

BACKGROUND

Primary hyperoxalurias (PH; types 1, 2, and 3, each caused by mutations in a unique gene) are a family of severe, rare liver disorders characterized by oxalate overproduction, which often manifest initially in the form of kidney complications. High levels of systemic oxalate in PH result in recurrent kidney stones, nephrocalcinosis, and chronic kidney disease, which may progress to end-stage renal disease. Rising oxalate levels also impact organ systems beyond the kidneys, including the skin, bones, heart, and eyes.¹ There are no approved therapies for the treatment of any of the three types of PH.

Current understanding of the real world clinical and economic burden associated with PH has not been established due to the rarity of this disease and, until recently, a lack of coding that would enable visibility into this specific diagnosis through claims data analysis.

OBJECTIVE

The objective of this study was to begin to determine the clinical, cost, and healthcare resource utilization burden associated with patients with PH (irrespective of PH type) compared to patients without PH.

METHODS

Study Design

- Retrospective claims analysis using the IQVIA PharMetrics® Plus Database (1/2014-12/2019)
 - Non-PH cohort drawn from a random 5% sample of patients with no diagnosis of any type of hyperoxaluria.
 - This analysis uses claims from Commercial payers only (Medicare and Medicaid not included due to small or zero sample sizes).

Inclusion/exclusion criteria

- PH cohort:
 - At least 1 claim with ICD-10 code E72.53 (PH) after 10/2018
 - This reflects only the time period for identification of patients due to the introduction of a code specific to this condition in 10/2018; once patients were identified in this manner, the analytic timeframe included 1/2014-12/2019 because the condition is genetic.
 - At least one year of continuous enrollment in medical and prescription benefits
 - Excluded if there was a claim for secondary hyperoxaluria (SH), or any SH associated conditions
- Non-PH cohort:
 - Continuous enrollment in medical and prescription benefits from October 2018 through September 2019

Cohort matching

- The PH cohort was matched 1:5 to patients in the non-PH sample using an exact match for age, sex, and insurance type.²
- Patients in the non-PH cohort who did not match were excluded from the analyses.

Analyses

- Results are reported for a 12-month period.
 - PH Cohort Definition: Either the first 12-month period of continuous enrollment with an E72.53 diagnosis code or (if unavailable) the first available 12-month period of continuous enrollment
 - Non-PH Cohort Definition: From October 2018 through September 2019
- All costs were adjusted to 2019 using the changes in the Medical Care Component of the Consumer Price Index (CPI).
- Comorbidities were assessed utilizing the Charlson Comorbidity Index (CCI).³
- Descriptive analyses were performed to summarize demographics, clinical outcomes, costs, and healthcare resource utilization both in general plus those relevant to PH.
- Note: The abstract reported data from an interim analysis; findings presented in this poster represent the completion of the analysis.

LIMITATIONS

- PH can present in infancy; without the incorporation of a Medicaid Claims dataset the pediatric population in this analysis is likely underrepresented.
- ICD codes prior to October 2018 did not distinguish PH from SH patients. We therefore limited our inclusion criteria for PH patients to those with the PH-specific ICD code after October 2018.
- Claims data provide information only on those patients who have been diagnosed and did not allow us to assess PH severity.
- Due to the nature of the ICD code for PH, it is not possible to distinguish whether the PH patients had type 1, 2, or 3.
- End-stage renal disease and dialysis patients are underrepresented in this study due to the transition of these more severe patients to Medicare coverage.

RESULTS

Table 1: Demographics of PH versus non-PH Patients

	PH N=324		Non-PH N=1,620	
		%		%
Age				
Mean	48.1	-	48.1	-
Age Distribution				
<18	20	6%	100	6%
18-35	41	13%	205	13%
36-55	137	42%	685	42%
55+	126	39%	630	39%
Sex				
Male	188	58%	940	58%
Female	136	42%	680	42%
Geographic Region				
Northeast	57	18%	257	16%
Midwest	104	32%	477	29%
South	125	39%	692	43%
West	38	12%	194	12%
Insurance Type				
Commercial	312	96%	1,560	96%
Medicaid	9	3%	45	3%
Medicare	3	1%	15	1%

Table 2: Median and Mean Costs for PH versus non-PH Patients

	PH N=324	Non-PH N=1,620	p-value	Magnitude of difference
Median Costs				
Total Costs	\$11,017	\$1,685	<0.001	6.5
Inpatient Stay	\$0	\$0	-	-
Outpatient Care	\$7,681	\$1,153	<0.001	6.7
Outpatient Surgery	\$707	\$0	<0.001	-
Emergency Department	\$0	\$0	-	-
Physician Office Visit	\$1,122	\$411	<0.001	2.7
Prescription Costs	\$826	\$146	<0.001	5.7
Out-of-pocket Costs	\$1,860	\$425	<0.001	4.4
Mean Costs				
Total Costs	\$22,549	\$7,853	<0.001	2.9
Inpatient Stay	\$4,530	\$1,605	<0.001	2.8
Outpatient Care	\$13,894	\$3,784	<0.001	3.7
Outpatient Surgery	\$3,379	\$785	<0.001	4.3
Emergency Department	\$651	\$211	<0.001	3.1
Physician Office Visit	\$1,759	\$684	<0.001	2.6
Prescription Costs	\$4,125	\$2,464	0.012	1.7
Out-of-pocket Costs	\$2,737	\$1,145	<0.001	2.4

Significant differences highlighted in orange

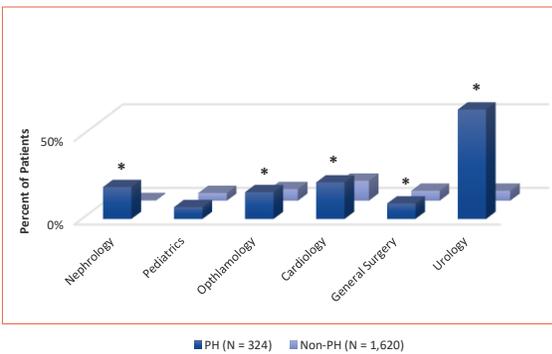
Figure 1: Mean Costs for PH versus non-PH Patients



* Denotes significance of p<0.05

- Mean costs were higher in PH patients for all types of care. Also, median total costs were 6.5 times higher (\$11,017 vs \$1,685, p<0.001) for PH patients compared to non-PH patients.

Figure 2: Physician Specialty Use for PH versus non-PH Patients



Denotes significance of p<0.05

- Use of multiple physician specialties was higher in PH patients compared to non-PH patients.

Table 3: Comorbidities Associated with PH versus non-PH Patients

	PH N=324	Non-PH N=1,620	p-value
Charlson Comorbidity Index			
Mean Total Score	0.79	0.37	<0.001
Individual Charlson Comorbidities			
Myocardial infarction	2.2%	0.9%	0.032
Congestive Heart Failure	2.8%	1.5%	0.122
Peripheral vascular disease	5.2%	2.0%	<0.001
Cerebrovascular disease	4.3%	1.4%	<0.001
Dementia	0.6%	0.1%	0.073
Chronic pulmonary disease	10%	8.0%	0.116
Connective tissue (rheumatic) disease	2.5%	1.2%	0.069
Peptic ulcer disease	0.9%	0.4%	0.13
Mild liver disease	9.9%	3.5%	<0.001
Diabetes without chronic complications	18%	10.0%	<0.001
Hemiplegia or paraplegia	2.2%	0.2%	<0.001
Moderate or severe renal disease	10%	1.3%	<0.001
Diabetes with chronic complications	3.7%	3.1%	0.564
Moderate or severe liver disease	0.6%	0.1%	0.069
Metastatic solid tumor	0.3%	0.6%	0.571
AIDS (not just HIV positive)	0.6%	0.3%	0.235

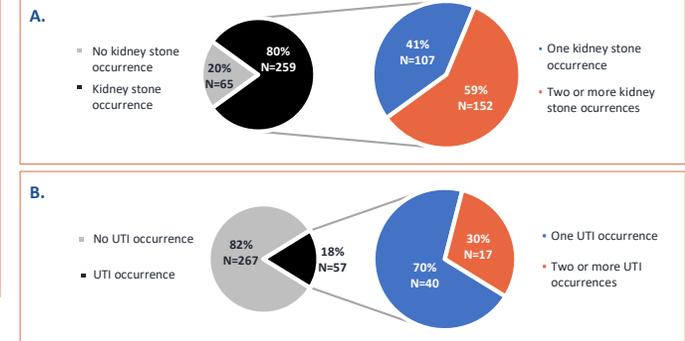
Significant differences highlighted in orange

- PH patients experienced higher rates of select comorbidities compared to non-PH patients.

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Figure 3: Kidney Stone and Urinary Tract Infection (UTI) Occurrence Among PH Patients in a 12-month period



- 80% of PH patients had one kidney stone, and among those patients, 47% had more than one stone in a 12-month period.

CONCLUSIONS

- PH patients showed higher levels of healthcare utilization and costs relative to their matched non-PH counterparts.
 - It is not unexpected to see a higher proportion of patients with kidney stones in the PH cohort; 80% had one kidney stone, but among those patients, 47% had more than one stone in a 12-month period.
 - Some comorbidities with acute and chronic care implications, such as myocardial infarctions and diabetes without complications, were seen in more PH patients than non-PH patients. Longitudinal research is needed to assess the ongoing clinical and economic impact of these comorbidities in PH patients.
 - PH patients had a significantly higher intensity of care for clinician visits compared to the non-PH group in the following specialties: nephrology, cardiology, ophthalmology, urology, and general surgery. While this may be a function of needed treatment for the PH patients' comorbidities, plus the sequelae of PH itself, these results are consistent with other outcomes in this study, indicating PH patients cost more and use more health care services than their matched non-PH counterparts.
- Whether total healthcare costs were measured at the mean or median, they were substantially higher in the PH group (2.9 and 6.5 times the cost relative to the non-PH group, respectively). Except for ER visits, where median costs are \$0 for both groups, this pattern was seen for all types of health care indicating the burden of PH targets for all aspects of care.
- While there are no approved pharmacologic treatments for PH, these results indicate that even with the current standard of care, the management of PH results in a significant clinical and economic burden to both the patient and the health care system and more work will need to be done to further evaluate the economic burden of PH across related age groups, PH sub-types and disease severity.
- The dataset has a very low proportion of pediatric (< 18 y.o) and renally compromised patients. Hence these data may underestimate the true clinical and cost burden of PH. Despite not capturing patients at more advanced/severe stages of disease, we still saw a greater median cost associated with PH, on an order of magnitude approaching 7 times that of non-PH patients.
- The economic burden represented in this analysis is expenditure focused; however, since there is no currently available treatment that addresses the root cause of PH, the spend captured in this analysis represents the cost of treating symptoms or other potential comorbidities and, therefore, PH patients may continue to experience a deterioration in renal function which may eventually result in the need for a dual liver-kidney transplant.