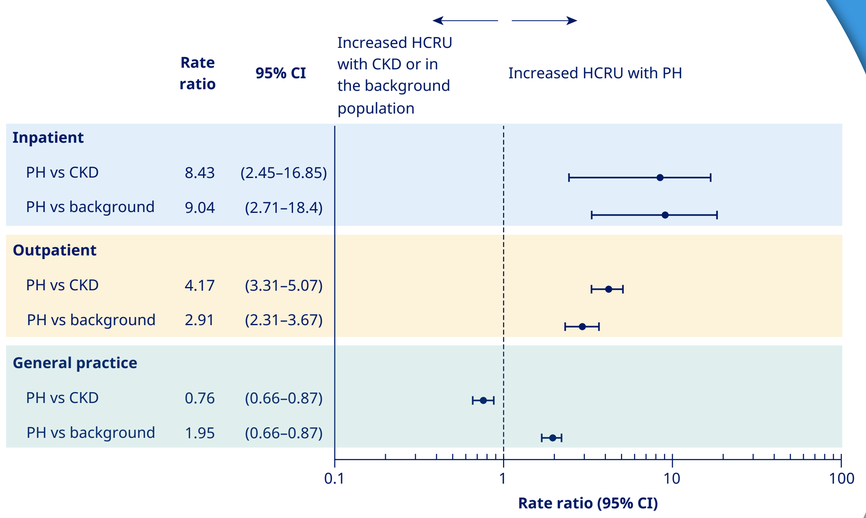

CKD, chronic kidney disease; HCRU, healthcare resource utilisation; PH, primary hyperoxaluria.

Higher Healthcare Resource Utilisation in Patients With Primary Hyperoxaluria

In inpatient, outpatient, and GP settings, patients with primary hyperoxaluria (PH) have high disease burden and healthcare resource utilisation (HCRU).

Healthcare Resource Utilisation and Disease Progression in Patients With Primary Hyperoxaluria: A Retrospective Cohort Study

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BACKGROUND & AIMS

- Primary hyperoxaluria (PH) is a family of rare autosomal recessive genetic disorders that result in overproduction and excessive urinary excretion of oxalate, leading to recurrent kidney stones, progressive chronic kidney disease (CKD), and kidney failure[1–3]
- Diagnosis of PH is often delayed, leading to more advanced disease and poor outcomes[1–3]
- PH is associated with increased healthcare resource utilisation (HCRU), substantial clinical and economic burden, and a negative impact on quality of life[4,5]
- This study assessed HCRU and disease progression in patients with PH compared with patients with CKD and a background population without either disease

METHODS

- This analysis used data from the UK Clinical Practice Research Datalink Aurum registry, linked to the Hospital Episode Statistics and Office of National Statistics, including all records through May 2022
- Study population
  - PH population: Included all patients with a diagnosis of PH and ≥1 year of registry enrollment before the index date (defined below). Patients could have any type of PH, as PH type was not specified in the registry. Patients with PH who had a prior CKD diagnosis were also included
  - CKD population: Included a random sample of patients with CKD and ≥1 year of registry enrollment before the index date from the CPRD Aurum registry. Patients with CKD and PH were included in the PH population
  - Background population: Included a random sample of people without a PH or CKD diagnosis and were matched (20:1) to patients with PH based on age and year of birth; ≥1 year of registry enrollment before the index date was required
- Index date
  - PH population: Date of first diagnosis of PH or CKD
  - CKD population: Date of first diagnosis of CKD
  - Background population: Defined by the index date of the matched PH patient
- Population comparisons included up to 10 years of follow-up after the index date (data extraction: May 2022)
- Analysis
  - Weighting adjusted for confounding factors (birth year, gender, and index of multiple deprivation [a proxy measure for socioeconomic status])
  - Rate ratios for HCRU were determined using negative binomial distribution with unique visit days as response variable, PH as exposure, and patient years from index date as exposure time
  - Comparisons of time-to-first-occurrence of dialysis, kidney transplant, liver transplant, and all-cause mortality were determined by Kaplan-Meier and estimated by Cox proportional hazards

CONCLUSIONS

- Patients with PH received their first diagnosis of PH or CKD at a younger age (mean 40 years) than patients with CKD without PH (mean 72 years)
- Patients with PH had an increased disease burden and HCRU compared with patients with CKD and the background population
  - Visits for kidney stones were common before patients received a diagnosis of PH; 38.2% of patients had a history of GP visits and 31.7% of patients had a history of inpatient visits for kidney stones
  - HCRU was higher in patients with PH than in patients with CKD or the background population according to rates of inpatient, outpatient, and GP visits, except for higher rates of GP visits in the CKD population
- Patients with PH had a faster disease progression, but better overall survival, compared with patients with CKD
  - The risks of dialysis and liver and kidney transplants were higher in patients with PH than in patients with CKD, but patients with PH had a better overall survival rate
- One limitation of the analysis is age at diagnosis was not included as confounding factor and therefore not adjusted for. This might be related to the lower risk of death observed in patients with PH (than with CKD) in the 10 years after diagnosis; however, this observation may be related to the older age of the CKD population
- This study highlights the high disease burden and HCRU of patients with PH

RESULTS

Study Populations

- The study included 123 patients with PH, 250,000 patients with CKD (without PH), and 250,000 people without PH or CKD diagnoses (background population)
  - Of 123 patients with PH, 29 (23.6%) had ≥1 CKD-related diagnosis
  - The proportion of female patients was 41%, 56%, and 52% in the PH, CKD, and background populations, respectively
  - Index of multiple deprivation (socioeconomic status of the area) (SD) was 3.1 (1.52), 3.2 (1.41), and 3.2 (1.38), respectively
- Mean ± SD age at first diagnosis was 40 ± 22 years in patients with PH and 72 ± 14 years in patients with CKD

Table 1 Prediagnosis Visit History in Patients With PH and CKD

Patients with PH		Patients with CKD without PH	
Event	**%**	**Event**	**%**
GP visits			
Renal stone[a]	38.2	Essential hypertension	41.7
Upper respiratory infection	24.3	Lower RTI	22.8
Low back pain	12.1	Type 2 diabetes mellitus	19.2
Essential hypertension	11.3	Upper respiratory infection	17.5
Lower RTI	11.3	Hypertensive disease	15.8
UTI, site not specified	11.3	Low back pain	13.9
Acute conjunctivitis	8.94	Shoulder pain	12.4
Cystoscopic insertion of ureteric stent	8.12	UTI, site not specified	11.0
Otitis externa	8.12	Wax in ear	9.98
Eczema	8.12	Skin lesion	9.94
Inpatient visits			
Calculus of the kidney	31.7	Cataract, unspecified	2.36
Calculus of the ureter	21.9	Atherosclerotic heart disease	1.72
Unspecified renal colic	9.75	Chest pain, unspecified	1.53
Hydronephrosis with renal and ureteral calculous obstruction	9.75	Unknown and unspecific causes of morbidity	1.2
Other and unspecified abdominal pain	6.50	UTI, site not specified	1.04
Unspecified hematuria	5.69	Atrial fibrillation and flutter	0.96
Calculus in bladder	5.69	Senile nuclear cataract	0.90
Calculus of kidney with calculus of ureter	4.87	Unspecified hematuria	0.84
Other specified disorders of carbohydrate metabolism	4.06	Gonarthrosis, unspecified	0.77
UTI, site not specified	4.06	Syncope and collapse	0.75

Table shows the 10 most common observations diagnosed in patients with PH and in patients with CKD without PH, recorded at least once before first diagnosis of PH or CKD.
[a]0.92% in patients with CKD without PH in the GP visits group.
CKD, chronic kidney disease; PH, primary hyperoxaluria; RTI, respiratory tract infection; UTI, urinary tract infection.

Disease Burden

- Before receiving a diagnosis of PH, patients had general practice (GP) visit histories for kidney stones (38.2%), urinary tract infections (11.3%), and ureteric stent cystoscopic insertions (8.1%); inpatient histories included kidney (31.7%), ureter (21.9%), and bladder (5.7%) stones (**Table 1**)
- In comparison, the 3 most common prediagnosis visits in patients with CKD were for essential hypertension (41.57%), lower respiratory tract infection (22.8%), and type 2 diabetes mellitus (19.2%) in the GP setting, and cataract (2.36%), atherosclerotic heart disease (1.72%), and unknown and unspecified causes of morbidity (1.2%) in the inpatient setting (**Table 1**)

Healthcare Resource Utilisation

- After the index date, patients with PH generally had greater rates of inpatient, outpatient, and GP visits compared with patients with CKD and the background population; however, patients with CKD had more GP visits than patients with PH (**Table 2**)

Table 2 HCRU (PPPY) in Patients With PH, CKD, and in the Background Population

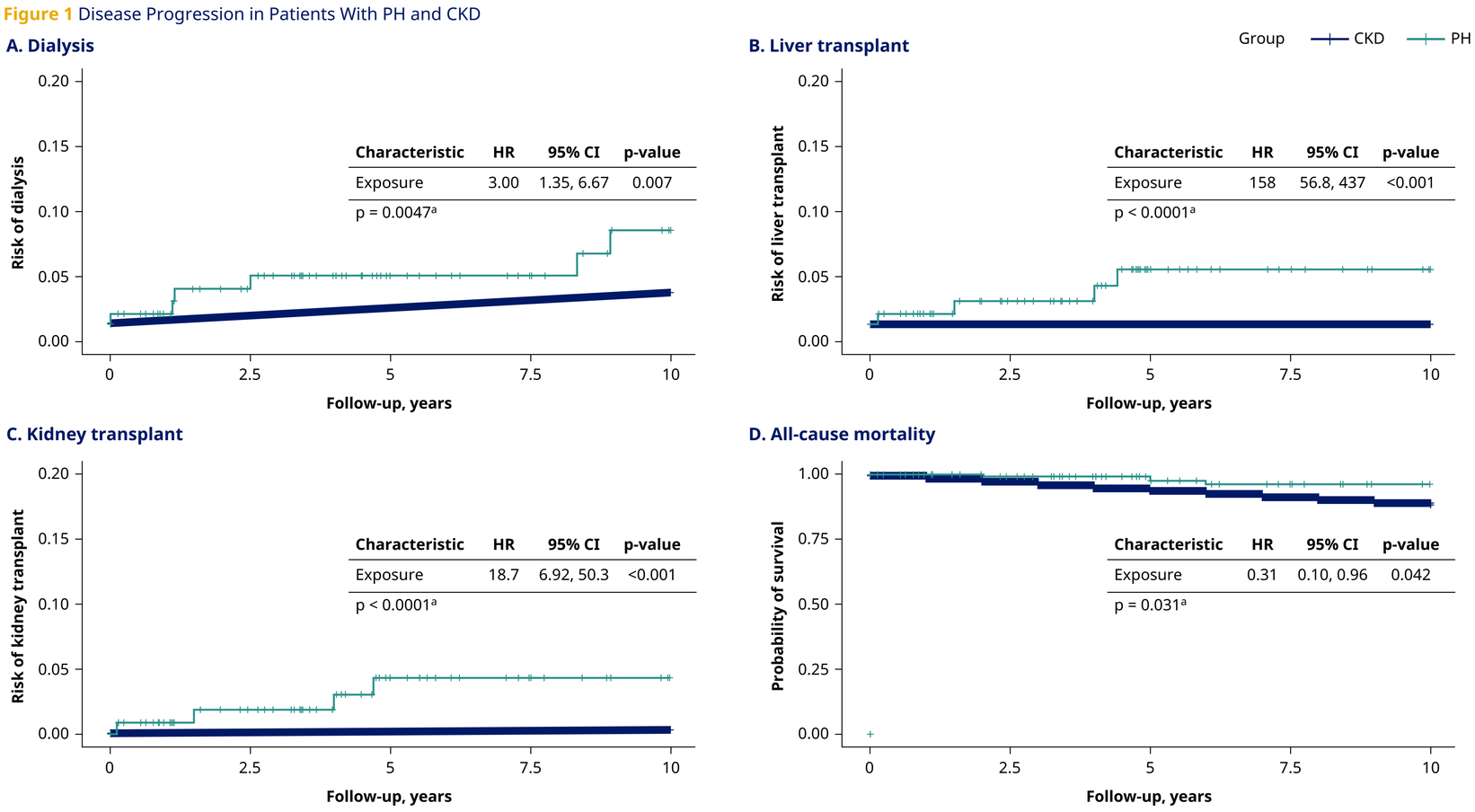
	Mean PH	Mean (SD) CKD or background	Rate ratio	95% CI
Inpatient				
PH vs CKD	2.23	0.27	8.43	2.45–16.85
PH vs background	2.23	0.16	9.04	2.71–18.4
Outpatient				
PH vs CKD	3.89	0.91	4.17	3.31–5.07
PH vs background	3.89	0.79	2.91	2.31–3.67
General practice				
PH vs CKD	19.9	25.6	0.76	0.66–0.87
PH vs background	19.9	6.56	1.95	1.69–2.21

Table shows HCRU after the index date of first diagnosis of PH or CKD, or index date of matched patient with PH for the background population. CKD, chronic kidney disease; HCRU, healthcare resource utilisation; PH, primary hyperoxaluria; PPPY, per patient per year; SD, standard deviation.

Disease Progression

- In the 10-year period after diagnosis, patients with PH had a 3-times increased risk of dialysis, 158-times increased risk of liver transplant, and 18.7-times increased risk of kidney transplant compared with patients with CKD (**Figure 1A, B, and C**, respectively)
- The risk of death was 0.3-times lower in patients with PH than in patients with CKD in the 10 years after diagnosis (**Figure 1D**)

Figure 1 Disease Progression in Patients With PH and CKD



Panels show Kaplan-Meier plots for the analysis of time from index date to first event of dialysis, liver transplant, kidney transplant, or all-cause mortality over a 10-year follow-up period. Cox proportional hazard ratios shown in inset tables.
[a]Kaplan-Meier estimate for difference in time from index date to first occurrence between PH and CKD over a 10-year follow-up period.
CKD, chronic kidney disease; HR, hazard ratio; PH, primary hyperoxaluria.

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