



# Clinical Consequences Following Parathyroidectomy in a Nationwide Cohort of Patients on Hemodialysis

## Introduction

- Secondary hyperparathyroidism (SHPT) is common, affecting 54% of patients on dialysis.
- KDIGO guidelines currently state that patients with stages 3-5D chronic kidney disease with severe hyperparathyroidism who fail to respond to medical therapy should undergo parathyroidectomy (PTX).
- This recommendation may have been based on observational, not randomized clinical trial, evidence describing potentially beneficial effects on short-term laboratory parameters and/or on longer-term clinical outcomes including fracture and death.
- There is a paucity of data describing the clinical consequences in the year following PTX.

Using a nationwide sample of US Hemodialysis patients who underwent PTX 2007-2009, we sought to:

- Evaluate morbidity and mortality following a PTX procedure.
- Compare event rates in the year immediately following PTX with rates in the year immediately preceding it.

## Methods

- The study population included all prevalent dialysis patients aged 18 years or older who underwent PTX between January 1, 2007, and December 31, 2009.
- Patients were required to have Medicare as primary insurance payer for both Part A and Part B and to have been receiving hemodialysis for at least 1 year before undergoing PTX.
- PTX was identified from Medicare inpatient claims using International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) procedure codes 06.8x and 06.95
- Comorbid conditions were defined using methods established by the United States Renal Data System.
- The post-PTX assessment period timeframe was broken into three distinct periods:
  - The index hospitalization associated with the PTX procedure.
  - The 30-day period of morbidity and mortality after discharge from the index hospitalization.
  - The 1-year period after discharge from the index hospitalization, to assess longer-term outcomes.

## Results

- Table 1 describes the baseline characteristics of the 4,435 patients in the study cohort.
- The median duration of the index hospitalization was 4 days (25th-75th percentile: 3-7); 1% of patients died during the index hospitalization.
- **30-Day Outcomes Post-Discharge**
  - 1% of patients died, 23.8% were rehospitalized, and 29.3% required an ICU stay
- **One-Year Outcomes (Table 2)**
  - 9.8% of patients died.
  - 7,571 hospitalizations occurred.
  - These involved 2,832 patients (64%), an average of 2.7 hospitalizations per person.
- **Compared with the prior year**
  - All-cause hospitalization increased 39% and total hospital days increased 58%, while ICU use increased 69%.
  - Hospitalization with hypocalcemia increased seventeen-fold (RR = 17.1).
  - Following PTX, more of these events occurred:
    - cause-specific hospitalizations,
    - total emergency room or hospital observation visits,
    - hospital observation stays with hypocalcemia treatment, and
    - total outpatient visits with hypocalcemia treatment (Table 2).
- Figure 1 displays rate ratios for 1-year hospitalization following PTX versus 1-year hospitalization before PTX by patient subgroups.

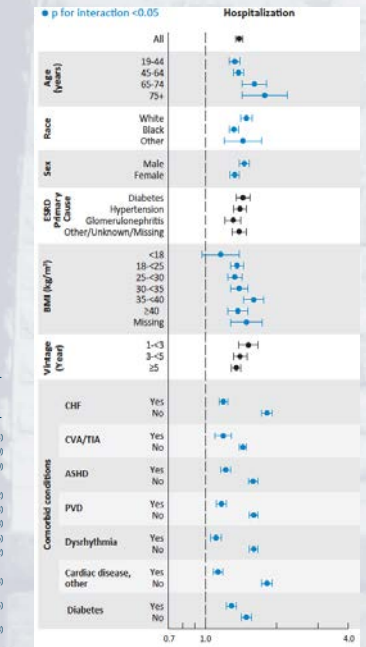
Table 1. Baseline characteristics of patients undergoing parathyroidectomy

Characteristics	N	Percent
Total	4,435	100
Age (years)		
15-44	1,764	39.8
45-64	2,154	48.6
65-74	410	9.2
≥75	107	2.4
Race		
White	1,485	33.0
Black	2,551	57.5
Other	199	4.5
Sex		
Men	2,298	51.8
Women	2,137	48.2
Primary cause of ESRD		
Diabetes	1,013	22.8
Hypertension	1,462	33.0
Glomerulonephritis	934	21.1
Other/unknown/missing	1,026	23.1
BMI (kg/m <sup>2</sup> )		
<18	151	3.4
18-25	1,217	27.4
25-30	1,026	23.1
30-35	772	17.4
35-40	517	11.7
≥40	536	12.1
Missing	216	4.9
Dialysis duration (years)		
1-3	538	12.1
3-5	970	21.9

Table 2. Events before and after parathyroidectomy

	Before parathyroidectomy (n = 4,435)		After parathyroidectomy (n=4,435)		Rate Ratio After vs. Before (95% CI)
	Patient with event (n)	Rate per 100 pt years (95% CI)	Patient with event (n)	Rate per 100 pt years (95% CI)	
<b>1-Year outcomes</b>					
Hospitalization	2,477	138.6 (135.1-142.1)	2,832	192.0 (187.7-196.3)	1.39 (1.34-1.44)
ICU stay required	997	37.9 (36.1-39.7)	1,415	64.0 (61.5-66.5)	1.69 (1.59-1.80)
Total hospital days	2,477	789.3 (781.0-797.5)	2,832	1,245.0 (1,234-1,256)	1.58 (1.56-1.60)
<b>Cause-specific hospitalization</b>					
CHF	391/568	12.8 (11.8-13.9)	307/453	11.5 (10.4-12.5)	0.90 (0.80-1.02)
CVA/TIA	67/76	1.7 (1.3-2.1)	101/124	3.1 (2.4-3.7)	1.82 (1.38-2.43)
Dysrhythmia	114/159	3.4 (2.8-3.9)	154/192	4.9 (4.2-5.6)	1.44 (1.16-1.78)
All <sup>a</sup>	102/130	2.9 (2.4-3.4)	174/229	5.8 (5.1-6.4)	1.98 (1.69-2.40)
With hypocalcemia	83/98	2.2 (1.8-2.6)	942/1,486	37.7 (25.8-39.4)	17.05 (13.90-20.92)
Total outpatient visits					
Total ED/observation	3,309/13,941	314.3 (309.1-319.4)	3,408/14,916	378.3 (372.2-384.3)	1.20 (1.17-1.23)
ED/observation with hypocalcemia	84/106	2.4 (1.9-2.8)	1,072/1,926	48.8 (46.7-51.0)	20.44 (16.81-24.85)
Outpatient/physician with hypocalcemia	30/31	0.7 (0.5-0.9)	234/469	11.9 (10.8-13.0)	17.02 (11.83-24.48)

Figure 1. Rate ratios for 1-year hospitalization after PTX versus 1-year hospitalization before PTX, by baseline characteristics (items in blue have a significant interaction)



## Discussion

- PTX is associated with significant morbidity, including increases in hospitalizations, ICU stays, total hospital days, and emergency department/observation visits, both with and without hypocalcemia treatment.
- Mortality during the PTX hospitalization and the 30 days immediately following discharge was substantial at 2%.
- The increased risks of these events following PTX were apparent across nearly all patient subgroups, suggesting that case-mix does not explain our findings.

## Conclusions

- With the availability of this new information, physicians and patients considering PTX as a treatment option for severe SHPT should weigh the potential benefits and risks associated with the procedure carefully before deciding on an appropriate course of action.

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