

Geographic Variations in Healthcare Resource Utilization and Costs and their Associations with Albuminuria Testing in Patients with Chronic Kidney Disease and Type 2 Diabetes

Keith A. Betts¹, Jinlin Song¹, Yao Wang¹, Jay Elliott², Neil Warnock², Ryan Farej², Rakesh Singh²

¹ Analysis Group, Inc., Los Angeles, CA, USA; ² Bayer U.S. LLC., Whippany, NJ, USA

BACKGROUND & OBJECTIVE

- Urine albumin-to-creatinine ratio (UACR) is an essential marker of early renal impairment in patients with type 2 diabetes (T2D)¹
- Therefore, regular monitoring of UACR should be a part of chronic kidney disease (CKD) management in this population according to the KDIGO guidelines¹
- However, UACR testing is often underutilized in clinical practice²
- This study aimed to assess the UACR testing rates across US states along with the associated economic outcomes in patients with CKD associated with T2D

METHODS

- The study utilized the Optum Clinformatics[®] administrative claims data (January 1st, 2015 to December 31st, 2019), which comprised information of patients from commercial health plans and Medicare Advantage plans across all US states
- Patients with CKD and T2D (CKD+T2D) were included
- CKD was identified by International Classification of Diseases (ICD) 9/10 diagnosis codes - T2D was identified by ICD 9/10 diagnosis codes and the use of anti-diabetes medications • The index date was defined as the first date the patient had both CKD and T2D, and the study
- period was defined as the 1-year period after the index date
- Statistical analysis
- UACR testing rates were summarized as the proportion of patients with at least one UACR test in the 1-year study period
- Annual healthcare resource utilization (HRU) was summarized for all-cause inpatient, outpatient, and emergency room (ER) visits

– Annual all-cause total healthcare costs (2020 US dollars) included medical costs (inpatient, outpatient, ER, and other costs) and pharmacy costs in the 1-year study period

(b) Average annual healthcare costs across states (a) UACR testing rates across states WA ND* MT* MT* ND* OR OR Proportion of patients with SD* SD* JACR tests WY* WY* NE NV* NV* WV³ CO CO CA KS KS NC TΝ OK AZ AZ NM NM 15% TΧ * indicates states with < 200 patients

Figure 2. UACR testing rates, annual total healthcare costs, and their correlation

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- Pearson's correlation coefficient was calculated for the association of healthcare costs with UACR testing rates at the state level (states with < 200patients were excluded from this analysis)

RESULTS

- A total of 101,057 patients with CKD+T2D were included in the study (Figure 1) • The average UACR testing rate was 38.7%, consistently low across states ranging from 14.0% (Maine) to 58.9% (Hawaii) (Figure 2a)

Figure 1. Sample selection flowchart for patients with CKD+T2D



All-cause HRU and Healthcare Costs

- The average annual frequency of all-cause inpatient, outpatient, and ER visits was 0.49, 25.58, and 0.58, respectively, with large variations seen across states: – Inpatient visits ranged from 0.3 (Arizona) to 0.7 (Arkansas)
- Outpatient visits ranged 18.3 (Colorado) to 29.8 (Connecticut)
- ER visits ranged from 0.4 (Michigan) to 1.0 (Kansas)
- The average annual healthcare costs were \$28,636 and increased with CKD severity, with \$20,122 for stage 1, \$25,226 for stage 2, \$29,626 for stage 3, \$34,022 for stage 4, and \$38,072 for stage 5 (excluding patients with dialysis or kidney transplantations)
- Large variations in annual healthcare costs exist across states ranging from \$21,003 (Hawaii) to \$35,995 (Illinois) (Figure 2b)
- The three states with the highest healthcare costs were Illinois (\$35,995), Kentucky (\$34,245), and Oklahoma (\$33,557)
- The three states with the lowest healthcare costs were Hawaii (\$21,003), Arizona (\$22,052), and Utah (\$22,631)
- Of note, two out of the three states with the lowest healthcare costs had the highest UACR testing rates: Hawaii (58.9%) and Utah (53.1%)
- States with lower UACR testing rates tended to have higher healthcare costs (Pearson correlation coefficient: -0.55; p<0.01) (Figure 2c)

LIMITATIONS

- Medical services and lab tests obtained outside of a patient's plan were not captured; coding inaccuracy and errors may have led to misclassifications of patients with CKD + T2D and UACR tests
- Patients with dialysis or kidney transplantation were excluded. Therefore, stage 5 CKD patients in this study may not be representative of those in clinical practice



CONCLUSIONS

- Patients with CKD and T2D had high HRU and healthcare costs with large variations across states
- Higher UACR testing rates were associated with lower healthcare costs suggesting that improving UACR testing rates lead to reductions in healthcare costs
- The lack of sufficient UACR testing raises concerns about the management of CKD in patients with T2D

References

- . Eknoyan G, Lameire N, Eckardt K, et al. KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. *Kidney Int.* 2013;3(1):5-14.
- 2. Lee J, Chu C, Guzman D, et al. Albuminuria testing by race and ethnicity among patients with hypertension with and without diabetes. Am J Nephrol 2019:50:48-54.

Conflict of Interest:

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