Nephrologist Visits Lower Rates of Hospitalization, Mortality, and ESKD Transition in CKD Patients

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Introduction and Objective

- Chronic kidney disease (CKD) patients require integrated care from a network of healthcare professionals including primary care physicians (PCP) and nephrologists.
- It has been hypothesized that increased exposure to nephrology care can slow CKD progression and reduce costs. One prospective cohort study associated the integration of primary care, nephrology, and public health with slower CKD progression.[1]
- Therefore, we sought to determine if CKD stage 4/5 patients benefit clinically because of nephrologist visits, independent of primary care physician exposure.

Methods

- This was a retrospective study of 8,941 adult CKD 4/5 observations.
- For this analysis, we used Optum's® de-identified Integrated Claims-Clinical Dataset that links administrative claims and clinical data from providers across the continuum of care.[2]
- The primary exposure (outpatient nephrologist visit: Y/N) was considered over a 6-month period. The outcomes were examined in the subsequent 6 months from exposure and included hospitalizations, mortality, and transition to end-stage kidney disease (ESKD).
- Two cohorts were examined. The first cohort had an exposure period of 01-Jan-2021 through 30-Jun-2021 with the outcome period the subsequent 6 months. The second cohort had an exposure period of 01-Jul-2021 through 31-Dec-2021 with the outcome period the subsequent 6 months.
- We modeled the hospitalization outcome using a quasi-Poisson distribution and modeled the ESKD transition and mortality outcomes using binomial distributions, adjusting for age, race, sex, insurance type, baseline CKD state, AKI events, and number of PCP visits (during exposure period).
- A sensitivity analysis also adjusted for albumin (model 3).

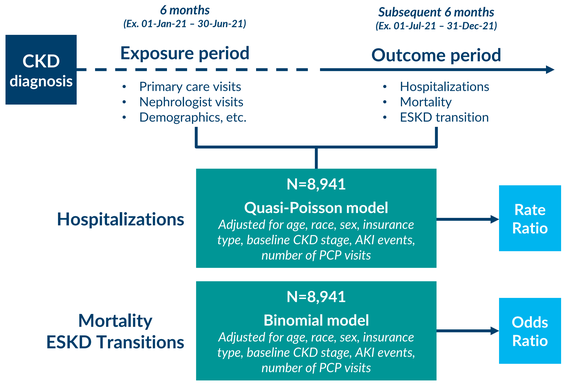

Figure 1: Study Schematic

Results

Table 1: Patient Characteristics

	All N=8,941 (100)	No Nephrologist Visit N=7,013 (100)	Nephrologist Visit N=1,928 (100)
Female, n (%)	4,848 (54.2)	3878 (55.3)	970 (50.3)
Race, n (%)			
White	6,260 (70.0)	4,929 (70.3)	1,331 (69.0)
Black	1,278 (14.3)	962 (13.7)	316 (16.4)
Asian	160 (1.8)	112 (1.6)	48 (2.5)
Other	1,243 (13.9)	1,010 (14.4)	233 (12.1)
Cohort ID, n (%)			
1	4,937 (55.2)	3,943 (56.2)	994 (51.6)
2	4,004 (44.8)	3,070 (43.8)	934 (48.4)
CKD Max Stage, n (%)			
4	7,151 (80.0)	5,590 (79.8)	1,561 (81.0)
5	1,790 (20.0)	1,423 (20.3)	367 (19.0)
Insurance Characteristic, n (%)			
Commercial Insurance	1,862 (20.8)	1,488 (21.2)	374 (19.4)
Administrative Services Only	980 (11.0)	702 (10.0)	278 (14.4)
Health Maintenance Organization	1,948 (21.8)	1,776 (25.3)	172 (8.9)
Consumer High Deductible Health Plan	287 (3.2)	186 (2.7)	101 (5.2)
Division^, n (%)			
East North Central	2,463 (27.5)	1,812 (25.8)	651 (33.8)
East South Central	355 (4.0)	266 (3.8)	89 (4.6)
Middle Atlantic	644 (7.2)	524 (7.5)	120 (6.2)
Mountain	748 (8.4)	679 (9.7)	69 (3.6)
New England	516 (5.8)	389 (5.6)	127 (6.6)
Other/Unknown	304 (3.4)	241 (3.4)	63 (3.3)
Pacific	713 (8.0)	626 (8.9)	87 (4.5)
South Atlantic/West South Central	2,271 (25.4)	1,769 (25.2)	502 (26.0)
West North Central	927 (10.4)	707 (10.1)	220 (11.4)
Age at baseline, mean (SD)	75.6 (11.7)	76.1 (11.5)	74.1 (12)
Albumin at baseline, mean (SD)	3.9 (0.5)	3.9 (0.5)	3.9 (0.5)
Number of AKI Hospitalizations*, mean (SD)	0.1 (0.5)	0.1 (0.5)	0.2 (0.5)
Number of Nephrologist Visits*, mean (SD)	0.3 (0.7)	0 (0.0)	1.5 (0.8)
Number of PCP Visits*, mean (SD)	1.8 (2.5)	1.4 (2.4)	3.3 (2.4)

^Derived from Optum data, defined as *Census bureau divisions*; *Claims-based

Table 2. Adjusted Effects for Nephrologist Visits

Outcome	Adjusted Effect
Hospitalization	0.81 (0.69, 0.94)
ESKD Transition	0.80 (0.66, 0.98)
Mortality	0.63 (0.48, 0.81)

Adjusted for number of PCP visits, age, AKI diagnosis, CKD stage (4/5), cohort ID, sex, race, and insurance characteristic.

Table 3. Summary of Adjusted Effects for Nephrologist Visits

Outcome	Model 1*	Model 2*	Model 3*
Hospitalization	0.79	0.81	0.80
ESKD Transition	0.84	0.80	0.82
Mortality	0.58	0.63	0.64

Model 1: Adjusted for number of PCP visits
Model 2: Adjusted for number of PCP visits, age, AKI diagnosis, CKD stage (4/5), cohort ID, sex, race, and insurance characteristic
Model 3: Adjusted for number of PCP visits, age, AKI diagnosis, CKD stage (4/5), cohort ID, sex, race, and insurance characteristic and albumin
*Standard errors for each outcome were similar across all models

- After adjusting for number of PCP visits, age, AKI diagnosis, CKD stage (4/5), cohort ID, sex, race, and insurance characteristic, results indicate that seeing a nephrologist is specifically associated with decreased hospitalization, ESKD transition, and mortality (Table 2 and Table 3 – Model 2).
- A sensitivity analysis (Model 3) also adjusted for albumin; results are similar to Model 2 (Table 3).

Conclusions

- Among patients with CKD 4/5, seeing a nephrologist is associated with 19-21% lower hospitalization rate, 36-42% lower mortality rate, and 16-20% lower rate of ESKD transition.
- Taken together these findings underscore the importance of the nephrologist role in managing CKD 4/5 patients.

References and Acknowledgements

1. Katafuchi, R; et. al., The effect of the Kasuya CKD network on prevention of the progression of chronic kidney disease: successful collaboration of a public health service, primary care physicians and nephrologists—community based cohort study. Clinical and Experimental Neph (2023) 27:32–43.
2. Optum's de-identified Integrated Claims-Clinical dataset (2007-2021)

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