

SGLT2i use in adults with chronic kidney disease: A cross-sectional study identifying care gaps to inform knowledge translation

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SUPPLEMENTAL MATERIALS

Administrative Databases Used

We performed a cross-sectional study using administrative databases of Alberta Health and Alberta Health Services, in the Canadian province of Alberta. The specific databases used were Population Registry, Vital Statistics – Deaths, Practitioner Claims, Ambulatory Care, Discharge Abstract Database, laboratory results repository, and Pharmaceutical Information Network (PIN) database. The Ambulatory Care database captures visits to the Emergency Department and other health care facilities for day procedures. While pharmaceuticals are not universally funded in Alberta, all point-of-sale drug dispensations are uploaded to PIN from Alberta pharmacies, with over > 95% participation since 2008. Each Alberta resident has a unique personal health care number allowing linkage of data across databases. Data linkage via Alberta Kidney Disease Network was based on a scrambled version of the personal health care number which was still unique to each individual.

Supplement Table S1: Classification of proteinuria

Proteinuria severity	UACR	UPCR	Semi-quantitative dipstick
None / mild	<3 mg/mmol	<15 mg/mmol	Negative or trace
Moderate	3-30 mg/mmol	15-50 mg/mmol	1+
Severe	31-220 mg/mmol	51-359 mg/mmol	2+ or 3+
Nephrotic range	> 220 mg/mmol	> 350 mg/mmol	4+

UACR – Spot urine albumin-to-creatinine ratio

UPCR – Spot urine protein-to-creatinine ratio

Supplemental Table S2: Administrative Database Definitions

Variable	Data source	Notes
Diabetes	Discharge Abstracts Database Practitioner Claims	1 hospitalization or 2 claims in 2 years or less for ICD-9 250 or ICD-10 E10-E14. ^{1,2}
CKD	Laboratory Results Repository	As defined in the main paper, using serum creatinine and eGFR data. This is considered to be gold standard for determination of CKD status, whereas ICD-based diagnostic codes are known to be insensitive. ³
SGLT2i use	Pharmaceutical Information Network	Pharmaceutical Information Network captures nearly all dispensations at point-of-care pharmacies, and has been validated against payment-based claims data. ⁴ ATC codes A10BK** A10BD15-16,19 A10BD20-21,23-25 (As a regular expression: A10B(K D(1[569] 2[01345]))) Prior to 2018 ATC codes A10BX09, A10BX11, and A10BX12 also identified SGLT2i. As our SGLT2i variable involved current use as of March 31, 2019, these codes were not relevant to the present work.
Sociodemographics (age, sex, rural residence, neighbourhood income quintile)	Population Registry	Neighbourhood income quintile based on postal code forward sortation area linkage to Statistics Canada data. Area-level measures are commonly used indicators of material deprivation. Concordance with individual-level income may be poor but area-level measures are nonetheless predict disparities in health outcomes and are considered important constructs in their own right. ⁵
Renal function indices (serum creatinins, eGFR, CKD stage, proteinuria, ACEi or ARB use)	Laboratory Results Repository	Laboratory results repository contains all relevant Alberta results, with the major limitation being that measurements are collected in the course of routine clinical care and may not have been ordered or completed by all individuals.
Diabetes (HbA1c, insulin use)	Pharmaceutical Information Network	ACEi / ARB status based on Drug Identification Number (DIN) search. Insulin use based on ATC codes: Basal insulin A10AC,AE,AD Bolus insulin A10AB,AD
Comorbidities (HF, CAD, stroke)	Discharge Abstracts Database Practitioner Claims	Heart failure: 1 hospitalization or 2 claims in 2 years or less, of ICD-9 398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 425.4–425.9, 428; or ICD-10 I09.9, I25.5, I42.0, I42.5–I42.9, I43, I50. ⁶ Coronary artery disease: 1 hospitalization (ICD-10 I20-25) single claim / hospitalization for PCI or CABG (CCPX 48.1, 51.59; CCI 1IJ50, 1IJ57GQ, 1IJ76), or 2 claims within 1 year (ICD-9 410, 412, 413). ⁷ Stroke: 1 most responsible or post-admittance hospitalization or 1 claim or 12 most responsible ED ambulatory code of ICD-9 362.3, 430, 431, 433.x1, 434.x1, 435, 436; ICD-10 G45.0-G45.3, G45.8-G45.9, H34.1, I60, I61, I63, I64. ⁶
Health care utilization (FP, endocrinology, nephrology, internal medicine, cardiology visits)	Practitioner Claims	Administrative databases have been shown to agree well with patient self-report of ambulatory physician utilization. ⁸ FP visits: Claims for CCPX codes "03.03A", "03.03E", "03.04A", "03.08A", "03.08AZ" with provider specialty indicated as GP. Medical specialist visits: Claims for CCPX codes "03.08A", "03.04A", "03.03F", "03.03A", "03.08AZ", "03.03FV", "03.03FZ", "03.04AZ" with provider specialty indicated as INMD, CARD, E/M, or NEPH.

Supplement Table S2 References

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Appendix 1, as supplied by the authors. Appendix to: Lau D, Pannu N, Yeung RO, et al. Use of sodium–glucose cotransporter 2 inhibitors in Alberta adults with chronic kidney disease: a cross-sectional study identifying care gaps to inform knowledge translation. *CMAJ Open* 2023. doi: 10.9778/cmajo.20210281. Copyright © 2023 The Author(s) or their employer(s). To receive this resource in an accessible format, please contact us at cmajgroup@cmaj.ca.

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Supplement Table S3: Adjusted odds ratios for predictors of SGLT2i use in all adults with DM, (both with and without SGLT2i-eligible CKD)

Variable		OR (95% CI)	P-value
CKD indication		0.91 (0.88-0.95)	<0.001
Sociodemographics			
Sex	Female	0.73 (0.71-0.75)	<0.001
Age	<= 44 years	0.59 (0.56-0.62)	<0.001
	45-54 years	0.98 (0.95-1.01)	0.251
	55-64 years (REF)	1.00	.
	65-74 years	0.79 (0.77-0.82)	<0.001
	75-84 years	0.38 (0.36-0.40)	<0.001
	>= 85 years	0.13 (0.12-0.15)	<0.001
Rural residence		0.95 (0.92-0.98)	0.005
Neighbourhood income quintile	1	0.81 (0.78-0.85)	<0.001
	2	0.94 (0.90-0.98)	0.002
	3	0.94 (0.90-0.98)	0.005
	4	1.01 (0.97-1.05)	0.757
	5 (REF)	1.00	.
Comorbidities and diabetes			
Heart failure		0.91 (0.87-0.96)	0.001
Coronary artery disease		1.17 (1.14-1.21)	<0.001
Stroke		0.94 (0.90-0.98)	0.005
Elixhauser index (per 5 units)		0.94 (0.94-0.95)	<0.001
HbA1c	<= 7.0%	0.23 (0.22-0.23)	<0.001
	> 7.0% and <= 9.0% (REF)	1.00	.
	> 9.0%	0.76 (0.74-0.79)	<0.001
Insulin	Basal insulin only	2.42 (2.34-2.51)	<0.001
	Bolus +/- basal insulin	1.27 (1.23-1.32)	<0.001
Health care utilization in the previous year			
FP visits	No FP visits (REF)	1.00	.
	2-4 FP visits	4.63 (4.27-5.02)	<0.001
	>4 FP visits	5.83 (5.38-6.32)	<0.001
Nephrologist	>= 1 visit	0.73 (0.67-0.79)	<0.001
Cardiologist	>= 1 visit	1.26 (1.21-1.32)	<0.001
Internist	>= 1 visit	1.64 (1.59-1.69)	<0.001
Endocrinologist	>= 1 visit	2.45 (2.30-2.61)	<0.001
Hospital admission	>= 1 admission	0.66 (0.63-0.70)	<0.001

Logistic regression including 320,488 of 446,315 adults with diabetes. CKD indication refers to the more expansive guideline-based definition of CKD in diabetes (definition (B) in the main paper). Abbreviations: OR – odds ratio (adjusted simultaneously for all other reported variables). 95% CI – 95% confidence interval. DM – diabetes. CKD – chronic kidney disease. REF – reference group or level. HbA1c – hemoglobin A1c / glycated hemoglobin. FP – family physician