

## INTRODUCTION

- The healthcare burden of hypoparathyroidism (HP) has not been well characterized due to the rarity of this condition.
- The goal of this study was to evaluate the healthcare resource utilization patterns of patients with chronic hypoparathyroidism (cHP) using patients with transient post-surgical hypoparathyroidism (tHP) as a reference.

## METHODS

- Study Design:** Non-interventional retrospective claims data analysis
- Data Source:** HealthVerity closed payer claim medical and pharmacy database (Private Source 20) with 130 million covered lives.
- Study Period:** October 1, 2014 - December 31, 2019
- Study Population:** Incident and prevalent patients identified with HP. Eligibility criteria were adapted from a study by Powers et al. (1) and defined under the guidance of clinicians experienced in treating patients with cHP. Patients were continuously enrolled  $\geq 1$  year pre- and post-index.

### Incident tHP (reference group)

- Patients having a claim for parathyroidectomy, complete or partial thyroidectomy, or neck dissection, followed by a claim with a diagnosis of HP within 6 months of the procedure, with no HP diagnosis claim before the procedure and 6 months after the procedure
- Index date: Date of the last HP diagnosis claim following the procedure

### Incident cHP

- Patients having a claim for parathyroidectomy, complete or partial thyroidectomy, or neck dissection, followed by a claim with an HP diagnosis 6-15 months later, and a second HP diagnosis claim at any subsequent time point

- Index date: Date of the first qualifying HP diagnosis claim

### Prevalent cHP

- Patients having  $\geq 2$  claims for HP that were 6-15 months apart and that had a prescription claim for either active vitamin D, calcium, parathyroid hormone (PTH) or thyroid replacement therapy between the first qualifying HP claim and within 30 days of the second HP claim
- Index date: Date of the first of two qualifying HP diagnosis claims

- Analysis:** All outcomes were assessed up to one year from the index date. Baseline characteristics and outcomes were compared using descriptive statistics.

**Abbreviations:** cHP: Chronic Hypoparathyroidism; CKD: Chronic Kidney Disease; eGFR: Estimated Glomerular Filtration Rate; ESRD: End-Stage Renal Disease; HP: Hypoparathyroidism; SD: Standard Deviation; tHP: Transient Hypoparathyroidism

## RESULTS

- Of the 43,640 patients with a diagnosis claim for HP in the claims database during the study period, a total of 6,297 individuals met the inclusion criteria of the study and were further divided into three cohorts: incident tHP (N=773), incident cHP (N=1,406), and prevalent cHP (N=4,118).
- The time between surgery and HP claim that qualified the patient for eligibility was 2.0 (1.7) months for the incident tHP cohort and 8.7 (2.3) months for the incident cHP cohort and. In the prevalent cHP cohort, only 3.4% had a record of neck surgery in the year before the index (**Table 1**).

**Table 1. Baseline Characteristics**

	Incident tHP N=773	Incident cHP N=1,406	Prevalent cHP N=4,118
<b>Female, n (%)</b>	624 (81.2%)	1,170 (83.2%)	3,146 (76.4%)
<b>Age (Years), Mean (SD)</b>	53.5 (14.9)	52.1 (16.4)	56.5 (18.6)
<b>Insurance type, n (%)</b>			
Commercial	452 (58.5%)	743 (52.8%)	1,591 (38.6%)
Medicaid	204 (26.4%)	397 (28.3%)	1,307 (31.7%)
Medicare Advantage	87 (11.3%)	220 (15.7%)	1,067 (25.9%)
Unknown	30 (3.9%)	42 (2.9%)	152 (3.7%)
<b>Procedures, n (%)</b>			
Parathyroidectomy	286 (37.0%)	368 (26.2%)	139 (3.4%)
Neck dissection	39 (5.1%)	332 (23.6%)	
Thyroidectomy	448 (57.9%)	706 (50.2%)	

### Treatment Patterns

- Calcitriol was the most frequently used prescription vitamin D therapy, and PTH replacement therapy was prescribed for less than 5% of patients (**Table 2**).

**Table 2. Treatment Patterns**

	Incident tHP Follow-up 1-2 y N=575	Incident cHP Follow-up 1-2 y N=726	Prevalent cHP Follow-up 1-2 y N=3,346
<b>Calcitriol</b>	106 (18.4%)	383 (52.8%)	2,072 (61.9%)
<b>Vitamin D*</b>	103 (13.8%)	103 (14.3%)	502 (15.0%)
<b>PTH (Natpara®)</b>	0 (0.0%)	34 (4.7%)	126 (3.6%)
<b>Teriparatide (Forteo®)</b>	1 (0.2%)	1 (0.1%)	11 (0.3%)

\*Vitamin D includes ergocalciferol and cholecalciferol.

Note: Over the counter vitamin D use is not available in claims databases

## CONCLUSIONS

- This study provides insights into the natural history of HP and the incremental burden of cHP on the healthcare system.
- The cHP patient characteristics were consistent with previous reports (1, 3-6) in that the majority of cHP patients were female with mean age consistent with peri- or post-menopause and treated in line with current treatment guidelines.
- During the follow-up periods, cHP cohorts had a higher comorbidity burden, utilized more healthcare services, and sought more specialist care compared to the tHP cohort.
- Given the noted increased burden of and monitoring for renal disease in the prevalent cHP cohort, the kidneys could be considered a key target organ for therapeutic intervention.
- The strength of this study lies in the inclusiveness of the U.S. HP patient population and the rigorous eligibility criteria for the identification of cHP patients. Limitations that are common among claims analysis studies also apply to the present study.
- Future studies could examine the costs associated with HP and its complications.

### Comorbidities

- As expected, in the 1 to 2 years following an incident diagnosis, there was a decrease in the rate of hypercalcemia and an increase in the rate of hypocalcemia compared to baseline, and in line with rates observed in the prevalent cHP cohort.
- While cHP patients have, on average, an increased bone mineral disease (7), it is interesting to note that cHP patients are not immune to osteoporosis as about 9% are diagnosed with osteoporosis.
- The prevalence of CKD Stages 1-4 was approximately two-fold higher in the prevalent cHP cohort during the study period compared to the incident tHP and cHP cohorts (**Table 3**).

**Table 3. Comorbidities**

	Incident tHP		Incident cHP		Prevalent cHP	
	Before Surgery (1 year) N=715	Follow-up 1-2 year N=575	Before Surgery (1 year) N=1,069	Follow-up 1-2 year N=726	Before Index (1 year) N=4,118	Follow-up 1-2 year N=3,346
<b>Cardiovascular and metabolic disorders</b>						
Arrhythmias	113 (15.8%)	55 (9.6%)	195 (18.2%)	120 (16.5%)	551 (13.4%)	529 (15.8%)
Congestive heart failure	33 (4.6%)	29 (5.0%)	60 (5.6%)	52 (7.2%)	321 (7.8%)	326 (9.7%)
Diabetes	175 (24.5%)	127 (22.1%)	225 (21.0%)	154 (21.2%)	1,052 (25.5%)	958 (28.6%)
Hypertension	331 (46.3%)	246 (42.8%)	485 (45.4%)	325 (44.8%)	2,052 (49.8%)	1,817 (54.3%)
<b>Laboratory Imbalances</b>						
Hypercalcemia	144 (20.1%)	25 (4.4%)	142 (13.3%)	39 (5.4%)	232 (5.6%)	190 (5.7%)
Hypercalciuria	5 (0.7%)	1 (0.2%)	9 (0.8%)	6 (0.8%)	60 (1.5%)	47 (1.4%)
Hypocalcemia	8 (1.1%)	67 (11.7%)	77 (7.2%)	258 (35.5%)	1,247 (30.3%)	1,041 (31.1%)
<b>Malignancy</b>						
Any Malignancy	265 (37.1%)	217 (37.7%)	457 (42.8%)	347 (47.8%)	1,063 (25.8%)	947 (28.3%)
Thyroid Cancer	212 (29.7%)	189 (32.9%)	379 (35.5%)	310 (42.7%)	832 (20.2%)	750 (22.4%)
<b>Musculoskeletal</b>						
Osteoporosis	50 (7.0%)	35 (6.1%)	95 (8.9%)	63 (8.7%)	317 (7.7%)	298 (8.9%)
<b>Neuropsychiatric</b>						
Anxiety	165 (23.1%)	111 (19.3%)	236 (22.1%)	168 (23.1%)	700 (17.0%)	683 (20.4%)
Depressive disorders	135 (18.9%)	101 (17.6%)	202 (18.9%)	149 (20.5%)	730 (17.7%)	716 (21.4%)
Sleep-wake disorders	115 (16.1%)	98 (17.0%)	190 (17.8%)	151 (20.8%)	632 (15.3%)	620 (18.5%)
<b>Renal Disease</b>						
CKD (Stage 1-4, unspecified)	54 (7.6%)	47 (8.2%)	87 (8.1%)	67 (9.2%)	629 (15.3%)	644 (19.2%)
CKD Stage 5, ESRD & failure	31 (4.3%)	17 (3.0%)	44 (4.1%)	23 (3.2%)	162 (3.9%)	140 (4.2%)
Diabetic Nephropathy	59 (8.3%)	46 (8.0%)	87 (8.1%)	61 (8.4%)	365 (8.9%)	390 (11.7%)
Nephrolithiasis/renal stones	54 (7.6%)	22 (3.8%)	65 (6.1%)	46 (6.3%)	214 (5.2%)	212 (6.3%)

### All-Cause Resource Utilization

- During the 1 to 2 year follow-up periods, the cHP cohorts had a higher prevalence of inpatient admissions and emergency visits than the tHP cohort (**Table 4**).
- The average number of hospitalizations were 1.5x higher in the cHP cohorts.

**Table 4. All-Cause Resource Utilization**

	Incident tHP	Incident cHP	Prevalent cHP
	Follow-up 1-2 year N=575 n (%)	Follow-up 1-2 year N=726 n (%)	Follow-up 1-2 year N=3,346 n (%)
<b>All-Cause Utilization</b>			
Inpatient Hospital	83 (14.4%)	126 (17.4%)	699 (20.9%)
Office/Clinic	504 (87.7%)	672 (92.6%)	3,047 (91.1%)
Emergency Room	123 (21.4%)	189 (26.0%)	1,009 (30.2%)
Urgent Care	52 (9.0%)	54 (7.4%)	272 (8.1%)
<b>Overall Mean</b>	<b>mean (SD)</b>	<b>mean (SD)</b>	<b>mean (SD)</b>
Inpatient Hospital	0.8 (3.4)	1.4 (6.2)	1.9 (8.3)
Office/Clinic Visit	12.5 (17.1)	15.2 (20.3)	14.1 (19.3)
Emergency Room	0.5 (1.6)	0.8 (2.2)	0.9 (3.7)
Urgent Care	0.1 (0.5)	0.1 (0.5)	0.2 (1.3)

### Provider Type

- Compared to the tHP cohort, the cHP cohorts saw a higher variety and frequency of providers in the follow-up period (**Table 5**).
- These included endocrinologists, cardiologists, neuropsychiatrists and nephrologists.

**Table 5. Provider Type for Resource Utilization**

	Incident tHP	Incident cHP	Prevalent cHP
	Follow-up 1-2 year N=575 n (%)	Follow-up 1-2 year N=726 n (%)	Follow-up 1-2 year N=3,346 n (%)
<b>Any All-Cause Utilization</b>			
Cardiology	56 (9.7%)	121 (16.7%)	693 (20.7%)
Endocrinology	91 (15.8%)	208 (28.7%)	851 (25.4%)
Rheumatology	14 (2.4%)	22 (3.0%)	174 (5.2%)
Nephrology	19 (3.3%)	33 (4.6%)	305 (9.1%)
Neuropsychiatry	41 (7.1%)	64 (8.8%)	346 (10.3%)
Oncology/Hematology	63 (11.0%)	114 (15.7%)	430 (12.9%)

## REFERENCES

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## DISCLOSURES

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