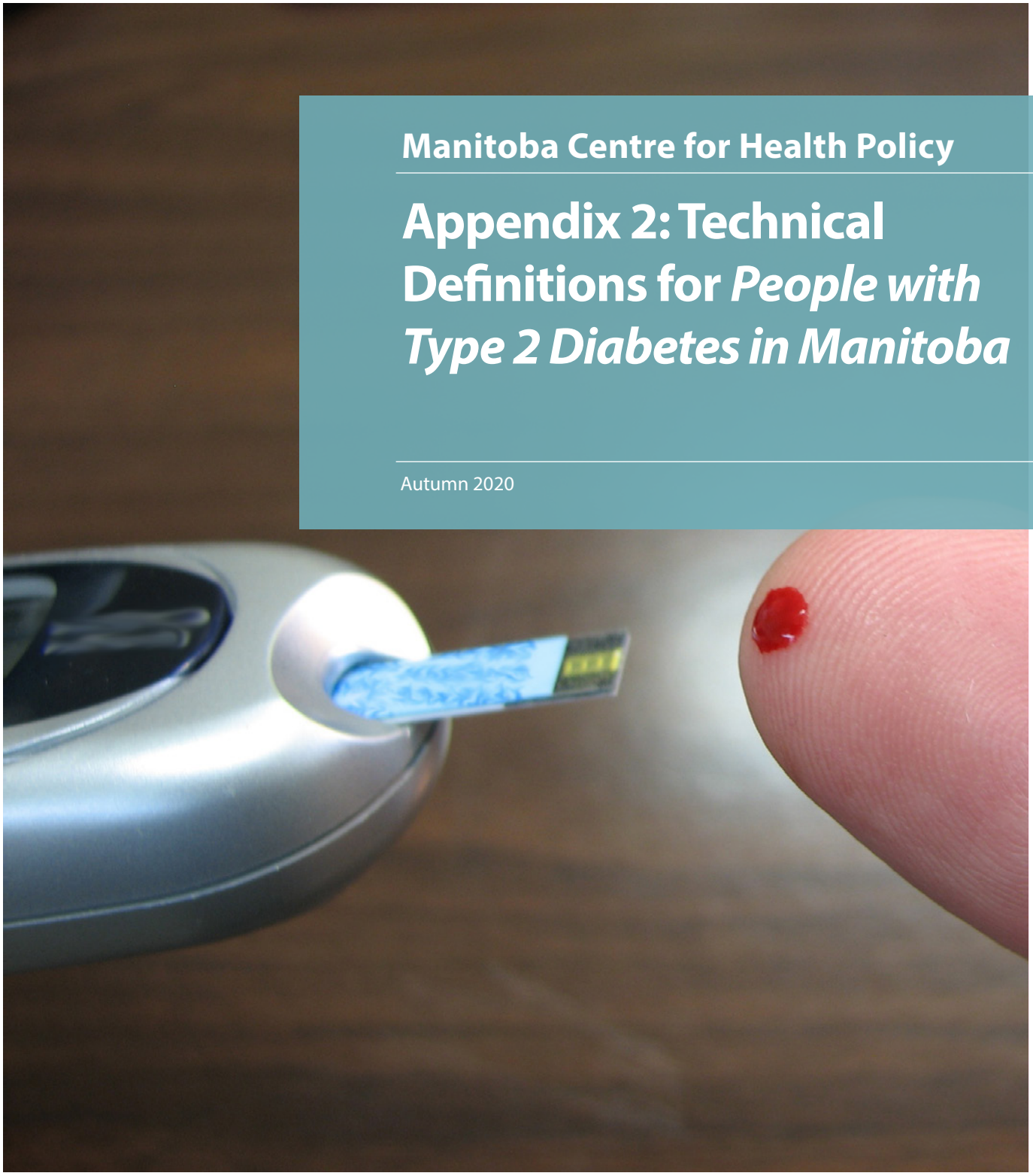

Manitoba Centre for Health Policy

# Appendix 2: Technical Definitions for *People with Type 2 Diabetes in Manitoba*

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FIRST NATIONS HEALTH AND SOCIAL SECRETARIAT OF MANITOBA

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# Chapter 3: Diabetes Incidence

## National Diabetes Surveillance System (NDSS)

1+ Hospitalization or 2+ Physician Claims in 2 years

This definition excludes codes within 120 days before and 180 days after delivery (to exclude codes related to gestational diabetes) (Shah, Retnakaran, & Booth, 2008)Canada, were identified. Women with GDM were matched with 10 women without GDM and were followed for CVD. RESULTS - The matched cohorts included 8,191 women with GDM and 81,262 women without GDM. Mean age at entry was 31 years, and median follow-up was 11.5 years. The hazard ratio for CVD events was 1.71 (95% CI 1.08-2.69.

For incidence, new cases must meet the definition in the 2 year time period, and have their first ever healthcare contact related to diabetes in that same two years. Healthcare contacts include diagnoses of diabetes from hospitalizations or physician claims, prescriptions for medications to treat diabetes, date of diagnosis from DER-CA or HbA1C tests ≥ 6.5%. See Type 2 Diabetes (T2DM) below for more information.

## Type 2 Diabetes (T2DM)

Individuals were considered to have type 2 diabetes if they met one of the following conditions:

- 1 or more hospitalizations with a diagnosis of diabetes, ICD-9-CM diagnosis code 250; ICD-10-CA codes E10-E14, OR
- 2 or more physician visits with a diagnosis of diabetes, ICD-9-CM diagnosis code 250, OR
- 1 or more prescriptions for drugs used in diabetes, e.g., insulins, blood glucose lowering drugs, ATC code A10, OR
- 1 or more glycohemoglobin (HbA1C) tests with a result ≥ 6.5%, OR
- Identified as having type 2 diabetes in the Diabetes Education Resource for Children and Adolescents

    Note: To prevent classifying gestational diabetes as type 2, all diagnoses, prescriptions and HbA1C tests for pregnant women identified between 120 days before delivery to 180 days after were excluded from the above algorithm

and did not meet any of the following conditions:

- 1 prescription for metformin (ATC code A10BA) without a diagnosis for diabetes from a hospitalization or physician visit
- Ever had 1 or more prescriptions for an insulin infusion set (Manitoba Product Identification Numbers: 00905739, 00908300, 00992968, 00992976, 00992984, 00992991)
- Ever had 1 or more diagnoses for cystic fibrosis from a hospitalization or physician visit, ICD-9-CM diagnosis code 277.0; ICD-10-CA code E84
- Age at first diabetes diagnosis was less than 7 years old
- Identified as any type of diabetes in the Diabetes Education Resource for Children and Adolescents other than type 2, e.g., type 1, medication induced.

For incidence, new cases must meet the definition in the 2 year time period, and have their first ever healthcare contact related to diabetes in that same two years. Healthcare contacts include diagnoses of diabetes from hospitalizations or physician claims, prescriptions for medications to treat diabetes, date of diagnosis from DER-CA or HbA1C tests ≥ 6.5%.

# Chapter 4: Demographics and General Health Status of Manitobans with Type 2 Diabetes

## Total Mortality Rate

Time Period: 2013/14-2016/17

Crude and age- and sex-adjusted annualized rates of death for a cohort with type 2 diabetes per 1,000 person-years at risk in the four-year period were calculated by ethnicity and geography. Crude annualized rates of death were calculated by ethnicity, sex and age group. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

The denominator includes all members of the cohort in 2011/12-2012/13. Note that this indicator uses a different cohort than the rest of the indicators to allow for four years of follow-up after cohort identification to examine mortality.

## Premature Mortality Rate

Time Period: 2013/14-2016/17

Crude and age- and sex-adjusted annualized rates of premature death (defined by death occurring at 0 to 74 years of age) for a cohort with type 2 diabetes per 1,000 person-years at risk in the four-year period were calculated by ethnicity and geography. Crude annualized rates of premature death were calculated by ethnicity, sex and age group. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

The denominator includes all members of the cohort in 2011/12-2012/13, age < 75. Note that this indicator uses a different cohort than the rest of the indicators to allow for four years of follow-up after cohort identification to examine mortality.

# Chapter 5: Health Services Use among Manitobans with Type 2 Diabetes

## Primary Care Provider (Ambulatory) Visit Rates

Time period: 2013/14-2016/17

Crude rates per person-year calculated by ethnicity and age. Crude and age- and sex-adjusted rates per person-year calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

For Tribal Council Areas (TCA), rates were adjusted to the RHA reference rate. TCA rates were benchmarked to the highest rate among TCAs.

Ambulatory visits to primary providers included visits to family physicians/general practitioners and nurse practitioners. Prenatal visits, office visits, walk–in clinics, home visits, personal care home (PCH; nursing home) visits, and visits to outpatient departments were included.

The denominator included all members of the cohort in 2013/14-2014/15.

## Percent of People with Zero Primary Care Provider (Ambulatory) Visits in One Year

Time period: 2016/17

Crude and age- and sex-adjusted percentage of the cohort with type 2 diabetes with zero ambulatory visits (including to Nurse Practitioners) in one-year calculated by ethnicity and geography. Crude percentage of the cohort with type 2 diabetes with zero ambulatory visits (including to Nurse Practitioners) in one-year calculated by ethnicity, sex and age group. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

The denominator included all members of the cohort in 2016/17.

## Continuity of Care Index (COCI)

Time period: 2014/15-2016/17

The Continuity of Care Index weighs both the frequency of ambulatory visits to primary care providers (which includes both family physicians and nurse practitioners) and the dispersion of visits among different providers. The possible index values range from zero (if all visits are made to different providers) to one (if all visits are made to a single provider).

Crude average COCI values in three years were calculated by ethnicity, sex and age group. Crude and age- and sex-adjusted average COCI values in three years were calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

The denominator included all members of the cohort in 2014/15-2016/17 ages 18+ who had three or more ambulatory visits over the three-year period. Ambulatory visits to both general practitioners and nurse practitioners are included in the analysis.

## Specialist Visit Rates

Time period: 2013/14-2016/17

All ambulatory visits to providers other than family physicians/general practitioners and nurse practitioners were considered specialist visits. Pediatricians were classified as specialists.

Crude rates per person-year calculated by ethnicity and age. Crude and age- and sex-adjusted rates per person-year calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

For Tribal Council Areas, rates were adjusted to the RHA reference rate. TCA rates were benchmarked to the highest rate among TCAs.

A separate model was run with Continuity of Care included as a variable, for ages 15-59.

The denominator included all members of the cohort in 2013/14-2014/15.

## Hospital Episode Rates (Inpatient, All Reasons Combined)

Time period: 2013/14-2016/17

Crude rates per person-year calculated by ethnicity and age. Crude and age- and sex-adjusted rates per person-year calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

For Tribal Council Areas, rates were adjusted to the RHA reference rate. TCA rates were benchmarked to the lowest rate among TCAs.

A separate model was run with Continuity of Care (COC) included as a variable, for ages 18+.

Inpatient hospital episodes were counted, not separations. Obstetrical and newborn abstracts were excluded. Out-of-province hospitalizations were excluded. Personal care homes, long-term care facilities, and nursing stations were excluded.

The denominator included all members of the cohort in 2013/14-2014/15.

## Hospitalizations for Ambulatory Care Sensitive Conditions

Time period: 2013/14-2016/17

Crude rates per person-year calculated by ethnicity and age. Crude and age- and sex-adjusted rates per person-year calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

For Tribal Council Areas, rates were adjusted to the RHA reference rate. TCA rates were benchmarked to the lowest rate among TCAs.

For the primary analysis hospitalizations for diabetes and hypoglycemia within 6 months of diagnosis were excluded. As a sensitivity analysis, rates and the separate model with COC were re-run excluding all hospitalizations for diabetes and hypoglycemia.

Separations were counted here, not episodes. Individuals who died in hospital were excluded from the numerator. Only inpatient separations were included (TRANSACT=1). Personal care homes, long-term care facilities, and nursing stations were excluded. Norway House was included. Out-of-province hospitalizations were excluded.

For all Ambulatory Care Sensitive (ACS) conditions (except congenital syphilis), the ACS condition must be coded as the most responsible diagnosis. ACS conditions are a group of 25 diseases and diagnoses for which it is thought that timely and effective outpatient care can reduce the risk of hospitalization. These conditions include asthma, angina, gastroenteritis, and congestive heart failure. The grouping was created by Billings and colleagues (Billings, Zeitel, Lukomnik, et al., 1993; Billings, Anderson, & Newman, 1996), but has been revised over time.

ACS conditions include:

- Congenital Syphilis: ICD–10–CA code A50 (newborns only)
- Immunization–related and Preventable Conditions: ICD–10–CA codes A35, A37, A80, I00, I01 (also including hemophilus meningitis for children aged 1 to 5 only: ICD–10–CA code G00.0)
- Epilepsy: ICD–10–CA codes G40, G41
- Convulsions: ICD–10–CA code R56
- Severe ENT Infections: ICD–10–CA codes H66, J02, J03, J06, J312 (cases of otitis media: ICD–10–CA code H66, with a procedure code for myringotomy with insertion of tube are excluded: CCI code 1.DF.53.JA–TS)
- Pulmonary Tuberculosis: ICD–10–CA codes A15.0, A15.1, A15.2, A15.3, A15.7, A15.9, A16.0, A16.1, A16.2, A16.7, A16.9
- Other Tuberculosis: ICD–10–CA codes A15.4, A15.5, A15.6, A15.8, A16.3, A16.4, A16.5, A16.8, A17, A18, A19
- Chronic Obstructive Pulmonary Disease (COPD): ICD–10–CA codes J41, J42, J43, J44, J47 (also included are patients with a primary diagnosis of acute lower respiratory infection: ICD–10–CA codes J10.0, J11.0, J12–J16, J18, J21, J22; and a secondary diagnosis of COPD with acute lower respiratory infection: ICD–10–CA code J44)
- Acute Bronchitis (only included if a secondary diagnosis of COPD is also present, diagnosis codes as above): ICD–10–CA code J20
- Bacterial Pneumonia: ICD–10–CA codes J13, J14, J15.3, J15.4, J15.7, J15.9, J16, J18 (patients with a secondary diagnosis of sickle–cell anemia: ICD–10–CA codes D57.0, D57.1, D57.2, D57.8 and patients less than two months of age are excluded)

- Asthma: ICD–10–CA code J45
- Congestive Heart Failure: ICD–10–CA codes I50, J81 (patients with certain cardiac procedures coded are excluded: CCI codes 1.HB.53, 1.HB.54, 1.HB.55, 1.HD.53, 1.HD.54, 1.HD.55, 1.HZ.53, 1.HZ.55, 1.HZ.85, 1.IJ.50, 1.IJ.57.GQ, 1.IJ.76)
- Hypertension: ICD–10–CA codes I10.0, I10.1, I11 (patients with certain cardiac procedures coded are excluded, procedure codes as in CHF)
- Angina: ICD–10–CA codes I20, I23.82, I24.0, I24.8, I24.9 (patients with any surgical procedure coded are excluded)
- Cellulitis: ICD–10–CA codes L03, L04, L08, L44.4, L88, L92.2, L98.0, L98.3 (patients with any surgical procedure coded are excluded, except for incisions of skin and subcutaneous tissue: CCI codes 1.AX.53.LA–QK, 1.IS.53.HN–LF, I.IS.53.LA–LF, 1.JU.53.GP–LG, 1.KR.53.LA–LF, 1.OA.53.LA–QK, 1.SY.53.LA–QK, 1.YA.35.HA–W1, 1.YA.35.HA–X4, 1.YA.52.HA, 1.YA.52.LA, 1.YA.55.DA–TP, 1.YA.55.LA–TP, 1.YA.56.LA, 1.YB.52.HA, 1.YB.52.LA, 1.YB.55.DA–TP, 1.YB.55.LA–TP, 1.YB.56.LA, 1.YF.35.HA–W1, 1.YF.35.HA–X4, 1.YF.52.HA, 1.YF.55.DA–TP, 1.YF.55.LA–TP, 1.YF.56.LA, 1.YG.52.HA, 1.YG.52.LA, 1.YG.55.DA–TP, 1.YG.55.LA–TP, 1.YG.56.LA, 1.YR.52.HA, 1.YR.52.LA, 1.YR.56.LA, 1.YS.35.HA–W1, 1.YS.35.HA–X4, 1.YS.52.HA, 1.YS.52.LA, 1.YS.55.DA.TP, 1.YS.55.LA–TP, 1.YS.56.LA, 1.YT.35.HA–W1, 1.YT.35.HA–X4, 1.YT.52.HA, 1.YT.52.LA, 1.YT.55.DA–TP, 1.YT.55.LA–TP, 1.YT.56.LA, 1.YU.52.HA, 1.YU.52.LA, 1.YU.55.DA–TP, 1.YU.55.LA–TP, 1.YU.56.LA, 1.YV.35.HA–W1, 1.YV.35.HA–X4, 1.YV.52.HA, 1.YV.52.LA, 1.YV.55.DA–TP, 1.YV.55.LA–TP, 1.YV.56.LA, 1.YW.52.HA, 1.YW.52.LA, 1.YW.55.DA–TP, 1.YW.55.LA–TP, 1.YW.56.LA, 1.YX.52.HA, 1.YX.52.HA–AV, 1.YX.52.LA, 1.YX.56.LA, 1.YZ.35.HA–W1, 1.YZ.35.HA–X4, 1.YZ.52.HA, 1.YZ.52.LA, 1.YZ.55.DA–TP, 1.YZ.55.LA–TP, 1.YZ.56.LA)
- Diabetes: ICD–10–CA codes E10.1, E10.6, E10.7, E10.9, E11.0, E11.1, E11.6, E11.7, E11.9, E13.0, E13.1, E13.6, E13.7, E13.9, E14.0, E14.1, E14.6, E14.7, E14.9
- Hypoglycemia: ICD–10–CA codes E16.0, E16.1, E16.2
- Gastroenteritis: ICD–10–CA codes K52.2, K52.8, K52.9
- Kidney/Urinary Infections: ICD–10–CA codes N10, N11, n12, N13.6, N15.1, N15.8, N15.9, N16.0–N16.5, N28.83–N28.85, N36.9, N39.0, N39.9
- Dehydration/Volume Depletion: ICD–10–CA code E86
- Iron Deficiency Anemia: ICD–10–CA codes D50.1, D50.8, D50.9 (patients aged 0 to 5 only)
- Nutritional Deficiencies: ICD–10–CA codes E40–E43, E55.0, E64.3
- Failure to Thrive: ICD–10–CA code R62 (patients less than one year of age only)
- Pelvic Inflammatory Disease: ICD–10–CA codes N70, N73, N99.4 (female patients only, patients with a hysterectomy procedure coded are excluded: CCI codes 1.RM.87, 1.RM.89, 1.RM.91, 5.CA.89.CK, 5.CA.89.DA, 5.CA.89.GB, 5.CA.89.WJ, 5.CA.89.WK)
- Dental Conditions: ICD–10–CA codes K02–K06, K08, K09.8, K09.9, K12, K13

Note: The ACS condition skin grafts with cellulitis was excluded from analyses.

The denominator included all members of the cohort in 2013/14-2014/15 ages 7-74.

A separate model was run with Continuity of Care (COC) included as a variable, for ages 18-74.

## Reasons for Inpatient Hospitalizations (Most Responsible Diagnosis) (See Appendix 1)

Time period: 2013/14-2016/17

Frequency tables were generated listing the most frequent reasons for inpatient hospitalizations in acute care facilities, based on the most responsible diagnosis. The diagnoses were grouped into 3-digit ICD-10-CA codes.

Only inpatient separations were included (TRANSACT=1). Norway House was included. Personal care homes, long-term care facilities, and nursing stations were excluded. Out-of-province hospitalizations were excluded. Obstetrical and newborn hospitalizations were excluded.

The denominator included all members of the cohort in 2013/14-2014/15.

# Chapter 6: Type 2 Diabetes-Related Care and Complications

## HbA1C Test Results

Time period: 2013/14-2016/17

Count and percent of mean, median, minimum and maximum Blood Glucose Test (HbA1C) results by ethnicity. Proportion of cohort with zero HbA1C tests by geography and age group. Count of HbA1C tests, low tests (<= 7%) and high tests (> 7%).

HbA1C tests within 6 months of diagnosis date were not included.

The denominator included all members of the cohort in 2013/14-2014/15. Only HbA1C tests for those with prevalent diabetes in this period were examined.

## Retinopathy Treatment

Time period: 1970-2016/17 and 2015/16-2016/17

Crude percentage of the cohort with type 2 diabetes with 1+ treatments for retinopathy (since 1970 OR in two years) was calculated by ethnicity, sex, and age group. Crude and age- and sex-adjusted percentage of the cohort with type 2 diabetes with 1+ treatments for retinopathy (since 1970 OR in two years) was calculated by ethnicity and geography.

Retinopathy treatments were defined as physician visits with tariff codes 5634 or 5636.

The denominator includes all members of the cohort in 2013/14-2014/15 ages 18+.

## End-Stage Renal Disease

Time period: 1979/80-2016/17

Crude percentages per person-year calculated by ethnicity and age. Crude and age- and sex-adjusted percentages per person-year calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

For Tribal Council Areas, percentages were adjusted to the RHA reference rate. TCA percentages were benchmarked to the lowest rate among TCAs.

End-stage renal disease was defined as ever diagnosed with any of the following:

Kidney transplant:

- ICD-9-CM codes: intervention code 55.6, donor source codes 00.91, 00.92, 00.93
- CCI codes: 1.PC.85.LA-XX-J, 1.PC.85.LA-XX-K, 1.OK.85.XU-XX-K, 1.OK.85.XV-XX-K
- Prefix/tariff codes: 2 5883, 7 5895, 7 5896, 7 5899

Dialysis:

- ICD-9-CM codes 9798, 9799, 9801, 9802, 9814, 9820, 9805, 9807, 9819, 9806, 9821, 9610, 3800, 3801, 3803, 3804, 3792, 3790, 3793, 3805, 3794

Renal failure/kidney disease:

- ICD-9-CM codes 584, 585, 586

The denominator included all members of the cohort in 2013/14-2014/15 ages 18+.

## Renal Transplant

Time period: 1979/80-2016/17 (because it is an "ever")

Percentage of those ever on dialysis who have had a kidney transplant, by age and sex.

The denominator included all members of the cohort in 2013/14-2014/15 ages 18+ who have ever been on dialysis.

See End-Stage Renal Disease for definitions of kidney transplant and dialysis for more information.

## Current Dialysis

Time period: 1979/80-2016/17

Crude percentages per person-year calculated by ethnicity and age. Crude and age- and sex-adjusted percentages per person-year calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups. For Tribal Council Areas, percentages were adjusted to the RHA reference percentage. TCA percentages were benchmarked to the lowest percentage among TCAs.

Dialysis is defined as for End-Stage Renal Disease indicator: ICD-9-CM codes 9798, 9799, 9801, 9802, 9814, 9820, 9805, 9807, 9819, 9806, 9821, 9610, 3800, 3801, 3803, 3804, 3792, 3790, 3793, 3805, 3794. Individuals were considered to be on dialysis if they received dialysis for a 90 day period with a gap of no more than 15 days.

The denominator included all members of the cohort in 2013/14-2014/15 ages 18+ who had never had a renal transplant.

## New Initiation of Dialysis

Time period: 2015/16-2016/17

Crude percentages per person-year calculated by ethnicity and age. Crude and age- and sex-adjusted percentages per person-year calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

Dialysis is defined as for End-Stage Renal Disease indicator: ICD-9-CM codes 9798, 9799, 9801, 9802, 9814, 9820, 9805, 9807, 9819, 9806, 9821, 9610, 3800, 3801, 3803, 3804, 3792, 3790, 3793, 3805, 3794. Individuals were considered to be on dialysis if they received dialysis for a 90 day period with no gap of more than 15 days.

The denominator included all members of the cohort in 2015/16-2016/17 ages 18+ who had never had a renal transplant or previously been on dialysis.

## Urine Albumin-Creatinine Ratio (ACR) Screening (1+)

Time period: 2015/16

Crude percentages per person-year calculated by ethnicity and age. Crude and age- and sex-adjusted percentages per person-year calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups. For Tribal Council Areas, percentages were adjusted to the RHA reference percentage. TCA percentages were benchmarked to the highest percentage among TCAs.

Following the overall analyses, the cohort was stratified into two groups: those who had a prescription for an ACE inhibitor or ARB in the previous year (2014/15), and those who did not.

ATC codes:

- ACE inhibitors: C09AA, C09BA, C09BB
- ARBs: C09CA, C09DA, C09DB, C09DX

The analyses were re-run on each group separately. Crude and adjusted percentages were calculated in the same manner as for the overall cohort, however there are no adjusted percentages by TCA.

Individuals with end-stage renal disease were excluded.

The denominator included all members of the cohort in 2013/14-2014/15.

A separate model was run with Continuity of Care included as a variable, for ages 18+.

## Lower Limb Amputations

Time period: 1979/80-2016/17 and 2011/12-2016/17

Crude percentage of the cohort with type 2 diabetes with 1+ lower limb amputations since 1979/80 was calculated by ethnicity, sex, and age group. Crude and age- and sex-adjusted percentage of the cohort with type 2 diabetes with 1+ lower limb amputations since 1979 was calculated by ethnicity and geography.

Crude rate of lower limb amputations per 1,000 person-years between 2011/12 and 2016/17 was calculated by ethnicity, sex, and age group. Crude and age- and sex-adjusted rate of lower limb amputations per 1,000 person-years between 2011/12 and 2016/17 was calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

Lower limb amputations include from above the knee (at femur), at knee joint, below the knee (at tibia and fibula), at ankle joint, of the foot and toe(s). Amputation was defined by a hospitalization with a surgery for a lower limb amputation, identified by ICD–9–CM procedure codes 84.10–84.17 and CCI codes 1.VC.93, 1.VG.93, 1.VQ.93, 1.WA.93, 1.WE.93, 1.WI.93, 1.WJ.93, 1.WK.93, 1.WL.93, and 1.WM.93, 1.WN.93. Amputations due to accidental injury were excluded (defined by ICD–9–CM diagnosis codes 878, 885, 886, 895, 896, 897 and ICD–10–CA codes: S08, S18, S28.1, S38.2, S38.3, S48, S58, S68, S78, S88, S98, T05, T11.6, T13.6, T14.7).

The denominator includes all members of the cohort in 2013/14-2014/15 ages 18+.

## Flu Vaccine Rates

Time period: 2015/16

Crude rates per person-year calculated by ethnicity and age. Crude and age- and sex-adjusted rates per person-year calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

One flu vaccine was counted per person.

The denominator included all members of the cohort in 2013/14-2014/15.

A separate model was run with Continuity of Care included as a variable, for ages 18+.

## Hip Fractures (See Appendix 1)

Percentage of people with hip fracture episode (if ever) in 1979/80-2016/17 (we searched for hip fracture codes starting in 1970, the first code was found in 1979/80). Age from cohort data (t2dm_cohort (where=(time='2')) age as of Dec 31). Hip fracture represents 1 hospitalization admission, ICD code in 1st diagnostic field (6 month episode period).

Any like fracture codes during the 6-month period were considered part of the same event. The date of the first fracture code of a fracture event established the end-point of the episode period (O'Donnell, 2013).

Hip fractures were identified using the following codes:

Hospital Visits ICD-9-CM: 820.0-820.3, 820.8, 820.9, ICD10-CA: S72.0, S72.1, S72.2.

Physician visits ICD-9-C<: 820.x

## Active Tuberculosis (See Appendix 1)

Time period: 2013/14-2014/15

Crude percentages of cohort with type 2 diabetes with active tuberculosis calculated by ethnicity and age.

The active tuberculosis (TB) cohort was comprised of all active TB cases identified from the Manitoba Tuberculosis Registry during the study period. While the Manitoba Tuberculosis Registry housed at MCHP contains cases from 1993 to 2015, we limited our attention to the period from 2013 to 2015 because we were most interested in the treatment and management of recently diagnosed cases.

The denominator included all members of the cohort in 2013/14-2014/15.

## Latent Tuberculosis (See Appendix 1)

Time period: 2013/14-2014/15

Crude percentages of cohort with type 2 diabetes with latent tuberculosis calculated by ethnicity and age.

Individuals with latent tuberculosis were defined based on the process developed by Rivest et al. using the health insurance registry in Quebec to determine medication completion rates among people receiving treatment for tuberculosis (Rivest, Street, & Allard, 2013). The Manitoba-specific process was determined in consultation with local experts (Lix, Plourde, Larcombe, et al., 2018) and used the Manitoba Tuberculosis Registry and the Drug Program Information Network to define the cohort.

The denominator included all members of the cohort in 2013/14-2014/15.

## Facial Palsy (See Appendix 1)

Time period: 1979/80-2016/17 and 2013/14-2016/17

Crude percentage of the cohort with type 2 diabetes with 1+ physician visits with a diagnosis of facial palsy (since 1979 OR in four years) was calculated by ethnicity, sex, and age group. Crude and age- and sex-adjusted percentage of the cohort with type 2 diabetes with 1+ physician visits with a diagnosis of facial palsy (since 1979 OR in four years) was calculated by ethnicity and geography.

Facial palsy was defined by a physician visit with ICD-9-CM diagnosis code 351.

The denominator included all members of the cohort in 2013/14-2014/15.

# Chapter 7: Cardiovascular Health of Manitobans with Type 2 Diabetes

## Acute Myocardial Infarction (AMI) (Heart Attack)

Time Period: 2013/14-2016/17

Crude incidence rates of AMI per 1,000 person-years were calculated by ethnicity, sex, and age group. Crude and age- and sex-adjusted rates of AMI per 1,000 person-years were calculated by ethnicity and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

AMIs were defined by one of the following conditions:

- An inpatient hospitalization with the most responsible diagnosis of AMI and a length of stay of three or more days (unless the patient died in hospital), OR
- A death with AMI listed as the primary cause of death on the Vital Statistics death record.

Diagnosis codes used to identify an AMI include ICD–9–CM code 410 and ICD–10–CA code I21. Hospitalizations for less than three days were excluded as likely "rule out" AMI cases; transfers between hospitals were tracked to ensure all "true" AMI cases staying at least three days in hospital(s) were counted. Rates by RHA are limited to age 40+ due to rarity of AMI among young people.

## Ischemic Heart Disease (IHD)

Time period: 2013/14-2016/17

Crude prevalence of IHD was calculated by ethnicity and age group. Crude and age- and sex-adjusted prevalence of IHD was calculated by ethnicity, sex, and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

- IHD was defined by one of the following conditions:
- One or more hospitalizations with a diagnosis of IHD, ICD–9–CM codes 410–414; ICD–10–CA codes I20–I22, I24, I25, OR
- Two or more physician visits with a diagnosis of IHD (ICD–9–CM codes as above), OR
- One physician visit with a diagnosis of IHD (ICD–9–CM codes as above) and two or more prescriptions for medications to treat IHD (listed below)

List of drugs used to treat IHD:

| ATC code | Generic Drug Name |
|---|---|
| B01AC04 | clopidogrel |
| B01AC22 | prasugrel |
| B01AC24 | ticagrelor |
| C01DA02 | glyceryl trinitrate |
| C01DA05 | pentaerithrityl tetranitrate |
| C01DA08 | isosorbide dinitrate |
| C01DA14 | isosorbide mononitrate |
| C07AA02 | oxprenolol |
| C07AA03 | pindolol |
| C07AA05 | propranolol |
| C07AA06 | timolol |
| C07AA12 | nadolol |
| C07AB02 | metoprolol |
| C07AB03 | atenolol |
| C07AB04 | acebutolol |
| C07AB07 | bisoprolol |
| C07AG01 | labetalol |
| C07BA05 | propranolol and thiazides |
| C07BA06 | timolol and thiazides |
| C07BA12 | nadolol and thiazides |
| C07CA03 | pindolol and other diuretics |
| C07CB03 | atenolol and other diuretics |
| C08CA01 | amlodipine |
| C08CA02 | felodipine |
| C08CA04 | nicardipine |
| C08CA05 | nifedipine |
| C08CA06 | nimodipine |
| C08DA01 | verapamil |
| C08DB01 | diltiazem |
| C09AA01 | captopril |
| C09AA02 | enalapril |
| C09AA03 | lisinopril |
| C09AA04 | perindopril |
| C09AA05 | ramipril |
| C09AA06 | quinapril |
| C09AA07 | benazepril |
| C09AA08 | cilazapril |
| C09AA09 | fosinopril |
| C09AA10 | trandolapril |
| C09BA02 | enalapril and diuretics |
| C09BA03 | lisinopril and diuretics |
| C09BA04 | perindopril and diuretics |
| C09BA06 | quinapril and diuretics |
| C09BA08 | cilazapril and diuretics |
| C09CA01 | losartan |
| C09CA02 | eprosartan |
| C09CA03 | valsartan |
| C09CA04 | irbesartan |
| C09CA06 | candesartan |
| C09CA07 | telmisartan |
| C09CA08 | olmesartan |
| C09DA01 | losartan and diuretics |
| C09DA02 | eprosartan and diuretics |
| C09DA03 | valsartan and diuretics |
| C09DA04 | irbesartan and diuretics |
| C09DA06 | candesartan and diuretics |
| C09DA07 | telmisartan and diuretics |
| C09DA08 | olmesartan and diuretics |
| C10AA01 | simvastatin |
| C10AA02 | lovastatin |
| C10AA03 | pravastatin |
| C10AA04 | fluvastatin |
| C10AA05 | atorvastatin |
| C10AA06 | cerivastatin |
| C10AA07 | rosuvastatin |
| C10AB02 | bezafibrate |
| C10AB04 | gemfibrozil |
| C10AB05 | fenofibrate |
| C10AX09 | ezetimibe |
| C10BX03 | atorvastatin and amlodipine |
| N02BA01 | acetylsalicylic acid (tablet strength ≤ 325 mg) |

The denominator included all members of the cohort in 2013/14-2014/15, ages 18+.

## Congestive Heart Failure (CHF)

Time Period: 2016/17

Crude prevalence of CHF was calculated by ethnicity and age group. Crude and age- and sex-adjusted prevalence of CHF was calculated by ethnicity, sex, and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

CHF was defined by one of the following conditions:

- One or more inpatient hospitalizations with a diagnosis for CHF: ICD–9–CM code 428, ICD–10–CA code I50, OR
- Two or more physician visits with a diagnosis for CHF (ICD–9–CM code as above).

Rates by RHA are limited to age 40+ due to rarity of CHF among young people.

The denominator included all members of the cohort in 2016/17.

## Hypertension (High Blood Pressure)

Time Period: 2015/16-2016/17

Crude prevalence of hypertension was calculated by ethnicity and age group. Crude and age- and sex-adjusted prevalence of hypertension was calculated by ethnicity, sex, and geography. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

Hypertension was defined by one of the following conditions (Quan, Khan, Hemmelgarn, et al., 2009):

- One or more hospitalizations with a diagnosis of hypertension: ICD–9–CM codes 401–405; ICD–10–CA codes I10–I13, I15, OR
- Two or more physician visits with a diagnosis of hypertension (ICD–9–CM codes as above).

The denominator included all members of the cohort in 2015/16-2016/17.

# Chapter 8: Type 2 Diabetes in Children in Manitoba

## Hospitalization Rates

Time period: We looked for hospitalizations from the beginning of health insurance coverage in the Manitoba Health Insurance Registry (MH coverage). In this study, this is from birth to earliest among (day before age 18, loss to follow up, March 31, 2017).

Inpatient (TRANSACT=1) hospitalization episode rates (per 1,000 "person years") with an episode separation date (_ episode_sepdt) during the year prior to diagnostic date, diagnostic month, and consecutive years after diagnostic month up to the minimum between the end of coverage/turning 18/31mar2017 (i.e., end of study). We excluded new born hospitalizations (abstract type=4) from the hospitalizations for the youth cohort.

Time intervals considered:

- The year (365 days) prior to Diagnostic month
- The diagnostic "month": [diagdt - 30, diagdt +30)
- 1st year after the diagnostic month: [diagdt+30, diagdt+395)
- 2nd year after the diagnostic month
- 3rd year after the diagnostic month
- 4th year after the diagnostic month
- 5th year after the diagnostic month

Hospitalizations for diabetic ketoacidosis (DKA) are defined as having DKA codes in most responsible diagnostics (diag01) of the hospitalization abstract.

ICD10 codes for DKA:'E101'-'E101Z', 'E111'-'E111Z', 'E121'-'E121Z', 'E131'-'E131Z', 'E141'-'E141Z'
ICD9 codes for DKA diagnostic codes: '2501'-'2501Z'
ICD 10 codes for coma: 'E100'-'E100Z', 'E110'-'E110Z', 'E120'-'E120Z', 'E130'-'E130Z', 'E140'-'E140Z'
ICD 9 codes for coma diagnostic '2503'-'2503Z'

Hospitalizations of the matched cohort starting at the latest date among those turning 18 years old, and starting MH coverage after January 1, 1984 and ending at the earliest date among those ending MH coverage at the end of study period, March 31, 2017. We computed the inpatient hospitalization episode rates per 1,000 person-years at different time periods. The periods considered are based on the episode separation date and all are relative to the diagnostic month. The diagnostic "month" is +/- 30 days around the diabetes diagnostic date. We stratified the results by First Nations and All Other Manitobans. To check the impact of DKA hospitalizations we also computed the rates excluding the DKA hospitalization.

We also computed relative risks and identified the reasons for hospitalization. Relative risks were derived using GEE (repeated subject=casephin /type=unstr covb).

## Proportion of Children with Mood and Anxiety disorder per 1,000 Person Years, from 6th Birthday to Earliest (day before age18/loss to follow-up/31mar2017).

Period during which we identified mood and anxiety disorder is defined by the following dates:

StartDt = Latest date among (age6, 01apr1995)
EndDt = Earliest date among (dayBefore18, loss to follow-up, 31mar2017)
01apr1995 – the date when MCHP starts getting DPIN data, i.e. prescription dispensations.
31Mar2017 – end of study period

Cases were identified using the following codes:

- 1+ Hospitalizations (any diagnostic code) with
  ICD-9-CM codes 296.1-296.8, 300.0, 300.2-300.4, 300.7, 309, 311 or
  ICD-10-CA codes F31, F32, F33, F34.1, F38.0, F38.1, F40, F41.0-F41.3,
  F41.8, F41.9, F42, F43.1, F43.2, F43.8, F45.2, F53.0, F93.0, OR
- 1+ Physician visits (prefix=7) with ICD-9-CM codes 296, 311, OR
- 1+ Hospitalizations (any diagnostic code) with ICD-9-CM code 300 or ICD-10-CA codes F41.4-F41.7, F44, F45.0, F45.1, F48, F68.0, F99 AND 1+ Rx within 4 years, OR
- 1+ Physician visits (prefix=7) with ICD-9-CM code 300 AND 1+ Rx within 4 years, OR
- 3+ Physician visits (prefix=7) with ICD-9-CM codes 300 or 309 (must be 3 of same diagnostic code) within 4 years (between 1st and 3rd visit), OR
- ATC codes: N05AN01, N05BA, N06A, N05BE01

Relative rates were estimated using GEE (repeated subject=casephin /type=unstr covb;).

## Proportion of Children with Substance Use per 1,000 Person Years, from 12th Birthday to Earliest (day before age18/loss to follow-up/31mar2017)

This indicator included the same cohort as suicide and suicide attempts.

Substance use was identified using the following (Chartier, Brownell, MacWilliam, et al., 2016):

- One or more hospitalization with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs in any diagnostic field: ICD-9-CM codes 291 (alcoholic psychoses), 292 (drug psychoses), 303 (alcohol dependence), 304 (drug dependence), or 305 (nondependent abuse of drugs) or ICD-10-CA codes F10-F19, F55, Z50.2 and Z50.3.
- One or more physician visits with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs: ICD-9-CM codes 291 (alcoholic psychoses), 292 (drug psychoses), 303 (alcohol dependence), 304 (drug dependence), or 305 (nondependent abuse of drugs).

## Proportion of Children who died from Suicide or Attempted Suicide per 1,000 person years, from 12th birthday to earliest (day before 18th birthday/loss to follow-up/31mar2017)

Attempted suicide is defined as hospitalization with ICD codes below in any diagnostic field. Brain death hospital admissions are excluded from analysis (i.e., admitstatus ^= '6'). Suicide is defined as record from Vital Statistics Mortality Registry with ICD codes below.

- Suicide and self-inflicted injury ICD9: E950-E959; ICD10: X60-X84, and Y870, OR
- Injury undetermined intent ICD9: E980-E989, ICD10: Y10-Y34, and Y872

We used the children in the youth cohort age 12+ (i.e., we removed kids whose MH coverage ended prior to age 12). We looked for events from the 12th birthday to earliest (day before 18th birthday/loss to follow-up/31mar2017).

## Proportion of Children with Atypical Antipsychotic Prescriptions per 1,000 Person Years, from 6th Birthday to Earliest (day before 18th birthday/loss to follow-up/31mar2017)

Period during which we identified antipsychotic prescriptions is defined by the following dates:

StartDt = Latest date among (age6, 01apr1995)
EndDt = Earliest date among (dayBefore18, loss to follow-up, 31mar2017)
01apr1995 – the date when MCHP starts getting DPIN data (i.e., prescription dispensations).
31Mar2017 – end of study period

The following ATC codes were used to define atypical antipsychotic prescriptions:

| | |
|---|---|
| N05AE04 | ziprasidone |
| N05AE05 | lurasidone |
| N05AH02 | clozapine |
| N05AH03 | olanzapine |
| N05AH04 | quetiapine |
| N05AH05 | asenapine |
| N05AX08 | risperidone |
| N05AX12 | aripiprazole |
| N05AX13 | paliperidone |
| N05AX16 | brexpiprazole |

## Earned Eight or More Credits in Grade 9

This is a measure of academic achievement for a student in grade 9. The completion of eight or more credits in a student's first year of grade 9 is the required number of credits to successfully complete grade 9.

First Nations schools were included. Some courses counted toward less than 1 credit.

## High School Graduation

Three criteria are used to identify high school graduation. These criteria are applied in sequential order that avoids duplicate counting. The criteria include:

1. The "Year End Status" variable (or Graduation Flag) on the student's high school marks data. If this variable indicates that the student graduated then the student would be identified as a 4, 5 or 6 year graduate, depending on the year the indicators appeared in the student record. Two additional criteria were developed to help identify high school graduation:
2. Achieving a required total number of high school credits:

   Prior to 2007-2008 - Minimum Credit Requirements: 28
   2008-2009 - Minimum Credit Requirements: 29
   2009-10 and beyond - Minimum Credit Requirements: 30
3. Earning four or more grade 12 course credits, regardless of how many credits in total the student had earned during high school (Smith et al., 2013).

## Child and Family Services (CFS)

Crude proportion children and youth involved with CFS for at least one day.

There are two versions of involvement: 1. In care, and 2. Any involvement.

Data description: The Child and Family Services Applications and Intake Module data provide information concerning children in care and families receiving voluntary protection and support services from Child and Family Services (CFS). Cases are entered into the province-wide management system by mandated agencies and service providers. The data combines information recorded in the Intake Module (INTAKE) and Child and Family Services Information System (CFSIS). Details include case category, case status, and data fields related to each category. Health, well-being, school, and maltreatment/injury indicators are also included. The data also includes foster care usage and capacity details (Manitoba Centre for Health Policy, 2020).

# Chapter 9: Maternal and Neonatal Outcomes for Women with Type 2 Diabetes

The maternal analyses were completed in two parts. The first part examined outcomes for all women ages 14-40 in the T2DM cohort in the study period 2011/12-2016/17. The second part considered pregnant women in the cohort matched 1:3 to pregnant women without any diagnosis/treatment for diabetes (ever). The data window is such that only ICD-10 codes are needed for the hospital abstracts but ICD-9 is used for medical claims.

## Population Descriptives

Time period: 2011/12 - 2016/17

This indicator counted all live births in Manitoba (see Live Births definition).

Calculate, overall and by ethnicity, with no maternal age restriction:

- RHA distribution
- Income quintile distribution (rural/urban, at delivery)
- SEFI (at delivery)
- Maternal age (mean, median)
- Gestational age
- Mean/median/IQR for each mom's A1C closest to the delivery date, noting how many
- did not have an A1C during pregnancy, i.e., the N for this one will be smaller than the group
- Birthweight (mean/median)
- Maternal parity (1,2,3+)
- NICU stay (yes/no)

## Live Births (Fertility Rate)

Live birth rates were calculated for women of all ages in the diabetes cohort. Crude rates per person-year were calculated by age. Crude and age-adjusted rates per person-year were calculated by ethnicity and geography.

## Perinatal Deaths

This indicator includes stillbirths and neonatal deaths.

Crude rates were calculated per total number of live and stillbirths, by ethnicity.

The denominator included all females in the diabetes cohort ages 14-40.

## Maternity Matched Cohort

For the matched analysis, one delivery was selected per mother PHIN. Mothers were matched on birth year (age of mom) +/- 2 years, ethnicity, RHA zone at delivery, and primipara (yes/no). The cohort was limited to live singleton births only.

## T2DM Matched Cohort Descriptives

Time period: 2011/12 - 2016/17

We identified live births to women in the diabetic cohort and their matched controls. Live births are defined in the live birth section. The analysis was limited to women ages 14-40 (age restriction when building cohort).

We calculated the following, overall and by ethnicity, with no maternal age restriction:

- RHA distribution
- Income quintile distribution (rural/urban, at delivery)
- SEFI (at delivery)
- Maternal age (mean, median)
- Gestational age
- Mean/median/IQR for each mom's A1C closest to the delivery date, noting how many did not have an A1C during pregnancy, i.e., the N for this one will be smaller than the group
- Birthweight (mean/median)
- Maternal parity (1,2,3+)
- NICU stay (yes/no)

## Antenatal Hospitalizations – Perinatal Atlas Definition

Time period: 2011/12 - 2016/17

Crude rates and relative risks were calculated by diabetes status and ethnicity.

All inpatient hospitalizations during pregnancy with a pregnancy-related diagnosis, excluding the birth hospitalization (the hospitalization resulting in a delivery).

ICD-10-CA codes: O10-O16, O20-O26, O28-O48, O61-O69, O71, O74, O75, O88, O91, O92, O95, O98, O99, Z32.1, Z33, Z34, Z35

The perinatal atlas definition counted each hospitalization in the rates, i.e., there could be multiple hospitalizations per person.

The denominator was all members of the matched cohort.

## Antenatal Hospitalizations – as Indicator Variable

Time period: 2011/12 - 2016/17

All inpatient hospitalizations with a pregnancy-related diagnosis. All hospitalizations during pregnancy but not including the birth hospitalization (the hospitalization resulting in a delivery).

The following ICD-10-CA codes were used: O10-O16, O20-O26, O28-O48, O61-O69, O71, O74, O75, O88, O91, O92, O95, O98, O99, Z32.1, Z33, Z34, and Z35.

As an indicator variable, this definition counted only one hospitalization per person (i.e., per pregnancy) in the rates.

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator was all members of the matched cohort.

## Distance/Travel for Delivery

Time period: 2011/12 - 2016/17

For this indicator, frequency tables were generated by diabetes status and ethnicity.

Location of delivery, based on the mother's delivery record, was classified into three groups:

1. Home RHA hospital – mother gave birth in a hospital in her RHA of residence,
2. Winnipeg hospital – mother gave birth in a Winnipeg hospital but was not a Winnipeg resident, and
3. Other RHA hospital – mother gave birth in a hospital that was neither her home RHA nor a Winnipeg hospital.

Births that were to residents of Winnipeg and who gave birth in Winnipeg were classified as home RHA hospital births. Residents of Churchill who gave birth in Winnipeg were classified as a Winnipeg hospital births. Churchill residents who gave birth in Churchill were classified as home RHA hospital births.

The denominator included all members of the matched cohort.

## Excess Hospital Days during Birth Hospitalization Episode (Length of Stay)

Time period: 2011/12 - 2016/17

Excess hospital days were calculated by subtracting the average annual length of stay for Manitoba births from the actual birth hospitalization episode length of stay.

Average excess birth hospital days were calculated by NICU admission (yes/no), diabetes status, and ethnicity.

The denominator included all members of the matched cohort.

## Neonatal Length of Stay

Time period: 2011/12 - 2016/17

The average birth hospital episode length of stay per infant was calculated by NICU admission (yes/no), diabetes status, and ethnicity.

The denominator included all members of the matched cohort.

## NICU Admission

Time period: 2011/12 - 2016/17

Admission to a neonatal special care unit during the birth hospitalization episode (birth hospitalization and any subsequent transfers).

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator included all members of the matched cohort.

## Gestational Age at Birth

Time period: 2011/12 - 2016/17

Gestational age at birth grouped into 0-33, 34-36, 37-38, 39-40, 41+ weeks.

Frequency tables were generated by diabetes status and ethnicity.

The denominator included all members of the matched cohort.

## Appropriate Initiation of Prenatal Care

Time period: 2011/12 - 2016/17

Trimester at first prenatal visit was determined from the medical claims. A patient was considered to have appropriate initiation of prenatal care if prenatal care began in first trimester.

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The following ICD-9 tariffs were identified: 8400, 8401, 8501, 8507, 8509, 8529, 8540, 8550.

The denominator was all members of the matched cohort.

## C-Section Delivery

Time period: 2011/12 - 2016/17

This indicator was identified using the CSECT variable on the delivery hospital record.

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator was all members of the matched cohort.

## Operative Vaginal Delivery

Time period: 2011/12 - 2016/17

The following intervention codes were identified on the delivery hospital record: 5MD55, 5MD54, 5MD53KL, 5MD53KK, 5MD53KN, 5MD53KM, 5MD53KJ, 5MD53KH, 5MD53KS, 5MD53KP, 5MD53JE, 5MD53JD.

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator was all members of the matched cohort.

## Induction of Labour

Time period: 2011/12 - 2016/17

The following intervention code was identified on the delivery hospital record: 5AC30

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator was all members of the matched cohort.

## Maternal Mortality/Severe Morbidity

Time period: 2011/12 - 2016/17

This indicator was identified with the following:

1. Maternal death, AND
2. One of the following morbidities: eclampsia; rupture of uterus during labour; puerperal sepsis; HIV disease; cardiac arrest; cardiac failure or myocardial infarction; assisted ventilation; hysterectomy, open approach; blood transfusion; repair of bladder, urethra, or intestine; embolization/ligation/suture uterus for postpartum hemorrhage; placenta previa with hemorrhage and blood transfusion; postpartum hemorrhage and blood transfusion; and postpartum hemorrhage and hysterectomy (Heaman et. al., 2012).

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator included all members of the matched cohort.

## Maternal Readmission within 90 Days of Discharge

Time period: 2011/12 - 2016/17

Maternal readmission within 90 days of discharge from delivery hospitalization. The most responsible diagnosis on the hospital separations were classified into pregnancy-related complications and non-pregnancy-related complications. Crude rates and relative risks were calculated by diabetes status and ethnicity.

In addition, pregnancy- and non-pregnancy related complications were combined and a separate analysis was run for maternal readmissions overall.

Episodes are counted here, not separations. Boarders were excluded as readmissions (ICD-10-CA Z763).

Pregnancy-related complications were included: ICD-10-CA codes O86004, O85004, O72204, O13004, N939, N61, N719, N739, N821, N838, N920, N938, O10004, O14004, O72104, O74504, O86104, O86204, O86404, O87204, O87904, O88204, O89404, O89504, O90004, O90104, O90204, O90804, O91104,O91104, O98804, O99004, O99304, O99404, O99604, O99804, Z390, Z392.

All other diagnoses were considered to be non-pregnancy-related.

The denominator included all members of the matched cohort.

## Average for Gestational Age

Time period: 2011/12 - 2016/17

The definition of average-for-gestational age was guided by the validation paper by Sellers et al. (Sellers, Dean, Shafer, et al., 2016). Infants were classified as average-for-gestational age based on their sex-specific birth weight and gestational age.

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator included all members of the matched cohort.

## Large for Gestational Age

Time period: 2011/12 - 2016/17

The definition of average-for-gestational age was guided by the validation paper by Sellers et al. (Sellers, Dean, Shafer, et al., 2016). Infants were classified as large-for-gestational age based on their sex-specific birth weight and gestational age.

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator included all members of the matched cohort.

## Small for Gestational Age

Time period: 2011/12 - 2016/17

The definition of average-for-gestational age was guided by the validation paper by Sellers et al. (Sellers, Dean, Shafer, et al., 2016). Infants were classified as small-for-gestational age based on their sex-specific birth weight and gestational age.

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator included all members of the matched cohort.

## Neonatal Readmission within 30 Days of Discharge

Time period: 2011/12 - 2016/17

Episodes are counted here, not separations. Boarders were excluded as readmissions (ICD-10-CA Z76).

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator included all members of the matched cohort.

## Congenital Anomalies

Time period: 2011/12 - 2016/17

Congenital anomalies were defined as the following ICD-10-CM codes on the birth hospitalization record: E7-E9 (not E86-87, E84), Q0, Q2 (not Q2.11, Q2.50, Q2.70), Q30.0-Q30.1, Q31-Q37, Q39-Q45, Q50-Q51, Q52 (not Q52.5), Q56, Q60-Q64, Q71-Q75, Q77-Q78, Q79.0, Q79.2-Q79.4, Q79.8, Q80-Q81, Q82.0-Q82.4, Q85-Q89, Q9.

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator included all members of the matched cohort.

## Birth Trauma

Time period: 2011/12 - 2016/17

Birth trauma was defined as the following ICD-10-CM codes on the birth hospitalization record: P10-11, P13-15.

Crude rates and relative risks were calculated by diabetes status and ethnicity.

The denominator included all members of the matched cohort.

# Chapter 10: Mental Health Outcomes among Manitobans with Type 2 Diabetes

## Hospitalization Rates

Time period: Period during which we looked for hospitalizations is defined by the following dates:

StartDt = Latest date among (age18, start_MHcoverage, 01jan1984)
EndDt = Earliest date among (end_MHcoverage, 31mar2017)
01jan1984 – the date when MH starts assigning PHINs
31Mar2017 – end of study period

Inpatient (TRANSACT=1) hospitalization episode rates (per 1,000 "person years") where the episode separation date (_episode_sepdt) during the year prior to diabetes diagnostic date, diagnostic "month", and 20 consecutive years after diagnostic month.

The diagnostic "month" is: [diagdt - 30, diagdt +30)

Hospitalizations for diabetic ketoacidosis (DKA) are defined as having DKA codes in most responsible diagnostics (diag01) of the hospitalization abstract.

ICD10 codes for DKA: 'E101'-'E101Z', 'E111'-'E111Z', 'E121'-'E121Z', 'E131'-'E131Z', 'E141'-'E141Z'
ICD9 codes for DKA diagnostic codes: '2501'-'2501Z'
ICD 10 codes for coma: 'E100'-'E100Z', 'E110'-'E110Z', 'E120'-'E120Z', 'E130'-'E130Z', 'E140'-'E140Z'
ICD 9 codes for coma diagnostic '2503'-'2503Z'.

## Proportion of Adults who died from Suicide per 1,000 Person Years

Time period: Period during which we looked for suicides is defined by the following dates:

StartDt = Latest date among (age18, start_MHcoverage, 01jan1984)
EndDt = Earliest date among (end_MHcoverage, 31mar2017)
01jan1984 – the date when MH starts assigning PHINs
31Mar2017 – end of study period

Crude annualized rates of suicide were calculated by ethnicity, sex and age group. Relative risks were calculated and statistically compared for First Nations and non-First Nations groups.

- Suicides were defined as any death record in Vital Statistics Registry with any of the following causes:
- Intentional self–harm: ICD–10–CA codes X60–X84
- Late effects of intentional self–harm: ICD–10–CA code Y87.0
- Poisoning of undetermined intent: ICD–10–CA codes Y10–Y19
- Other events of undetermined intent: ICD–10–CA codes Y20–Y34
- Late effects of other events of undetermined intent: ICD–10–CA codes Y87.2.

Events of undetermined intent were included for the purposes of developing a more "inclusive" definition in an attempt to overcome suspected under-counting of suicides in administrative data; however accidental poisonings were not included in the counts of suicide deaths as the uncertainty around the cause of death was too high.

Suicide is defined as record from Vital Statistics Mortality Registry with the ICD codes below.

Codes: suicide and self-inflicted injury ICD9: E950-E959; ICD10: X60-X84, and Y870

Codes: injury undetermined intent ICD9: E980-E989, ICD10: Y10-Y34, and Y872

The denominator included all members of the cohort in 2011/12-2012/13, age 10+. Note that this indicator used a different cohort than the rest of the indicators to allow for four years of follow-up after cohort identification to examine mortality.

## Proportion of Adults who Attempted Suicide per 1,000 Person Years

Time period: Period during which we looked for attempted suicide is defined by the following dates:

StartDt = Latest date among (age18, start_MHcoverage, 01jan1984)
EndDt = Earliest date among (end_MHcoverage, 31mar2017)
01jan1984 – the date when MH starts assigning PHINs
31Mar2017 – end of study period

Attempted suicide is defined as hospitalization with ICD codes below in any diagnostic field. Brain death hospital admissions are excluded from analysis (i.e., admitstatus ^= '6').

- Suicide and self-inflicted injury ICD9: E950-E959; ICD10: X60-X84, and Y870
- Injury undetermined intent ICD9: E980-E989, ICD10: Y10-Y34, and Y872

## Proportion of Adults with Mood and Anxiety Before and After Diabetes Diagnosis

Time period: Period during which we identified mood and anxiety disorders is defined by the following dates:

StartDt = Latest date among (age18, start_MHcoverage, 01apr1995)
EndDt = Earliest date among (end_MHcoverage, 31mar2017)
01apr1995 – the date when MCHP started receiving DPIN data, i.e., prescription dispensations.
31Mar2017 – the end of the study period
Before/after analysis limited to people with 5+ years before/after diagnostic.

Mood and anxiety was identified with the following:

- 1+ Hospitalizations (any diagnostic code) with

  ICD-9-CM codes 296.1-296.8, 300.0, 300.2-300.4, 300.7, 309, 311 or
  ICD-10-CA codes F31, F32, F33, F34.1, F38.0, F38.1, F40, F41.0-F41.3,
  F41.8, F41.9, F42, F43.1, F43.2, F43.8, F45.2, F53.0, F93.0, OR

- 1+ Physician visits (prefix=7) with ICD-9-CM codes 296, 311, OR

- 1+ Hospitalizations (any diagnostic code) with ICD-9-CM code 300 or ICD-10-CA codes

  F41.4-F41.7, F44, F45.0, F45.1, F48, F68.0, F99 AND 1+ Rx within 5 years, OR

- 1+ Physician visits (prefix=7) with ICD-9-CM code 300 AND 1+ Rx within 5 years, OR

- 3+ Physician visits (prefix=7) with ICD-9-CM codes 300 or 309 (must be 3 of same diagnostic code) within 5 years (between 1st and 3rd visit).

The following drugs to treat mood and anxiety disorders were included:

- Antidepressants, ATC code N06A
- Benzodiazepine Derivatives Anxiolytics, ATC code N05BA
- Lithium, ATC code N05AN01

The relative rates were estimated using GEE (repeated subject=casephin /type=unstr covb;)

## Proportion of Adults with Substance Use per 1,000 Person Years

Time period: Period during which we identified substance use is defined by the following dates:

StartDt = Latest date among (age18, start_MHcoverage, 01jan1984)
EndDt = Earliest date among (end_MHcoverage, 31mar2017)
01jan1984 – the date when MH starts assigning PHINs
31Mar2017 – end of study period.

An adult is considered to have a diagnosis of substance use disorders in either time period when he/she meets at least one of the following criteria:

- one or more hospitalization with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs in any diagnostic field: ICD-9-CM codes 291 (alcoholic psychoses), 292 (drug psychoses), 303 (alcohol dependence), 304 (drug dependence), or 305 (nondependent abuse of drugs) or ICD-10-CA codes F10-F19, F55, Z50.2 and Z50.3.
- one or more physician visits with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs: ICD-9-CM codes 291 (alcoholic psychoses), 292 (drug psychoses), 303 (alcohol dependence), 304 (drug dependence), or 305 (nondependent abuse of drugs). (Chartier, Brownell, MacWilliam, et al., 2016).

## Proportion of Adults with Atypical Antipsychotic Prescriptions per 1,000 Person Years

Time period: Period during which we identified Antipsychotic prescriptions is defined by the following dates:

StartDt = Latest date among (age18, start_MHcoverage, 01jan1984)
EndDt = Earliest date among (end_MHcoverage, 31mar2017)
01jan1984 – the date when MH starts assigning PHINs
31Mar2017 – end of study period

The following ATC codes were used to define atypical antipsychotic prescriptions:

| | |
|---|---|
| N05AE04 | ziprasidone |
| N05AE05 | lurasidone |
| N05AH02 | clozapine |
| N05AH03 | olanzapine |
| N05AH04 | quetiapine |
| N05AH05 | asenapine |
| N05AX08 | risperidone |
| N05AX12 | aripiprazole |
| N05AX13 | paliperidone |
| N05AX16 | brexpiprazole |

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