Table S1. ICD-9 and ICD-10 CM codes for baseline comorbidity and cause of hospitalization

	ICD-9 CM	ICD-10 CM
Pulmonary hypertension	416	I27
Chronic renal disease		
Stage 1	585.1	N18.1
Stage 2	585.2	N18.2
Stage 3	585.3	N18.3
Stage 4	585.4	N18.4
Stage 5	585.5	N18.5
Stage unknown	585.9, 585	N18.9, N18
Baseline comorbidity		
Hyperlipidemia	272.0, 272.1, 272.2, 272.3, 272.4	E78.0, E78.1, E78.2, E78.3, E78.4, E78.5
Obstructive sleep apnea	327.23	G47.33
Stroke	430 - 438	I60 - I69
Interstitial lung disease	515, 516	J84
Systemic lupus erythematosus	710.0	M32
Cardiovascular hospitalization		
Cardiovascular disease	390 - 459	I00 – I99

Table S2. PH and mortality by sex, diabetes, and race, among Medicare beneficiaries with CKD

Stratum	Mortality per 1000 person-years		HR (95% CI), PH vs. non-PH		P-value for interaction
	non-PH	PH	Model 1	Model 2	
Follow-up year 1					
Men	113.9	538.0	4.71 (4.54, 4.89)	2.90 (2.79, 3.02)	0.5
Women	101.8	453.6	4.45 (4.30, 4.62)	2.85 (2.74, 2.96)	
No diabetes	101.0	479.6	4.74 (4.58, 4.92)	2.89 (2.78, 3.00)	0.8
Diabetes	116.7	497.6	4.25 (4.10, 4.41)	2.85 (2.74, 2.97)	
White	110.2	496.3	4.49 (4.37, 4.62)	2.86 (2.78, 2.95)	0.4
African American	95.5	440.1	4.63 (4.25, 5.04)	2.98 (2.73, 3.25)	
Hispanic	113.4	503.7	4.48 (3.59, 5.59)	2.72 (2.18, 3.40)	
Other race	79.3	399.6	5.03 (4.17, 6.06)	3.14 (2.59, 3.81)	
Follow-up year 2-3					
Men	109.8	273.1	2.61 (2.49, 2.73)	1.62 (1.55, 1.70)	0.02
Women	101.9	227.4	2.35 (2.26, 2.44)	1.51 (1.44, 1.57)	
No diabetes	101.3	237.8	2.47 (2.37, 2.58)	1.54 (1.47, 1.61)	0.3
Diabetes	111.8	253.1	2.36 (2.27, 2.47)	1.58 (1.51, 1.65)	
White	108.4	251.5	2.43 (2.36, 2.51)	1.56 (1.51, 1.62)	0.3
African American	93.7	206.2	2.30 (2.09, 2.54)	1.49 (1.34, 1.64)	
Hispanic	93.9	276.6	3.02 (2.37, 3.86)	1.88 (1.48, 2.39)	
Other race	82.5	181.0	2.38 (1.90, 2.97)	1.45 (1.15, 1.82)	
Follow-up year 4-5					
Men	115.2	251.5	2.35 (2.20, 2.51)	1.45 (1.36, 1.55)	0.5
Women	104.4	224.4	2.32 (2.19, 2.45)	1.48 (1.39, 1.57)	
No diabetes	102.7	228.9	2.41 (2.27, 2.56)	1.54 (1.45, 1.64)	0.05
Diabetes	120.0	240.7	2.14 (2.02, 2.28)	1.39 (1.30, 1.48)	
White	112.6	240.9	2.31 (2.20, 2.42)	1.47 (1.40, 1.54)	0.7
African American	94.1	194.6	2.21 (1.92, 2.53)	1.43 (1.24, 1.64)	
Hispanic	101.8	233.6	2.30 (1.57, 3.39)	1.45 (0.99, 2.11)	
Other race	88.5	205.7	2.50 (1.86, 3.36)	1.62 (1.20, 2.18)	

PH: pulmonary hypertension, CKD: chronic renal disease, HR: hazard ratio, CI: confidence interval
Model 1: crude model
Model 2: adjusting for age, sex, race, and comorbidities (diabetes mellitus, hypertension, coronary artery disease, heart failure, hyperlipidemia, chronic obstructive pulmonary disease, sleep apnea, stroke, liver disease, obesity, anemia, interstitial lung disease, systemic lupus erythematosus)

Table S3. PH and kidney failure by sex, diabetes, and race, among Medicare beneficiaries with CKD

Stratum	Rate of kidney failure per 1000 person-years		Cause specific HR (95% CI), PH vs. non-PH		P-value for interaction
	non-PH	PH	Model 1	Model 2	
Follow-up year 1					
Men	14.4	38.9	2.70 (2.38, 3.07)	2.06 (1.80, 2.35)	0.3
Women	11.3	33.1	3.03 (2.68, 3.42)	2.25 (1.99, 2.55)	
No diabetes	8.6	21.1	2.52 (2.16, 2.93)	2.02 (1.73, 2.37)	0.2
Diabetes	18.5	50.5	2.73 (2.46, 3.04)	2.28 (2.04, 2.55)	
White	10.9	31.1	2.89 (2.62, 3.20)	2.19 (1.97, 2.44)	0.3
African American	23.6	67.4	2.95 (2.42, 3.60)	2.31 (1.89, 2.83)	
Hispanic	23.0	44.1	1.65 (0.87, 3.12)	1.08 (0.56, 2.09)	
Other race	18.7	54.0	2.97 (1.86, 4.73)	2.06 (1.30, 3.28)	
Follow-up year 2-3					
Men	13.5	21.4	1.65 (1.41, 1.92)	1.21 (1.03, 1.42)	0.8
Women	9.3	13.6	1.56 (1.33, 1.84)	1.17 (0.99, 1.37)	
No diabetes	7.5	8.5	1.20 (0.97, 1.48)	0.97 (0.78, 1.20)	0.02
Diabetes	16.8	25.3	1.57 (1.38, 1.80)	1.29 (1.12, 1.48)	
White	9.7	15.3	1.66 (1.46, 1.88)	1.26 (1.10, 1.43)	0.1
African American	21.8	24.7	1.22 (0.92, 1.61)	0.91 (0.69, 1.22)	
Hispanic	18.2	36.0	1.97 (0.96, 4.01)	1.31 (0.64, 2.66)	
Other race	15.4	18.3	1.56 (0.76, 3.19)	1.01 (0.48, 2.09)	
Follow-up year 4-5					
Men	13.0	15.6	1.28 (0.98, 1.67)	0.92 (0.70, 1.20)	0.2
Women	8.5	13.4	1.71 (1.35, 2.16)	1.24 (0.98, 1.57)	
No diabetes	7.5	7.9	1.12 (0.82, 1.54)	0.89 (0.65, 1.22)	0.3
Diabetes	15.5	21.4	1.45 (1.18, 1.80)	1.17 (0.95, 1.45)	
White	9.1	11.7	1.37 (1.12, 1.69)	1.03 (0.83, 1.26)	0.7
African American	20.2	30.2	1.55 (1.07, 2.26)	1.15 (0.79, 1.68)	
Hispanic	18.6	50.0	2.97 (1.18, 7.49)	1.92 (0.69, 5.30)	
Other race	14.0	12.9	1.28 (0.39, 4.24)	0.87 (0.25, 3.00)	

PH: pulmonary hypertension, CKD: chronic renal disease, HR: hazard ratio, CI: confidence interval
Model 1: crude model
Model 2: adjusting for age, sex, race, and comorbidities (diabetes mellitus, hypertension, coronary artery disease, heart failure, hyperlipidemia, chronic obstructive pulmonary disease, sleep apnea, stroke, liver disease, obesity, anemia, interstitial lung disease, systemic lupus erythematosus)

Table S4. PH and hospitalization by sex, diabetes, and race, among Medicare beneficiaries with CKD

Stratum	All-cause hospitalization rate, per year		RR (95% CI), PH vs. non-PH		P-value for interaction
	non-PH	PH	Model 1	Model 2	
Follow-up year 1					
Men	0.59	2.55	5.84 (5.70, 5.99)	3.46 (3.37, 3.54)	0.02
Women	0.58	2.40	5.51 (5.38, 5.63)	3.30 (3.23, 3.38)	
No diabetes	0.50	2.21	6.04 (5.89, 6.18)	3.60 (3.51, 3.69)	<.0001
Diabetes	0.70	2.72	5.05 (4.93, 5.17)	3.16 (3.08, 3.23)	
White	0.58	2.42	5.63 (5.53, 5.74)	3.38 (3.32, 3.44)	0.5
African American	0.65	2.79	5.50 (5.22, 5.78)	3.28 (3.12, 3.44)	
Hispanic	0.67	3.08	6.01 (5.25, 6.87)	3.40 (2.99, 3.88)	
Other race	0.49	2.23	6.18 (5.50, 6.93)	3.64 (3.25, 4.07)	
Follow-up year 2-3					
Men	0.54	1.27	2.54 (2.45, 2.63)	1.53 (1.48, 1.59)	0.1
Women	0.54	1.23	2.42 (2.35, 2.49)	1.47 (1.43, 1.52)	
No diabetes	0.47	1.07	2.45 (2.37, 2.53)	1.50 (1.45, 1.55)	0.8
Diabetes	0.64	1.43	2.36 (2.28, 2.43)	1.49 (1.45, 1.54)	
White	0.53	1.21	2.44 (2.38, 2.50)	1.49 (1.46, 1.53)	0.7
African American	0.60	1.46	2.52 (2.35, 2.70)	1.50 (1.40, 1.60)	
Hispanic	0.59	1.75	2.98 (2.49, 3.57)	1.67 (1.40, 1.98)	
Other race	0.45	1.14	2.68 (2.27, 3.16)	1.54 (1.32, 1.81)	
Follow-up year 4-5					
Men	0.54	1.16	2.29 (2.17, 2.41)	1.37 (1.30, 1.44)	0.9
Women	0.53	1.10	2.25 (2.15, 2.34)	1.37 (1.31, 1.43)	
No diabetes	0.47	0.96	2.20 (2.10, 2.31)	1.38 (1.32, 1.45)	0.7
Diabetes	0.63	1.31	2.18 (2.08, 2.28)	1.35 (1.29, 1.42)	
White	0.53	1.10	2.22 (2.14, 2.30)	1.36 (1.32, 1.41)	0.9
African American	0.59	1.33	2.38 (2.15, 2.64)	1.38 (1.25, 1.52)	
Hispanic	0.63	1.44	2.36 (1.80, 3.10)	1.41 (1.09, 1.81)	
Other race	0.44	0.99	2.43 (1.92, 3.08)	1.47 (1.16, 1.87)	

PH: pulmonary hypertension, CKD: chronic renal disease, RR: rate ratio, CI: confidence interval
Model 1: crude model
Model 2: adjusting for age, sex, race, and comorbidities (diabetes mellitus, hypertension, coronary artery disease, heart failure, hyperlipidemia, chronic obstructive pulmonary disease, sleep apnea, stroke, liver disease, obesity, anemia, interstitial lung disease, systemic lupus erythematosus)

Table S5. Associations of PH with kidney failure among Medicare beneficiaries with CKD, from the Fine-Gray model

	HR (95% CI)	
	Model 1	Model 2
Follow-up year 1		
Non-PH	1.0 (referent)	1.0 (referent)
PH	2.12 (1.96, 2.30)	1.74 (1.59, 1.89)
Follow-up year 2-3		
Non-PH	1.0 (referent)	1.0 (referent)
PH	1.38 (1.25, 1.53)	1.11 (0.99, 1.23)
Follow-up year 4-5		
Non-PH	1.0 (referent)	1.0 (referent)
PH	1.31 (1.12, 1.55)	1.03 (0.87, 1.21)

PH: pulmonary hypertension, CKD: chronic renal disease, HR: hazard ratio, CI: confidence interval
Model 1: crude model
Model 2: adjusted for age, sex, race, and comorbidities (diabetes mellitus, hypertension, coronary artery disease, heart failure, hyperlipidemia, chronic obstructive pulmonary disease, sleep apnea, stroke, liver disease, obesity, anemia, interstitial lung disease, systemic lupus erythematosus)

Table S6. PH and all-cause mortality, kidney failure, and hospitalization among Medicare beneficiaries with CKD, limiting to a subset of patients with 1-year Medicare Part D enrollment before the index date

	All-cause mortality		Kidney failure		All-cause hospitalization		CV hospitalization		Non-CV hospitalization	
	Rate, per 1000 person-years	HR (95% CI) *	Rate, per 1000 person-years	Cause specific HR (95% CI) *	Rate, per year	RR (95% CI) *	Rate, per year	RR (95% CI) *	Rate, per year	RR (95% CI) *
Follow-up year 1										
Non-PH	104.0	1.0 (referent)	11.4	1.0 (referent)	0.56	1.0 (referent)	0.15	1.0 (referent)	0.42	1.0 (referent)
PH	461.9	2.84 (2.71, 2.97)	34.9	2.42 (2.07, 2.82)	2.46	3.43 (3.34, 3.53)	1.00	4.63 (4.43, 4.83)	1.46	2.71 (2.63, 2.81)
Follow-up year 2-3										
Non-PH	105.5	1.0 (referent)	9.8	1.0 (referent)	0.52	1.0 (referent)	0.13	1.0 (referent)	0.39	1.0 (referent)
PH	246.3	1.61 (1.53, 1.69)	14.2	1.22 (1.00, 1.49)	1.24	1.55 (1.49, 1.60)	0.41	1.88 (1.77, 1.99)	0.83	1.42 (1.36, 1.48)
Follow-up year 4-5										
Non-PH	110.5	1.0 (referent)	8.71	1.0 (referent)	0.50	1.0 (referent)	0.13	1.0 (referent)	0.38	1.0 (referent)
PH	237.6	1.54 (1.42, 1.66)	11.1	1.09 (0.77, 1.53)	1.10	1.39 (1.31, 1.47)	0.36	1.64 (1.51, 1.80)	0.74	1.29 (1.21, 1.38)

PH: pulmonary hypertension, CKD: chronic renal disease, CV: cardiovascular, HR: hazard ratio, RR: rate ratio, CI: confidence interval
*Adjusted for age, sex, race, comorbidities (diabetes mellitus, hypertension, coronary artery disease, heart failure, hyperlipidemia, chronic obstructive pulmonary disease, sleep apnea, stroke, liver disease, obesity, anemia, interstitial lung disease, systemic lupus erythematosus), and medication use (statins, ACEi/ARBs, diuretics, beta-blocker)

Table S7. PH and all-cause mortality, kidney failure and hospitalization among Medicare beneficiaries with CKD, from patients with PH and patients without PH matched on the worst CKD stage

	All-cause mortality		Kidney failure		All-cause hospitalization		CV hospitalization		Non-CV hospitalization	
	Rate, per 1000 person-years	HR (95% CI) *	Rate, per 1000 person-years	Cause specific HR (95% CI) *	Rate, per year	RR (95% CI) *	Rate, per year	RR (95% CI) *	Rate, per year	RR (95% CI) *
Follow-up year 1										
Non-PH	107.6	1.0 (referent)	13.4	1.0 (referent)	0.59	1.0 (referent)	0.17	1.0 (referent)	0.42	1.0 (referent)
PH	488.5	2.89 (2.81, 2.97)	35.5	2.09 (1.90, 2.29)	2.46	3.36 (3.30, 3.42)	1.04	4.57 (4.45, 4.70)	1.42	2.62 (2.57, 2.67)
Follow-up year 2-3										
Non-PH	104.7	1.0 (referent)	11.9	1.0 (referent)	0.55	1.0 (referent)	0.15	1.0 (referent)	0.40	1.0 (referent)
PH	245.3	1.58 (1.53, 1.63)	16.6	1.14 (1.01, 1.28)	1.25	1.49 (1.46, 1.53)	0.43	1.77 (1.71, 1.84)	0.82	1.38 (1.34, 1.41)
Follow-up year 4-5										
Non-PH	110.2	1.0 (referent)	10.688	1.0 (referent)	0.53	1.0 (referent)	0.14	1.0 (referent)	0.39	1.0 (referent)
PH	234.6	1.48 (1.41, 1.54)	14.2	1.09 (0.91, 1.30)	1.12	1.38 (1.33, 1.43)	0.37	1.58 (1.50, 1.66)	0.75	1.30 (1.25, 1.35)

PH: pulmonary hypertension, CKD: chronic renal disease, CV: cardiovascular, HR: hazard ratio, RR: rate ratio, CI: confidence interval
*Adjusted for age, sex, race, and comorbidities (diabetes mellitus, hypertension, coronary artery disease, heart failure, hyperlipidemia, chronic obstructive pulmonary disease, sleep apnea, stroke, liver disease, obesity, anemia, interstitial lung disease, systemic lupus erythematosus)