Network database.Rent assist payments were quantified from MF’s Rent Assist database. Rent Assist (formally Manitoba Shelter Benefit or RentAid) is a monthly benefit to help low income families and individuals, as well as people receiving income assistance.Cause of death was determined from the VSA mortality registry. Comorbidities, defined as any chronic disease, were determined based on previously validated algorithms using pre-specified diagnosis, physician claim, and DPIN codes (REFS) (Supplementary Table 1).33,34

**Supplementary Table 1.** Diagnosis (ICD) and drug classification (ATC) codes for comorbidities

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| --- | --- |
| **Chronic conditions** |  |
| **Diabetes** | **Codes** |
| 1+ diagnosis in hospital abstract | E10\*, E11\*, E13\*, E14\*, G59.0\*, G63.2\*, H28.0\*, H36.0\*, M14.2\*, M14.6\*,  N08.3\*, O24\*, 249\*, 250\*, 648.0\* |
| 2+ physician claim diagnosis | 249, 250 |
| 2+ DPIN prescriptions | A10\* |
| **Chronic cardiovascular disease**  **(excluding hypertension)** | **Codes** |
| 1+ diagnosis in hospital abstract | I05\*, I06\*, I07\*, I08\*, I09\*, I11\*, I13\*, I2\*, I34\*, I35\*, I36\*, I37\*, I42\*,  I43\*, I44\*, I45\*, I46\*, I47\*, I48\*, I49\*, I50\*, I51\*, I52\*, I60\*, I61\*, I62\*,  I63\*, I64\*, I65\*, I66\*, I67.0\*, I67.1\*, I67.2\*, I67.3\*, I67.5\*, I67.6\*, I67.7\*,  I67.8\*, I67.9\*, I68\*, I69\*, I7\*, 393\*, 394\*, 395\*, 396\*, 397\*, 398\*, 402\*,  404\*, 410\*, 411\*, 412\*, 413\*, 414\*, 415\*, 416\*, 417\*, 424\*, 425\*, 426\*,  427\*, 428\*, 429\*, 430\*, 431\*, 432\*, 433\*, 434\*, 435\*, 437\*, 438\*, 440\*,  441\*, 442\*, 444\* |
| 2+ physician claim diagnosis | 393, 394, 395, 396, 397, 398, 402, 404, 410, 411, 412, 413, 414, 415, 416, 417,  424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 437, 438, 440, 441,  442, 444 |
| **Peripheral cardiovascular disease** | **Codes** |
| 1+ diagnosis in hospital abstract | I8\*, 443\*, 445\*, 446\*, 447\*, 448\*, 449\*, 451\*, 453\*, 454\*, 455\*, 456\*, 457\* |
| 2+ physician claim diagnosis | 443, 445, 446, 447, 448, 449, 451, 453, 454, 455, 456, 457 |
| **Chronic respiratory disease**  **(excluding asthma)** | **Codes** |
| 1+ diagnosis in hospital abstract | J40\*, J41\*, J42\*, J43\*, J44\*, J47\*, J6\*, J70\*, J82\*, J84\*, 490\*, 491\*, 492\*,  494\*, 495\*, 496\*, 500\*, 501\*, 502\*, 503\*, 504\*, 505\*, 506.4\*, 507\*, 508\* |
| 2+ physician claim diagnosis | 490, 491, 492, 494, 495, 496, 500, 501, 502, 503, 504, 505, 507, 508 |
| **Chronic renal failure** | **Codes** |
| 1+ diagnosis in hospital abstract | I12\*, I13\*, N18\*, N19\*, N25.0\*, Z49\*, Z99.2\*, 403\*, 404\*, 585\*, 586\*, 587\*,  588.0\*, V45.1\*, V56\* |
| 2+ physician claim diagnosis | 403, 404, 585, 586, 587, V56 |
| **Chronic liver disease** | **Codes** |
| 1+ diagnosis in hospital abstract | K70\*, K71.1\*, K71.3\*, K71.4\*, K71.5\*, K71.6\*, K71.7\*, K71.8\*, K71.9\*,  K72.1\*, K72.9\*, K73\*, K74\*, K76.6\*, K76.7\*, K76.8\*, 571\*, 572\* |
| 2+ physician claim diagnosis | 571, 572 |
| **Immunocompromised persons** |  |
| **Organ transplant** | **Codes** |
| 1+ diagnosis in hospital abstract | T86\*, Y83.0\*, Z94\*, 996.8\*, V42\* |
| 2+ physician claim diagnosis | V42 |
| **HIV/AIDS** | **Codes** |
| 1+ diagnosis in hospital abstract | B24\*, F02.4\*, Z21\*, 042\*, V08\* |
| 2+ physician claim diagnosis | 042, V08 |
| 1+ DPIN prescriptions | J05AE\*, J05AF\*, J05AG\*, J05AR\* |
| **Other immune deficiency** | **Codes** |
| 1+ diagnosis in hospital abstract | D80\*, D81\*, D82\*, D83\*, D84\*, D89\*, 279\*, 288.0\*, 288.1\*, 288.2\* |
| 2+ physician claim diagnosis | 279 |
| **Cancer (excluding nonmelanoma**  **skin cancer)** | **Codes** |
| 1+ diagnosis in hospital abstract | C0\*, C1\*, C2\*, C3\*, C40\*, C41\*, C43\*, C45\*, C46\*, C47\*, C48\*, C49\*, C5\*,  C6\*, C7\*, C8\*, C9\*, 14\*, 15\*, 16\*, 170\*, 171\*, 172\*, 174\*, 175\*, 176\*, 179\*,  18\*, 19\*, 20\* |
| 2+ physician claim diagnosis | 14\*, 15\*, 16\*, 170, 171, 172, 174, 175, 176, 179, 18\*, 19\*, 20\* |
| **Prescription for immunosuppressants** | **Codes** |
| 1+ DPIN prescriptions | L01\*, L04A\* |
| **Prescription for systemic steroids** | **Codes** |
| 1+ DPIN prescriptions | H02A\*, H02B\* |

**Supplementary Table 2.** Codes used to define depression cohort.

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| **Data source** | **Coding system** | **Code** | **Description** |
| Hospital abstract | ICD-10 | F32 | Depressive episode |
| Hospital abstract | ICD-10 | F33 | Recurrent depressive disorder |
| Hospital abstract | ICD-10 | F34 | Persistent mood [affective] disorders |
| Hospital abstract | ICD-9 | 296.2 | Major depressive disorder, single episode |
| Hospital abstract | ICD-9 | 296.3 | Major depressive disorder, recurrent episode |
| Hospital abstract | ICD-9 | 298 | Depressive type psychosis |
| Hospital abstract | ICD-9 | 300.4 | Dysthymic disorder |
| Hospital abstract | ICD-9 | 311 | Depressive disorder, not elsewhere classified |
| Physician claim | ICD-9 | 296 | Episodic mood disorders |
| Physician claim | ICD-9 | 311 | Depressive disorder, not elsewhere classified |
| DPIN | ATC | N06AA01 | desipramine |
| DPIN | ATC | N06AA02 | imipramine |
| DPIN | ATC | N06AA04 | clomipramine |
| DPIN | ATC | N06AA11 | protriptyline |
| DPIN | ATC | N06AA12 | doxepin |
| DPIN | ATC | N06AA17 | amoxapine |
| DPIN | ATC | N06AA21 | maprotiline |
| DPIN | ATC | N06AB03 | fluoxetine |
| DPIN | ATC | N06AB04 | citalopram |
| DPIN | ATC | N06AB05 | paroxetine |
| DPIN | ATC | N06AB06 | sertraline |
| DPIN | ATC | N06AB08 | fluvoxamine |
| DPIN | ATC | N06AB10 | escitalopram |
| DPIN | ATC | N06AF03 | phenelzine |
| DPIN | ATC | N06AF04 | tranylcypromine |
| DPIN | ATC | N06AG02 | moclobemide |
| DPIN | ATC | N06AX06 | nefazodone |
| DPIN | ATC | N06AX11 | mirtazapine |
| DPIN | ATC | N06AX16 | venlafaxine |
| DPIN | ATC | N06AX21 | duloxetine |
| DPIN | ATC | N06AX23 | desvenlafaxine |

1. Acronyms: ICD, International Classification of Diseases; ATC, Anatomical Therapeutic Chemical

**Supplementary Table 3.** Psychotherapy tariff codes

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| **Tariff** | **Description** |
| **8007** | Consulting Psychiatrist, direct physician to physician or physician to RN (EP) telephone response within two (2) hours of referring General Practitioner’s, Paediatrician’s or RN (EP)’s request |
| **8008** | Consulting Psychiatrist, direct physician to physician or physician to RN (EP) telephone response within forty-eight (48) hours of referring General Practitioner’s, Paediatrician’s or RN (EP)’s request |
| **8444** | Psychotherapy - group of two to four patients |
| **8446** | Psychotherapy - group of five or more patients |
| **8466** | Psychiatry Intake Registry Consultation to Primary Care Provider - Adult |
| **8467** | Psychiatry Intake Registry Consultation to Primary Care Provider - Child |
| **8468** | Psychiatry Intake Registry Consultation to Primary Care Provider - Geriatric (Patient at least 70 years of age) |
| **8472** | Child and Youth Management Conference |
| **8475** | Psychiatry - Patient Care Family Conference |
| **8476** | Psychiatric Social Interview |
| **8477** | Psychiatry Team Management Conference |
| **8503** | Complete history and psychiatric examination - adult |
| **8504** | Complete history and psychiatric examination - child |
| **8530** | Subsequent Visit |
| **8553** | Psychiatry Consultation - adult |
| **8554** | Psychiatry Consultation - child |
| **8580** | Psychotherapy - individual |
| **8581** | Psychotherapy - individual |
| **8584** | Psychiatric care - individual |
| **8589** | Psychotherapy - group |
| **8595** | Consultation - Unassigned Patient - adult |
| **8596** | Consultation - Unassigned Patient - child |
| **8622** | Consultation - geriatric patient |
| **8623** | Consultation - Unassigned Patient - Geriatric |
| **8624** | Extended Consultation - Geriatric (age 70 and older) minimum of forty-five (45) minutes of patient/physician contact time |
| **8625** | Extended Consultation - Adult minimum of forty-five (45) minutes of patient/physician contact time |
| **8626** | Extended Consultation - Child minimum of forty-five (45) minutes of patient/physician contact time |
| **8650** | Shared Care Conference |
| **8662** | Extended Consultation - Unassigned Patient - Geriatric (age 70 and older) minimum of fortyfive (45) minutes of patient/physician contact time |
| **8663** | Extended Consultation - Unassigned Patient - Adult minimum of forty-five (45) minutes of patient/physician contact time |
| **8664** | Extended Consultation - Unassigned Patient - Child minimum of forty-five (45) minutes of patient/physician contact time |
| **8706** | Extended Psychiatry Intake Registry Originated Consultation to Primary Care Provider - Geriatric (age 70 and older) minimum of forty-five (45) minutes of patient/physician contact time |
| **8707** | Extended Psychiatry Intake Registry Originated Consultation to Primary Care Provider - Adult minimum of forty-five (45) minutes of patient/physician contact time |
| **8708** | Extended Psychiatry Intake Registry Originated Consultation to Primary Care Provider - Child minimum of forty-five (45) minutes of patient/physician contact time |

**Supplementary Table 4.** Prescription drugs by category and ATC code

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| **Drug Category** | **Coding System** | **Code** | **Drug Name/Description** | |
| Norepinephrine reuptake inhibitor | ATC | N06AA21 | maprotiline | |
| Norepinephrine reuptake inhibitor | ATC | N06AX12 | bupropion | |
| Other antidepressant | ATC | N06AF03 | phenelzine | |
| Other antidepressant | ATC | N06AF04 | tranylcypromine | |
| Other antidepressant | ATC | N06AG02 | moclobemide | |
| Other antidepressant | ATC | N06AX02 | tryptophan | |
| Other antidepressant | ATC | N06AX05 | trazodone | |
| Other antidepressant | ATC | N06AX06 | nefazodone | |
| Other antidepressant | ATC | N06AX11 | mirtazapine | |
| Other antidepressant | ATC | N06AX26 | vortioxetine | |
| Serotonin and norepinephrine reuptake inhibitor | ATC | N06AX16 | venlafaxine | |
| Serotonin and norepinephrine reuptake inhibitor | ATC | N06AX21 | duloxetine | |
| Serotonin and norepinephrine reuptake inhibitor | ATC | N06AX23 | desvenlafaxine | |
| Serotonin and norepinephrine reuptake inhibitor | ATC | N06BA09 | atomoxetine | |
| Selective serotonin reuptake inhibitor | ATC | N06AB03 | fluoxetine | |
| Selective serotonin reuptake inhibitor | ATC | N06AB04 | citalopram | |
| Selective serotonin reuptake inhibitor | ATC | N06AB05 | paroxetine | |
| Selective serotonin reuptake inhibitor | ATC | N06AB06 | sertraline | |
| Selective serotonin reuptake inhibitor | ATC | N06AB08 | fluvoxamine | |
| Selective serotonin reuptake inhibitor | ATC | N06AB10 | escitalopram | |
| Tricyclic antidepressant | ATC | N06AA01 | desipramine | |
| Tricyclic antidepressant | ATC | N06AA02 | imipramine | |
| Tricyclic antidepressant | ATC | N06AA04 | clomipramine | |
| Tricyclic antidepressant | ATC | N06AA06 | trimipramine | |
| Tricyclic antidepressant | ATC | N06AA09 | amitriptyline | |
| Tricyclic antidepressant | ATC | N06AA10 | nortriptyline | |
| Tricyclic antidepressant | ATC | N06AA11 | protriptyline | |
| Tricyclic antidepressant | ATC | N06AA12 | doxepin |  |
| Tricyclic antidepressant | ATC | N06AA17 | amoxapine | |
| Tricyclic antidepressant | ATC | N06CA01 | amitriptyline and psycholeptics | |
| Benzodiazepine derivative or related drug | ATC | N03AE | Benzodiazepine derivative antiepileptics | |

**Supplementary Table 5.** The mean and median costs (2018 CAD) of healthcare utilization and social services per patient per year during the entire follow-up period

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| --- | --- | --- | --- | --- |
|  | **Depression** | | **Non-Depression Controls** | |
|  | Mean  (SD) | Median  (Q1, Q3) | Mean (SD) | Median  (Q1, Q3) |
| Hospital Costs | $7,192 ($38,761) | $603  ($56, $2,525) | $1,701 ($6,623) | $139  ($0, $897) |
| Physician Costs | $1,431 ($3,282) | $882  ($506, $1,528) | $605 ($737) | $403  ($184, $769) |
| Prescription Drug Costs | $1,441 ($2,962) | $739  ($310, $1,707) | $527 ($2,101) | $134  ($31, $511) |
| **Total Direct Medical Costs** | **$10,064 ($41,113)** | **$2,622**  **($1,259, $6,379)** | **$2,832 ($7,601)** | **$893**  **($306, $2,349)** |
| Rent Assist Payments | $19  ($105) | $0  ($0, $0) | $9  ($87) | $0  ($0, $0) |
| Employment Income Assistance Costs | $1,503 ($4,175) | $0  ($0, $0) | $501 ($2,505) | $0  ($0, $0) |
| **Total Social Service Costs** | **$1,522 ($4,176a)** | **$0**  **($0, $0)** | **$510 ($2,507a)** | **$0**  **($0, $0)** |

1. SD calculated as follows: SD of Total Indirect Medical Costs = sqrt[(SD of Rent Assist Payments)2 + (SD of Employment Income Assistance Costs)]