Real-world Assessment of All-cause and Cardiovascular-related Inpatient Readmissions, Healthcare Resource Utilization, and Costs among Type 2 Diabetes Patients With and Without Chronic Kidney Disease

CO84

Lopes M[1], Ramsey S[2], Pantalone KM[3], Li Q[4], Singh R[4], Du Y[4], Williamson T[4], Nahar T[4], Kong SX[4]

[1] MMDLOPES, LLC, Cresskill, NJ, USA ; [2] Hutchinson Institute for Cancer Outcomes Research (HICOR), Fred Hutchinson Cancer Center, Seattle, WA, USA ; [3] Cleveland Clinic, Cleveland, Ohio, USA ;[4] Bayer U.S. LLC, Whippany, New Jersey, USA

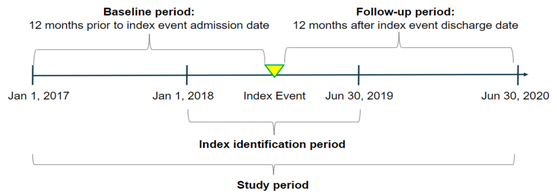
BACKGROUND & OBJECTIVE

- Presence of type 2 diabetes (T2D) is an independent risk factor for both macrovascular and microvascular complications such as cardiovascular (CV) disease and chronic kidney disease (CKD).[1-3]
- The prevalence of CKD among patients with T2D (over 40%) is projected to continue increasing which is of particular concern given diabetes-related CKD is among the leading causes of end stage kidney disease.[2]
- This study aimed to compare all-cause and CV-related 30-, 60-, and 90-day hospital readmission rates, healthcare resource utilization (HRU), and costs among T2D patients with and without CKD.

METHODS

- Data from the Optum electronic healthcare records (EHR) database (Jan1, 2017 to Jun 30, 2020) were used.
- Adult patients with T2D who were hospitalized for a CV event [myocardial infarction, unstable angina (UA), atrial fibrillation (a-fib), peripheral arterial disease, coronary revascularization, ischemic stroke, or heart failure (HF)] were included.
- The index event was defined as the earliest CV event hospitalization to occur during the index identification period. **(Figure 1)**
- Statistical analyses
  - -Study cohorts, namely T2D with CKD and T2D without CKD, were propensity matched 1:1 using greedy nearest neighbor algorithm on age, gender, geographical region, race, payor type, health plan type and Charlson comorbidity index score excluding T2D and CKD.
  - -Categorical and continuous variables were analyzed using Chi-square and Student's t tests, respectively.

Figure 1. Study design diagram



RESULTS

- In propensity-matched cohorts, a total of 17,643 patients in each cohort were included in the study. (**Table 1**)

Table 1. Baseline characteristics of matched cohorts

	All patients N = 35,286		T2D with CKD N = 17,643		T2D without CKD N = 17,643	
Demographics, n (%)						
Age ≥ 65	30,948	(87.7%)	15,633	(88.6%)	15,315	(86.8%)
Female	17,602	(49.9%)	8,801	(49.9%)	8,801	(49.9%)
Race						
Caucasian	23,398	(66.3%)	11,699	(66.3%)	11,699	(66.3%)
African American	6,098	(17.3%)	3,049	(17.3%)	3,049	(17.3%)
Asian	872	(2.5%)	436	(2.5%)	436	(2.5%)
Hispanic	4,918	(13.9%)	2,459	(13.9%)	2,459	(13.9%)
Comorbidities, n (%)						
Hypertension	33,702	(95.5%)	17,298	(98.0%)	16,404	(93.0%)
Hyperlipidemia	30,251	(85.7%)	15,584	(88.3%)	14,667	(83.1%)
Microvascular complications	30,164	(85.5%)	17,278	(97.9%)	12,886	(73.0%)
Obesity	14,651	(41.5%)	8,113	(46.0%)	6538	(37.1%)
Prior CV hospitalization, n (%)						
UA	2,997	(8.5%)	1,899	(10.8%)	1,098	(6.2%)
AF	2,022	(5.7%)	1,276	(7.2%)	746	(4.2%)
HF	2,622	(7.4%)	1,870	(10.6%)	752	(4.3%)
Prior overall hospitalization	8,117	(23.0%)	4,741	(26.9%)	3,376	(19.1%)

- The majority of patients were 65 years or older (87.7%), Caucasian (66.3%), and had hypertension (95.5%) or hyperlipidemia (85.7%)

Table 3. Medical and prescription costs among study cohorts

	All patients N = 35,286	T2D with CKD N = 17,643	T2D without CKD N = 17,643
Medical cost (inpatient and outpatient costs), mean (SD)			
all-cause cost	$24,651 ($47,551)	$29,490 ($52,935)	$19,812 ($40,906)*
CV-related cost	$19,719 ($43,811)	$24,474 ($49,387)	$14,964 ($36,805)*
Prescription cost, mean (SD)	$8,319 ($16,503)	$9,061 ($17,048)	$7,578 ($15,905)*

*indicates significant difference (P<0.05) comparing the T2D with CKD cohort with T2D without CKD

- T2D with CKD cohort had higher all-cause and CV-related medical cost as well as higher prescription cost than T2D without CKD cohort.

Table 2. All-cause and CV-related readmission rates at 30-, 60-, and 90-day post-discharge among study cohorts

	All patients N = 35,286	T2D with CKD N = 17,643	T2D without CKD N = 17,643
All-cause readmission			
30-day readmission	4,144 (12%)	2,369 (13%)	1,775 (10%)*
60-day readmission	5,872 (17%)	3,395 (19%)	2,477 (14%)*
90-day readmission	7,065 (20%)	4,059 (23%)	3,006 (17%)*
CV-related readmission			
30-day readmission	3,582 (10%)	2,101 (12%)	1,481 (8%)*
60-day readmission	5,120 (15%)	3,031 (17%)	2,089 (12%)*
90-day readmission	6,187 (18%)	3,634 (21%)	2,553 (14%)*

*indicates significant difference (P<0.05) comparing the T2D with CKD cohort with T2D without CKD

- T2D with CKD cohort had higher all-cause and CV-related readmission rates at 30-, 60-, and 90-days post discharge compared to T2D without CKD cohort

Table 4. Healthcare resource utilization among study cohorts

	All patients N = 35,286	T2D with CKD N = 17,643	T2D without CKD N = 17,643
Length of stay of readmission, days, mean (SD)			
all-cause readmission	7.7 (22.1)	9.7 (24.9)	5.8 (18.7)*
CV-related readmission	6.6 (20.0)	8.5 (22.4)	4.7 (17.1)
No. of outpatient claims, mean (SD)			
all-cause outpatient claims	7.7 (11.1)	8.1 (11.4)	7.4 (10.8)*
CV-related outpatient claims	4.5 (6.5)	4.7 (6.8)	4.2 (6.3)*
No. of office visits, mean (SD)	11.5 (8.0)	12.5 (8.4)	10.6 (7.4)*
No. of ER visits, mean (SD)	1.6 (2.4)	1.8 (2.6)	1.4 (2.2)*
No. of prescription fills, mean (SD)	37.4 (21.0)	39.6 (21.3)	35.2 (20.4)*

*indicates significant difference (P<0.05) comparing the T2D with CKD cohort with T2D without CKD cohort.

- T2D with CKD cohort had approximately double the mean length of stay for both all-cause and CV-related readmission, higher all-cause and CV-related outpatient services utilization, and higher pharmacy prescription fills.

CONCLUSIONS

- T2D patients with CKD have consistently higher readmission rates, healthcare resource utilization, and medical costs for all-cause and CV-related events, compared to T2D patients without CKD.
- This study evaluated the incremental burden of CKD among T2D patients, emphasizing the importance of treating the comorbidity of CKD for clinicians when managing their T2D patients.
- This study also contributes to further research hypothesis generation to identify opportunities for cost savings and efficiencies in therapy to optimize care for T2D patients with CKD.

LIMITATIONS

- Optum database is representative of only a subset of the commercially insured U.S. population and may not be generalized to other populations such as those insured by Medicaid.
- Readmissions to a healthcare provider not covered by one of the health plans included in the database could not be captured.
- Administrative claims data are collected for the purpose of facilitating payment for healthcare services; therefore, definitive diagnoses and data on disease severity are not available.
- Information derived from medical billing codes may be subject to omissions and errors, or other differences in billing and reimbursement practices of clinicians and individual insurance plans.

CONFLICT OF INTEREST

Funding for this research was provided by Bayer U.S. LLC. (Bayer); the study sponsor was involved in all stages of the study research and poster preparation.

REFERENCES

1. Strojek K, Raz I, Jermendy G, et al. Factors associated with cardiovascular events in patients with type 2 diabetes and acute myocardial infarction. J Clin Endocrinol Metab. 2016;101(1):243-253.
2. Bailey RA, Wang Y, Zhu V, Rupnow MFT. Chronic kidney disease in US adults with type 2 diabetes: an updated national estimate of prevalence based on Kidney Disease: Improving Global Outcomes (Kdigo) staging. BMC Res Notes. 2014;7:415.
3. Hamada S, Gulliford MC. Multiple risk factor control, mortality and cardiovascular events in type 2 diabetes and chronic kidney disease: a population-based cohort study. BMJ Open. 2018;8(5):e019950.

Presented at ISPOR 2023 (May 7-10), Boston, MA, USA

Corresponding author: Qixin Li (qixin.li.ext@bayer.com)