

Patterns of Hospital Admissions Among Patients with Chronic Kidney Disease

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Disclosures

- KSG, DEC, and SMB are employees of DaVita Clinical Research
 - SMB's spouse is an employee of AstraZeneca

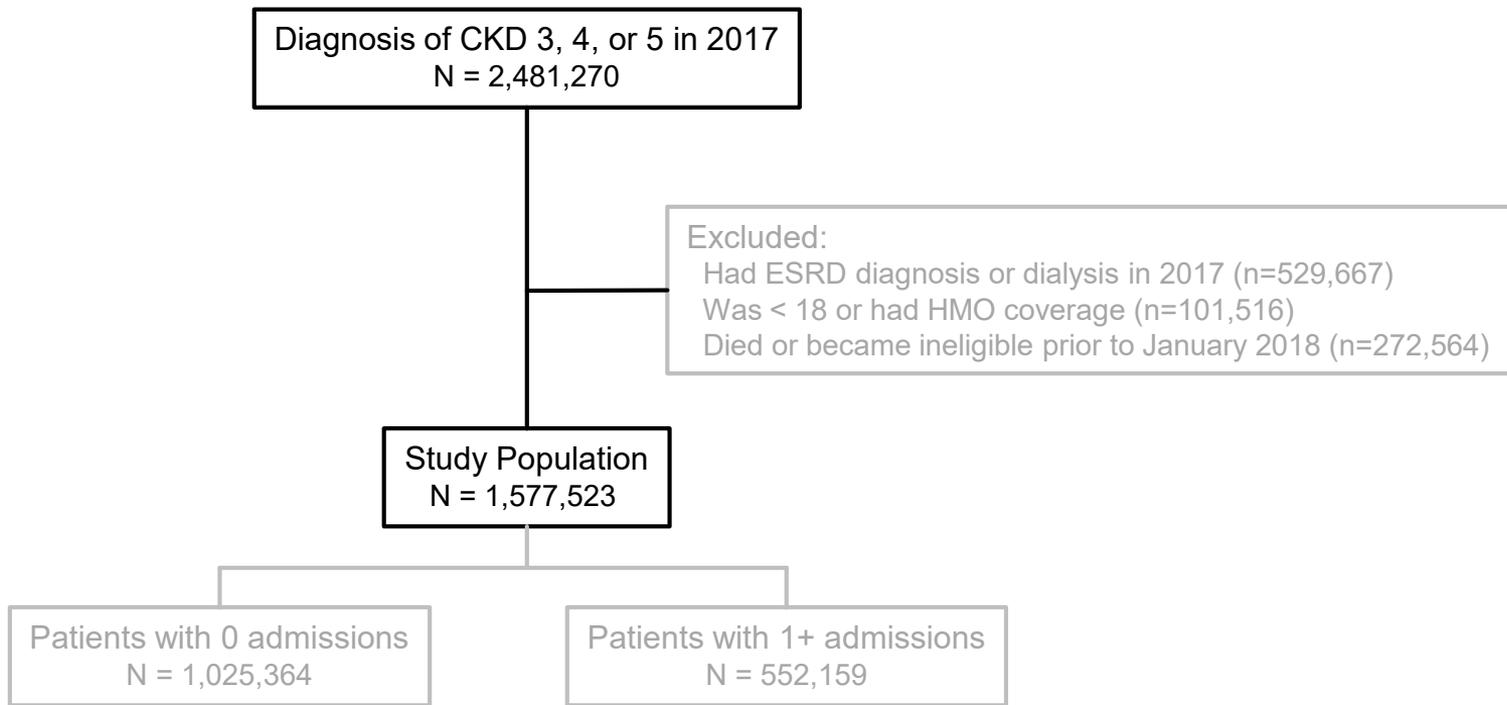
Background

- Chronic kidney disease (CKD) is relatively common in the United States
- A national-level understanding of the frequency, causes, and costs of hospital admissions among patients with CKD was previously lacking

Approach

- All study data were derived from the Centers for Medicare & Medicaid Services 100% claims sample (2017-2018).
- Included patients were adults enrolled in Medicare A & B who had a claim including a diagnosis code for CKD stage 3, 4, or 5 during 2017.
 - Patients with evidence of commercial insurance, diagnosis of end-stage kidney disease, dialysis treatment, or death prior to 31 December 2017 were excluded.
- Hospital admissions and paid costs were considered from 01 Jan – 31 Dec 2018 or until censoring for loss of Medicare Part A, dialysis initiation, or death.
- Hospital causes were ascribed on the basis of the primary ICD-10 code associated with the claim, grouped using Clinical Classification Software Level 1 categories.
- Hospital admissions were grouped geographically on the basis of core-based statistical areas (CBSAs), determined from the patient's residential ZIP code.
 - Annual hospitalization costs were categorized as approximate quartiles.

Study Cohort

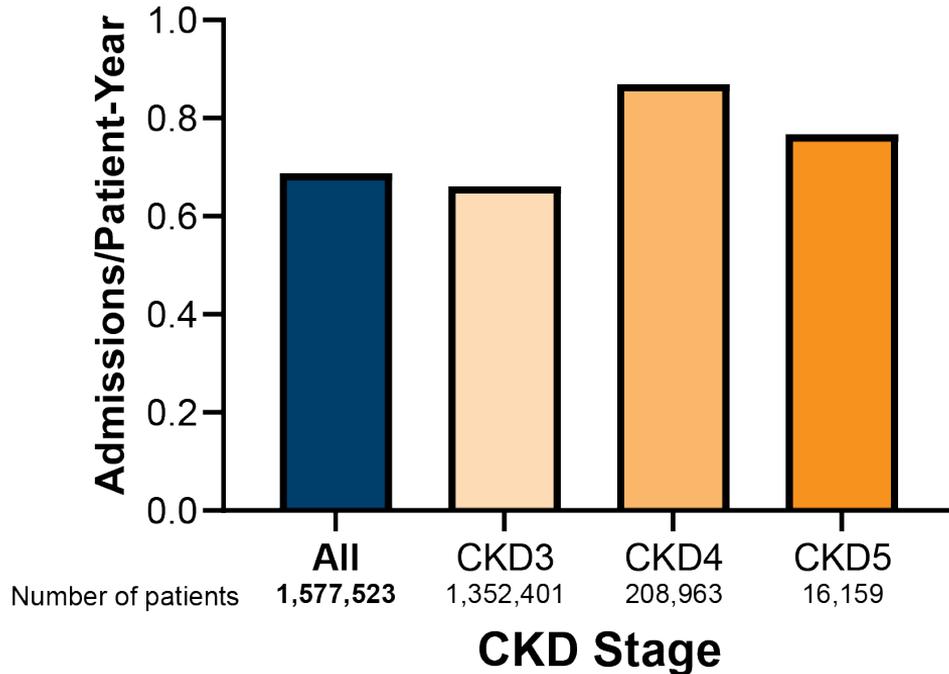


Patient Characteristics at Baseline

	CKD 3		CKD 4		CKD 5	
	No Admit (N=891,850)	Admit (N=460,551)	No Admit (N=122,936)	Admit (N=86,027)	No Admit (N=10,578)	Admit (N=5581)
Patient-months , mean ± SD	11.5 ± 2.0	10.8 ± 2.8	10.8 ± 3.0	10.1 ± 3.3	9.2 ± 4.1	9.4 ± 3.6
Age , years, mean ± SD	75.5 ± 10.0	76.6 ± 10.6	76.4 ± 10.7	77.3 ± 10.9	71.7 ± 12.7	73.9 ± 12.9
Sex , female, n (%)	459,587 (51.5)	236,706 (51.4)	66,916 (54.4)	47,450 (55.2)	5347 (50.5)	3136 (56.2)
Race , n (%)						
White	743,094 (83.3)	386,357 (83.9)	98,408 (80.0)	69,268 (80.5)	7271 (68.7)	3962 (71.0)
Black	98,986 (11.1)	51,815 (11.3)	16,501 (13.4)	11,488 (13.4)	2100 (19.9)	1103 (19.8)
Other/Unknown	49,770 (5.6)	22,379 (4.9)	8027 (6.5)	5271 (6.1)	1207 (11.4)	516 (9.2)
Diabetes , n (%)	469,590 (52.7)	269,752 (58.6)	67,814 (55.2)	52,770 (61.3)	5810 (54.9)	3360 (60.2)
Heart failure , n (%)	201,269 (22.6)	200,781 (43.6)	38,721 (31.5)	43,426 (50.5)	2752 (26.0)	2384 (42.7)
Hypertension , n (%)	780,702 (87.5)	427,650 (92.9)	109,741 (89.3)	80,498 (93.6)	9289 (87.8)	5145 (92.2)

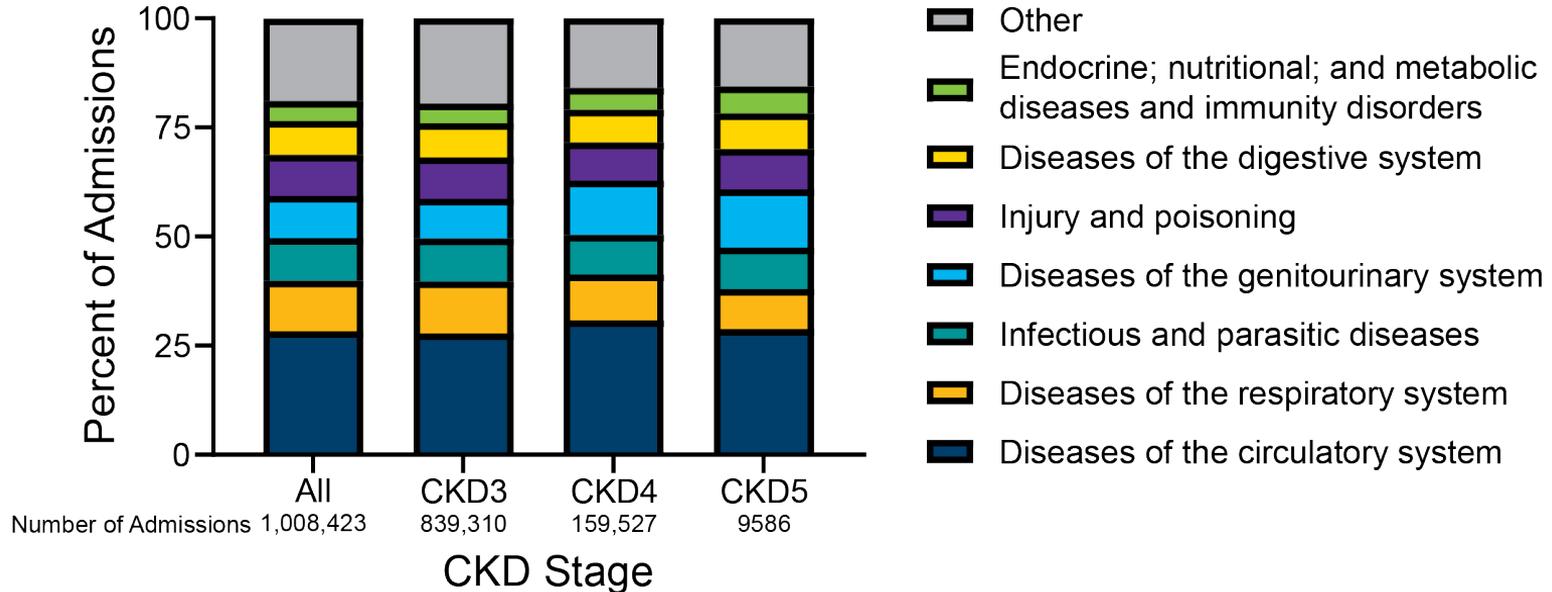
- Patients with CKD5 were, on average, younger and less likely to be of white race than those with either CKD3 or CKD4.
- Within each CKD stage, patients with a hospital admission tended to be older and were more likely to have diabetes, heart failure, and hypertension, compared to patients without a hospital admission.

Annual Hospitalization Rates: Overall and by CKD Stage



- Hospitalization rates ranged from 0.66-0.87 admissions per patient-year, depending on CKD stage.

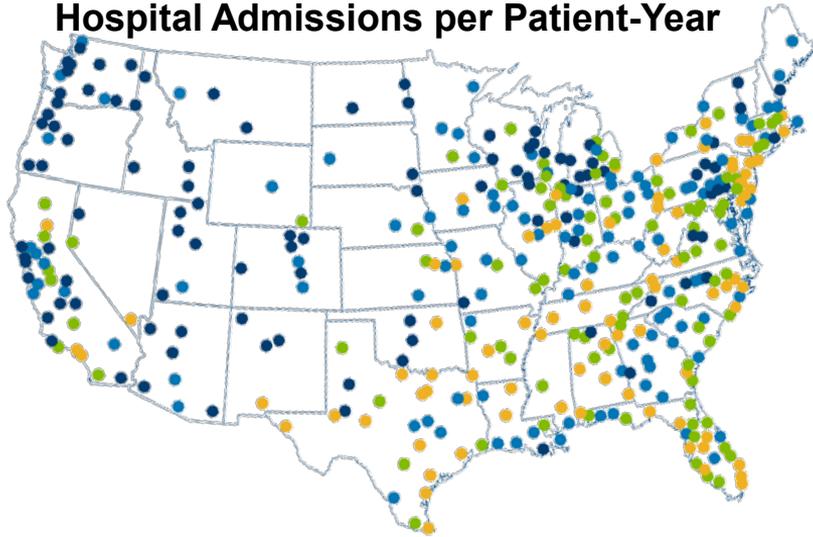
Causes of Hospitalizations: Overall and by CKD Stage



- The distribution of causes of hospitalization were similar across CKD stages.
- For each, the most common cause was “Diseases of the circulatory system”, representing approximately 25% of all hospitalizations.

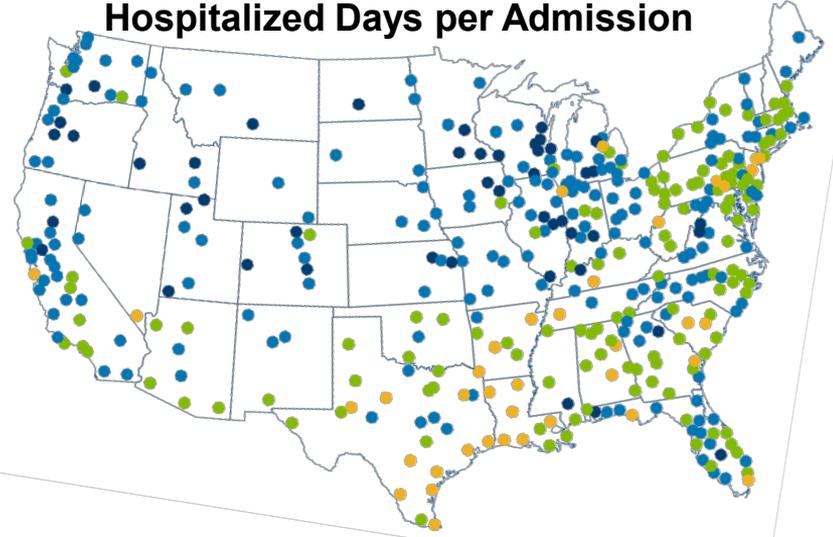
Hospital admission rates and hospitalized days per year

Hospital Admissions per Patient-Year



● <0.6 ● 0.6- <0.7 ● 0.7 - <0.8 ● 0.8+

Hospitalized Days per Admission



● <5 ● 5 - <6 ● 6 - <7 ● 7+

- Considering all patients with CKD, hospital admission rates tended to be lower in the western states.
- Hospital admissions also tended to be shorter in the western states.

Conclusions and Limitations

Conclusions

- Hospitalizations among patients with CKD:
 - Occur at a rate of 0.66-0.87 admissions/patient-year, depending on CKD stage
 - Frequently occur due to “Diseases of the Circulatory System”
 - Display marked geographic variation with respect to admission rates and number of hospitalized days per admission.

Limitations

- CKD stage was ascribed on the basis of the presence of relevant diagnosis codes; some misclassification is possible.
 - CKD stages 3A and 3B cannot be distinguished using claims data.
 - Patients may have progressed to more advanced CKD stages during the outcome period.
- Due to data availability, this analysis considered patients with Medicare insurance only.
 - Generalizability to those with other insurance types, who may differ significantly in terms of clinical and demographic characteristics, is not known.