Associations of Comorbid Conditions with Outcomes in Patients Initiating Home Dialysis

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Introduction and Objective

- Ongoing growth of home dialysis depends on not only the number of end-stage kidney disease (ESKD) patients who initiate either peritoneal dialysis (PD) or home hemodialysis (HHD), but also the rate at which patients discontinue home dialysis.
- The prescription of home dialysis to ESKD patients with more severe comorbidities may impact overall utilization due to higher rates of discontinuation.
- The purpose of this study was to understand the prevalence of specific comorbid conditions and their associations with clinical outcomes in patients initiating home dialysis.

Methods

- Utilizing data from the United States Renal Data System Standard Analysis Files through 2021, we identified (1) incident ESKD patients who initiated PD in 2011-2019 and (2) prevalent ESKD patients who initiated HHD in 2011-2019.
- Files contained: Demographic data, ESKD Medical Evidence Report (form CMS-2728) submissions, ESKD Death Notification (form CMS-2746) submissions, Modality and payer histories, and Medicare Parts A and B claims, including inpatient (hospital) claims.
- For each modality, we estimated associations of five common comorbid conditions [diabetes mellitus (DM), heart failure (HF), atrial fibrillation (AF), ischemic heart disease, and chronic obstructive pulmonary disease (COPD)] with three outcomes [death, modality change (i.e., conversion to in-center hemodialysis), and kidney transplant]. All conditions identified at home dialysis initiation.
- Associations were derived from Cox regression models adjusted for age, sex, race, Hispanic ethnicity, ESKD network, and primary cause of and duration of ESKD.

Results

Table 1: Patient Characteristics: Among PD patients

	Heart failure		COPD		Diabetes Mellitus		Atrial fibrillation		Ischemic heart disease	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Sample size (N)	120,470	25,392	131,431	14,431	63,295	82,567	125,910	19,952	130,066	15,796
Mean age (years)	**57.8**	**64.8**	**58.7**	**61.4**	**56.8**	**60.7**	**57.9**	**65.9**	**58.0**	**67.3**
Female (%)	41.7	38.9	41.4	39.8	43.2	39.7	42.2	34.9	42.3	32.1
Race (%)										
White	70.1	73.7	69.8	79.5	70.8	70.7	69.5	78.8	69.4	81.6
Black	21.5	20.2	21.7	17.1	21.8	20.8	**22.2**	**15.1**	**22.4**	**11.7**
Asian	6.1	4.1	6.2	1.9	5.8	5.7	6.0	4.3	5.9	4.8
Hispanic ethnicity (%)	14.6	10.4	14.8	5.5	11.2	16.0	14.7	8.7	14.3	10.8
Primary cause of ESKD (%)										
Diabetes	**42.4**	**56.4**	45.1	42.6	0.0	79.2	44.2	48.5	43.3	57.2
Hypertension	28.3	27.2	27.7	32.4	47.3	13.5	27.8	30.2	28.5	25.3
Glomerulonephritis	14.7	5.8	13.4	11.2	26.3	3.0	14.0	7.7	13.9	7.0
Polycystic kidney disease	5.1	1.1	4.5	3.5	9.1	0.7	4.7	2.3	4.7	1.9
Mean ESKD duration (years)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Table 2: Patient Characteristics: Among HHD patients

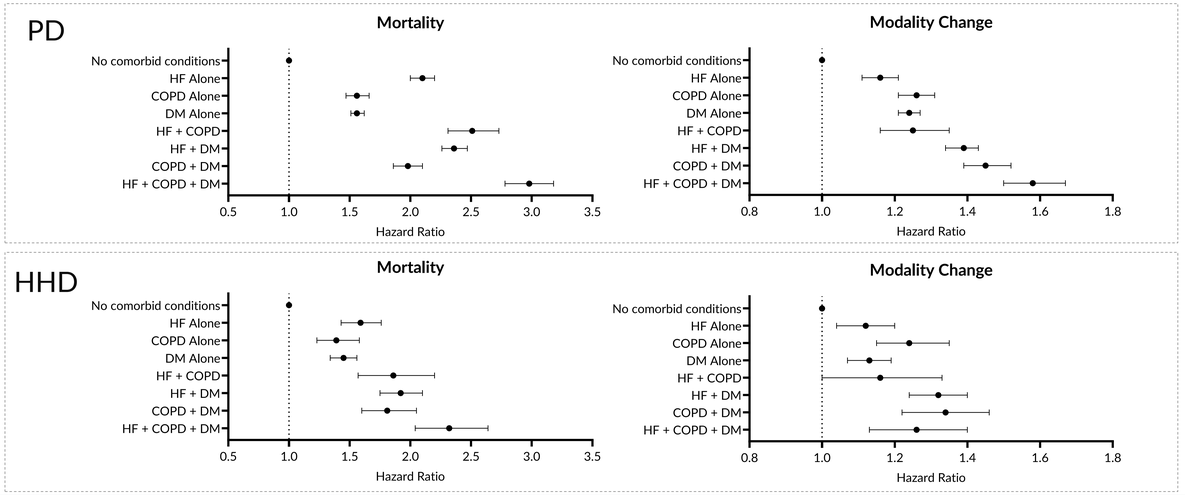
	Heart failure		COPD		Diabetes Mellitus		Atrial fibrillation		Ischemic heart disease	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Sample size (N)	25,427	6,775	28,591	3,611	14,801	17,401	27,448	4,754	28,659	3,543
Mean age (years)	**54.8**	**62.4**	**56.0**	**59.4**	**53.3**	**59.0**	**55.2**	**63.0**	**55.3**	**65.1**
Female (%)	37.2	37.0	37.2	36.8	38.1	36.3	38.0	32.0	38.1	29.4
Race (%)										
White	67.7	70.4	67.1	77.7	66.0	70.3	66.9	76.6	66.8	80.7
Black	27.5	25.9	**28.1**	**19.7**	**30.0**	**24.8**	**28.5**	**19.6**	**28.6**	**15.2**
Asian	2.8	2.0	2.9	1.1	2.8	2.5	2.7	2.3	2.7	2.6
Hispanic ethnicity (%)	9.2	7.6	9.4	4.4	7.5	10.1	9.2	6.8	9.2	6.1
Primary cause of ESKD (%)										
Diabetes	**36.6**	**53.7**	40.3	39.9	0.0	74.4	39.3	45.6	38.3	55.8
Hypertension	24.8	24.4	24.4	27.2	38.4	13.0	24.5	25.9	25.0	22.2
Glomerulonephritis	17.6	7.7	15.9	12.4	28.4	4.6	16.7	9.0	16.6	7.3
Polycystic kidney disease	5.5	1.5	4.8	3.8	9.0	1.1	5.0	3.0	5.0	2.1
Mean ESKD duration (years)	**3.7**	**2.7**	**3.6**	**2.7**	**4.4**	**2.7**	**3.6**	**2.6**	**3.6**	**2.8**

Table 3: Prevalence of Comorbid Conditions and Hazard Ratios of Outcomes for Each Condition (Modeled individually)

		Prevalence	Mortality	Modality change	Kidney transplant
PD	Heart failure	17.4%	1.55 (1.51-1.59)	1.11 (1.09-1.14)	0.85 (0.81-0.90)
	COPD	9.9%	1.30 (1.26-1.34)	1.19 (1.16-1.21)	0.81 (0.76-0.86)
	Diabetes mellitus	56.6%	1.41 (1.36-1.46)	1.23 (1.20-1.26)	0.86 (0.81-0.90)
	Atrial fibrillation	13.7%	1.23 (1.20-1.26)	1.02 (1.00-1.04)	0.96 (0.91-1.02)
	Ischemic heart disease	10.8%	1.15 (1.11-1.18)	1.01 (0.98-1.04)	0.81 (0.75-0.87)
HHD	Heart failure	21.0%	1.32 (1.25-1.39)	1.11 (1.07-1.15)	0.90 (0.79-1.02)
	COPD	11.2%	1.24 (1.16-1.33)	1.13 (1.08-1.19)	0.83 (0.71-0.97)
	Diabetes mellitus	54.0%	1.37 (1.28-1.46)	1.13 (1.08-1.19)	0.83 (0.72-0.95)
	Atrial fibrillation	14.8%	1.30 (1.23-1.38)	0.99 (0.95-1.04)	1.13 (0.98-1.30)
	Ischemic heart disease	11.0%	1.07 (1.00-1.14)	1.03 (0.98-1.08)	0.81 (0.67-0.98)

- The prevalence of DM exceeded 50% in both modalities; HF was also common.
- For both modalities, DM, HF, and COPD were consistently associated with higher adjusted rates of death and (to a lesser extent) modality change and lower adjusted rates of kidney transplant.
- For both modalities, the number of comorbid conditions among DM, HF, and COPD (0, 1, 2, or 3) was associated with outcome rates in a graded manner.

Figure 1: Hazard Ratios of Outcomes for HF, COPD, and DM (Modeled jointly)



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Conclusions

- Among patients initiating home dialysis, the presence of several comorbid conditions individually or in combination is associated with increased rates of death and modality change, and lower rates of kidney transplant.
- Future studies identifying and utilizing additional strategies to manage comorbidities in patients on home therapies may have a beneficial clinical impact.