

Supplementary Online Content

Seib CD, Suh I, Meng T, et al. Patient factors associated with parathyroidectomy in older adults with primary hyperparathyroidism. Published online January 6, 2021. *JAMA Surg*. doi:10.1001/jamasurg.2020.6175

eTable 1. Baseline Characteristics of Medicare Beneficiaries Diagnosed With PHPT (2006-2016) When Cohort Is Restricted to Patients 67 Years and Older

eTable 2. Baseline Characteristics of Medicare Beneficiaries Diagnosed With PHPT (2006-2016) When Parathyroidectomy at Any Time After Diagnosis Is Considered Primary Outcome

eTable 3. Patient Characteristics Associated With Parathyroidectomy for Beneficiaries With PHPT Based on Multivariable Logistic Regression When Cohort Is Restricted to Patients 67 Years and Older

eTable 4. Patient Characteristics Associated With Parathyroidectomy for Beneficiaries With PHPT Based on Multivariable Logistic Regression When Parathyroidectomy at Any Time After Diagnosis Is Considered

eFigure. Rate of Parathyroidectomy in Those Diagnosed With PHPT in Each Calendar Year (2006-2016) Among All Patients and Those Who Met Consensus Guideline Criteria for Operative Management

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Baseline Characteristics of Medicare Beneficiaries Diagnosed With PHPT (2006-2016) When Cohort Is Restricted to Patients 67 Years and Older

Characteristic	Overall Cohort (n = 175,796)		Parathyroidectomy (n = 51,684)		Non-operatively Managed (n = 124,112)	
	No.	%	No.	%	No.	%
Gender						
Male	37,146	21.1	11,168	21.6	25,978	20.9
Female	138,650	78.9	40,516	78.4	98,134	79.1
Age						
66 to 75	93,388	53.1	32,932	63.7	60,456	48.7
76 to 85	65,425	37.2	16,901	32.7	48,524	39.1
86 and above	16,983	9.7	1,851	3.6	15,132	12.2
Race						
White	154,105	87.7	46,792	90.5	107,313	86.5
Black	15,986	9.1	3,718	7.2	12,268	9.9
Asian	1,598	0.9	306	0.6	1,292	1.0
Hispanic	1,794	1.0	357	0.7	1,437	1.2
American Native	381	0.2	121	0.2	260	0.2
Other	1,932	1.1	390	0.8	1,542	1.2
ADI^a Group						
Most advantaged	44,568	25.4	10,422	20.2	34,146	27.5
Slightly advantaged	57,240	32.6	16,985	32.9	40,255	32.4
Slightly disadvantaged	54,886	31.2	18,100	35.0	36,786	29.6
Most disadvantaged	19,102	10.9	6,177	12.0	12,925	10.4
Geography						
Urban	149,376	85.0	42,240	81.7	107,136	86.3
Rural	26,420	15.0	9,444	18.3	16,976	13.7
Region						
Midwest	35,901	20.4	12,269	23.7	23,632	19.0
Northeast	43,324	24.6	7,889	15.3	35,435	28.6
South	65,614	37.3	21,928	42.4	43,686	35.2
West	30,957	17.6	9,598	18.6	21,359	17.2
Frailty^b						
Robust	61,784	35.1	21,977	42.5	39,807	32.1
Prefrail	91,092	51.8	25,386	49.1	65,706	52.9
Mildly frail	16,186	9.2	3,085	6.0	13,101	10.6
Moderately-to-severely frail	6,734	3.8	1,236	2.4	5,498	4.4
Charlson Comorbidity Index Score						
0	41,754	23.8	15,216	29.4	26,538	21.4
1	39,477	22.5	12,484	24.2	26,993	21.7
≥2	94,565	53.8	23,984	46.4	70,581	56.9
Consensus Guideline Criteria^c						
History of stage 3 CKD	15,996	9.1	3,258	6.3	12,738	10.3
History of nephrolithiasis	25,032	14.2	8,785	17.0	16,247	13.1
History of osteoporosis	97,032	55.2	27,467	53.1	69,565	56.1
Endocrinologist Care	82,874	47.1	28,137	54.4	54,737	44.1

Abbreviations: ADI, area deprivation index; CKD, chronic kidney disease; OR, odds ratio; CI, confidence interval.

^a Area Deprivation Index determined based on mailing zip code of beneficiary according to the Neighborhood Atlas.¹⁵

^b Frailty category determined based on the validated Claims-based frailty index.¹⁶

eTable 2. Baseline Characteristics of Medicare Beneficiaries Diagnosed With PHPT (2006-2016) When Parathyroidectomy at Any Time After Diagnosis Is Considered Primary Outcome

Characteristic	Overall Cohort (n = 210,206)		Parathyroidectomy at any time during follow up (n = 75,225)		Non-operatively Managed (n = 134,981)	
	No.	%	No.	%	No.	%
Gender						
Male	44,569	21.2	16,034	21.3	28,535	21.1
Female	165,637	78.8	59,191	78.7	106,446	78.9
Age						
66 to 75	117,960	56.1	50,632	67.3	67,328	49.9
76 to 85	73,491	35.0	22,272	29.6	51,219	37.9
86 and above	18,755	8.9	2,321	3.1	16,434	12.2
Race						
White	183,433	87.3	67,457	89.7	115,976	85.9
Black	19,797	9.4	5,929	7.9	13,868	10.3
Asian	1,953	0.9	473	0.6	1,480	1.1
Hispanic	2,280	1.1	564	0.7	1,716	1.3
American Native	453	0.2	180	0.2	273	0.2
Other	2,290	1.1	622	0.8	1,668	1.2%
ADI^a Group						
Most advantaged	52,899	25.2	15,668	20.8	37,231	27.6
Slightly advantaged	68,471	32.6	24,785	32.9	43,686	32.4
Slightly disadvantaged	65,887	31.3	25,988	34.5	39,899	29.6
Most disadvantaged	22,949	10.9	8,784	11.7	14,165	10.5
Geography						
Urban	178,718	85.0	61,986	82.4	116,732	86.5
Rural	31,488	15.0	13,239	17.6	18,249	13.5
Region						
Midwest	43,340	20.6	17,651	23.5	25,689	19.0
Northeast	51,574	24.5	12,368	16.4	39,206	29.1
South	78,235	37.2	31,194	41.5	47,041	34.9
West	37,057	17.6	14,012	18.6	23,045	17.1
Frailty^b						
Robust	76,954	36.6	33,249	44.2	43,705	32.4
Prefrail	107,248	51.0	36,220	48.1	71,028	52.6
Mildly frail	18,316	8.7	4,082	5.4	14,234	10.5
Moderately-to-severely frail	7,688	3.7	1,674	2.2	6,014	4.5
Charlson Comorbidity Index Score						
0	51,534	24.5	22,824	30.3	28,710	21.3
1	47,758	22.7	18,334	24.4	29,424	21.8
≥2	110,914	52.8	34,067	45.3	76,847	56.9
Consensus Guideline Criteria^c						
History of stage 3 CKD	17,566	8.4	4,262	5.7	13,304	9.9
History of nephrolithiasis	28,239	13.4	11,793	15.7	16,446	12.2
History of osteoporosis	110,314	52.5	37,841	50.3	72,473	53.7
Endocrinologist Care	98,660	46.9	41,325	54.9	57,335	42.5

Abbreviations: ADI, area deprivation index; CKD, chronic kidney disease.

^a Area Deprivation Index determined based on mailing zip code of beneficiary according to the Neighborhood Atlas.¹⁵

^b Frailty category determined based on the validated Claims-based frailty index.¹⁸

eTable 3. Patient Characteristics Associated With Parathyroidectomy for Beneficiaries With PHPT Based on Multivariable Logistic Regression When Cohort Is Restricted to Patients 67 Years and Older

Characteristic	Adjusted OR	95% CI	
Gender			
Female	Ref	--	--
Male	1.00	0.97	1.02
Age			
66 to 75	Ref	--	--
76 to 85	0.69	0.68	0.71
86 and above	0.27	0.26	0.29
Race			
White	Ref	--	--
Black	0.66	0.64	0.69
Asian	0.64	0.56	0.72
Hispanic	0.64	0.57	0.73
American Native	0.94	0.75	1.17
Other	0.60	0.53	0.67
ADI^a Group			
Most advantaged	Ref	--	--
Slightly advantaged	1.39	1.35	1.43
Slightly disadvantaged	1.62	1.57	1.67
Most disadvantaged	1.66	1.60	1.73
Geography			
Urban	Ref	--	--
Rural	1.18	1.15	1.22
Frailty^b			
Robust	Ref	--	--
Prefrail	0.84	0.82	0.86
Mildly frail	0.61	0.58	0.64
Moderately-to-severely frail	0.59	0.55	0.63
Charlson Score			
0	Ref	--	--
1	0.88	0.85	0.91
≥2	0.77	0.75	0.79
Consensus Guideline Criteria			
History of nephrolithiasis	1.40	1.36	1.44
History of osteoporosis	0.99	0.97	1.01
History of stage 3 CKD	0.73	0.70	0.76
Endocrinologist Care	1.43	1.40	1.46

Abbreviations: ADI, area deprivation index; CKD, chronic kidney disease; OR, odds ratio; CI, confidence interval.

^a Area Deprivation Index determined based on mailing zip code of beneficiary according to the Neighborhood Atlas.¹⁵

^b Frailty category determined based on the validated Claims-based frailty index.¹⁸

eTable 4. Patient Characteristics Associated With Parathyroidectomy for Beneficiaries With PHPT Based on Multivariable Logistic Regression When Parathyroidectomy at Any Time After Diagnosis Is Considered

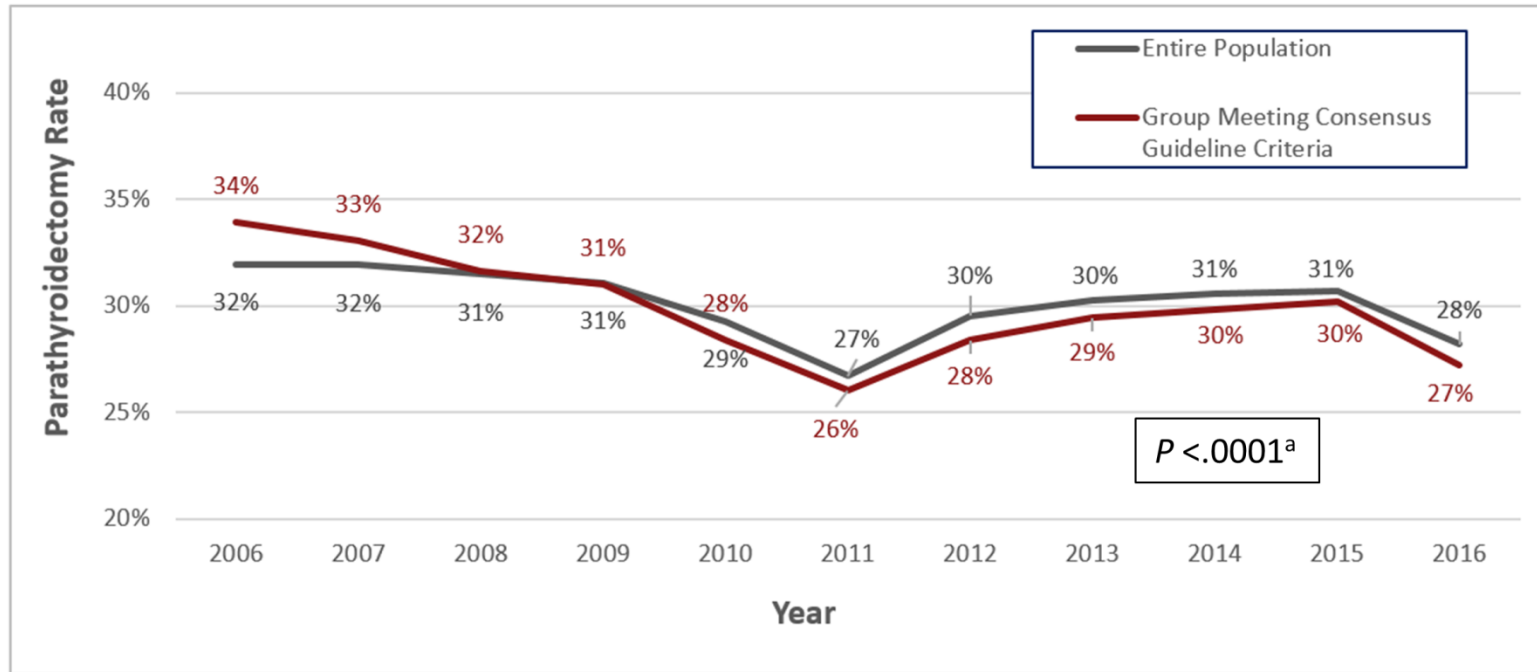
Characteristic	Adjusted OR	95% CI	
Gender			
Female	Ref	--	--
Male	0.96	0.94	0.99
Age			
66 to 75	Ref	--	--
76 to 85	0.63	0.62	0.64
86 and above	0.23	0.22	0.24
Race			
White	Ref	--	--
Black	0.70	0.68	0.72
Asian	0.63	0.57	0.70
Hispanic	0.64	0.58	0.71
American Native	1.01	0.83	1.23
Other	0.66	0.60	0.72
ADI^a Group			
Most advantaged	Ref	--	--
Slightly advantaged	1.36	1.33	1.40
Slightly disadvantaged	1.57	1.53	1.61
Most disadvantaged	1.59	1.53	1.65
Geography			
Urban	Ref	--	--
Rural	1.16	1.13	1.19
Frailty^b			
Robust	Ref	--	--
Prefrail	0.83	0.81	0.84
Mildly frail	0.57	0.55	0.59
Moderately-to-severely frail	0.56	0.53	0.59
Charlson Score			
0	Ref	--	--
1	0.87	0.84	0.89
≥2	0.75	0.73	0.77
Consensus Guideline Criteria			
History of nephrolithiasis	1.40	1.36	1.44
History of osteoporosis	0.97	0.95	0.99
History of stage 3 CKD	0.70	0.68	0.73
Endocrinologist Care	1.57	1.54	1.60

Abbreviations: ADI, area deprivation index; CKD, chronic kidney disease; OR, odds ratio; CI, confidence interval.

^a Area Deprivation Index determined based on mailing zip code of beneficiary according to the Neighborhood Atlas.¹⁵

^b Frailty category determined based on the validated Claims-based frailty index.¹⁸

eFigure. Rate of Parathyroidectomy in Those Diagnosed With PHPT in Each Calendar Year (2006-2016) Among All Patients and Those Who Met Consensus Guideline Criteria for Operative Management



* Meeting consensus guideline criteria for parathyroidectomy defined based on a documented diagnosis of osteoporosis, nephrolithiasis, or stage 3 chronic kidney disease.

^a P-value reported is for Cochran-Armitage trend test among the entire population diagnosed with PHPT and among the subgroup of patients who met consensus guideline criteria.