Clinical Outcomes and Healthcare Resource Utilization in Patients with T2D and CKD from Two New-User Medication Cohorts

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Abstract number: BA2025-0778

BACKGROUND & OBJECTIVES

- Type 2 diabetes mellitus (T2D) and chronic kidney disease (CKD) are prevalent comorbid conditions that significantly increase morbidity and mortality [1].
- The treatment landscape has evolved with the introduction of new therapeutic options, including sodium-glucose cotransporter 2 inhibitors (SGLT2i) and glucagon-like peptide-1 receptor agonists (GLP-1 RA) [2].
- This study aims to describe the incidence rates of clinical outcomes and the healthcare resource utilization (HRU) in a real-world setting among two new-user medication cohorts of SGLT2i and GLP-1 RA.

METHODS

- **Study design:** Retrospective cohort study
- **Study period:** January 1, 2012, to December 31, 2019 (To avoid COVID-19 interruptions)
- **Study population:** Adults diagnosed with T2D and CKD, and continuously used SGLT2i or GLP-1 RA during the study period. Index date defined as the first valid prescription of study drug during study period.
- **Current use period:** From the day after the index date to the end of supply for consecutive prescriptions. Any medication within the corresponding medication class were jointly considered.
- **Data source:** Tianjin Healthcare and Medical Big Data Platform, a regional electronic health record (EHR) database covering about 15 million residents in Tianjin, China.
- **Statistical Analysis:** Descriptive statistics were used to summarize patient characteristics and HRU over time. Incidence rates of kidney failure and cardiovascular events were calculated per 100 person-years.

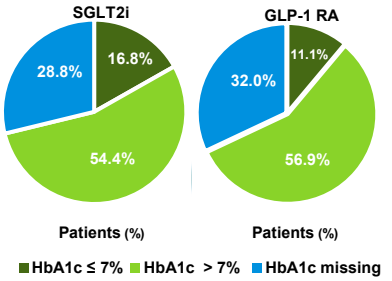
RESULTS

- A total of **935** and **4,821** patients were included in the **SGLT2i and GLP-1 RA** medication cohorts, respectively. Both cohorts had similar T2D duration (mean: 5 years) and CKD duration (mean: 3 years). The **patient characteristics at baseline** are shown in **Table 1**.
- In SGLT2i and GLP-1 RA cohorts, 54.4% and 56.9% had **HbA1c >7%**, and mean **eGFR** were 90.6, and 97.2 mL/min/1.73m^2 at baseline. (**Figure 1**)
- The disease burden of **macrovascular and cardiovascular complications** was heavy for both medication cohorts at baseline. (**Figure 2**)

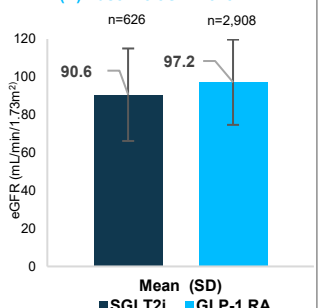
Table 1. Baseline characteristics for patients in study medication cohorts

	SGLT2i	GLP-1 RA
Age at index date (years)		
n (%)	935 (100.0%)	4,821 (100.0%)
Mean (SD)	59.1 (12.7)	55.7 (12.1)
Sex, n (%)		
Male	574 (61.4%)	2,685 (55.7%)
Female	361 (38.6%)	2,136 (44.3%)
Obesity, n (%)		
Yes (by diagnosis or BMI ≥ 30 kg/m²)	107 (11.4%)	992 (20.6%)
No	203 (21.7%)	811 (16.8%)
Missing	625 (66.8%)	3,018 (62.6%)
Smoking status, n (%)		
Current smoker	60 (6.4%)	259 (5.4%)
Former smoker	21 (2.2%)	94 (1.9%)
Non-smoker	178 (19.0%)	1,050 (21.8%)
Missing	676 (72.3%)	3,418 (70.9%)
Duration of T2D (years)		
n (%)	935 (100.0%)	4,821 (100.0%)
Mean (SD)	5.2 (2.9)	5.0 (3.1)
Duration of CKD (years)		
n (%)	935 (100.0%)	4,821 (100.0%)
Mean (SD)	3.2 (2.8)	3.3 (2.6)
UACR		
Count with baseline value, n (%)	115 (12.3%)	1,128 (23.4%)
Baseline value, median (Q1, Q3)	42.5 (13, 261)	40.1 (13, 184)
Serum potassium		
Count with baseline value, n (%)	468 (50.1%)	2,333 (48.4%)
Baseline value, mean (SD)	4.3 (1.4)	4.1 (0.6)

Figure 1. (A) Baseline HbA1c level



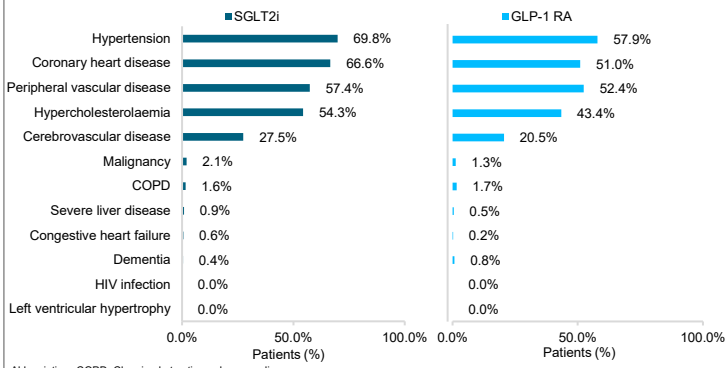
(B) Baseline eGFR level



Note: n specifies the number of patients with baseline eGFR value captured

Abbreviation: HbA1c, haemoglobin A1c (glycated haemoglobin); eGFR, estimated glomerular filtration rate; UACR, urinary albumin-to-creatinine ratio

Figure 2. Baseline comorbidities for patients in study medication cohorts



Abbreviation: COPD, Chronic obstructive pulmonary disease

Note: Malignancy include cancers other than kidney cancer and non-melanoma skin cancers.

Clinical Outcomes:

- The vast majority (>75%) of the kidney failure and cardiovascular events were developed within 6-month follow-up period.
- The incidence rate of **kidney failure events** for both medication cohorts were comparable with similar studies among Chinese population [3]. (**Table 2**)
- **Acute coronary syndrome** exhibited the highest incidence rate among all cardiovascular outcomes, and most of the captured events were unstable angina. (**Table 2**)

Table 2. Incidence rate of outcome events for patients in study medication cohorts

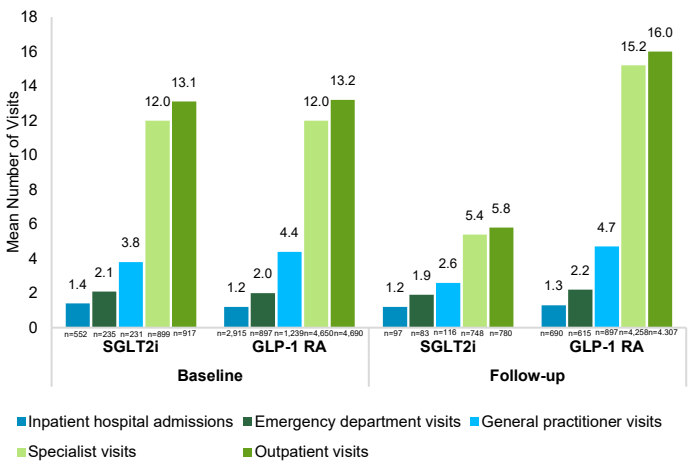
	SGLT2i	GLP-1 RA
Kidney failure	3.1 (1.0, 7.3)	4.9 (3.9, 6.0)
Acute coronary syndrome	36.4 (27.0, 47.9)	12.4 (10.8, 14.2)
Heart failure	0.0 (NA)	0.1 (0.0, 0.3)
Atrial fibrillation	4.0 (1.5, 8.6)	1.9 (1.3, 2.7)
Stroke	1.9 (0.4, 5.5)	0.7 (0.4, 1.2)

Note: Incidence rate per 100 person-years with 95% CI.

HRU:

- The number of **specialist visits** were much higher than **general practitioner visits**, and there was also a much higher percentage of patients with specialist visit records in general. (**Figure 3**)
- There was no clear difference of HRU among the two medication cohorts. GLP-1 RA cohort seemed to have more **outpatient visits and specialist visits** during follow up, which should be caused by relatively longer current use period of patients in GLP-1 RA cohort. (**Figure 3**)

Figure 3. HRU during baseline and follow-up for patients in study medication cohorts



Note: n specifies the number of patients with certain types of medical visits captured.

CONCLUSIONS

- The study results fill the **knowledge gap** of the patient characteristics among T2D and CKD patients with usage of SGLT2i or GLP-1 RA in real-world settings in China.
- The study highlights the critical need for **regular monitoring** and **early treatment interventions** to reduce the residual risk of severe outcomes and high disease burden for these patients.
- **Optimizing the treatment options** for potential combination of different medications might be considered, especially with the introduction of novel treatments.
- These findings provide **valuable insights** into the real-world evidence of different therapeutic options for managing T2D and CKD, informing future research and clinical guidance.

FUNDING: This study was sponsored by Bayer AG, Berlin, Germany

DISCLOSURES: FL, AEF, and NGO are employees of Bayer AG. ZX, SW and YL are employees of Bayer Healthcare Company Ltd. HW is employee of IQVIA Ltd. LC received research funding from AstraZeneca and Eli Lilly. Other authors declare no competing interests.

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