Epidemiology of rare kidney diseases in the United Kingdom using a large rare renal registry

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BACKGROUND

- Rare kidney diseases make a significant contribution to the burden of kidney disease in the UK and globally.
- At least 10% of adults and over 50% of children receiving renal replacement therapy (RRT) have a rare disease.[1]
- However, gaps remain in disease understanding due to scarce data in sufficient patient populations.
- Access to large, geographically representative registries enable the conduct of real-world studies to better understand rare disease patients.

OBJECTIVE

To describe the prevalence, demographics, clinical characteristics, and treatment of rare kidney disease patients in the United Kingdom (UK).

METHODS

Study design and data source

- A retrospective cohort study used the UK National Registry of Rare Kidney Diseases (RaDaR) from 2010 to 2022, which collects data from 107 renal care centers.
- RaDaR is uniquely embedded with the publicly funded National Health Service (NHS), allowing collection of retrospective and prospective data for patients across multiple healthcare systems and regions, and is the largest rare kidney disease registry worldwide.
- Data on all patients recruited to RaDaR were extracted on October 18th, 2022.

Study population

- Nine rare kidney conditions were assessed, including Focal segmental glomerulonephritis (FSGS), IgA nephropathy (IgAN), Membranous nephropathy (MN), Minimal change nephropathy (MCD), Steroid resistant nephrotic syndrome (SRNS), Steroid sensitive nephrotic syndrome (SSNS), Autosomal dominant polycystic kidney disease (ADPKD), Autosomal recessive polycystic kidney disease (ARPKD), and Alport syndrome.

Statistical analysis

- Minimum point prevalence of rare kidney conditions were estimated, overall and stratified by sex and age groups, using Office of National Statistics UK population data.[2]
- Descriptive statistics were calculated to characterize the prevalent cohorts of rare kidney disease patients in terms of demographic, clinical characteristics, and treatment patterns as of index date.
- Index date for IgAN and MN was defined as date of renal biopsy, while index date for FSGS, MCD, SRNS, and SSNS was defined as date of presentation to secondary or tertiary center. For ADPKD, ARPKD, and Alport syndrome, index date is defined as date of first clinical diagnosis.

DISCLOSURES

K.T. Sy and K. Huang are employees and shareholders of Pfizer Inc..

RESULTS

Prevalence for the nine diseases can be found in **Figure 1**. Prevalence between sexes were generally equal for all diseases, except for IgAN and MN where prevalence for males were roughly three-fold and two-fold higher, respectively.

Table 1 characterizes the demographics, clinical, and treatment patterns of nine prevalent cohorts of rare kidney disease patients. Among disease populations, median diagnosis age for MN was greatest at 52 years (IQR: 30 to 65) and lowest for ARPKD at 1 year (IQR: 0 to 20). Median baseline urine protein creatinine ratio (UPCR) were elevated (defined as greater than 3 g/g) in FSGS (5.3 g/g; IQR: 2.7 to 9.4), MCD (6.1 g/g; IQR: 2.4 to 10), and MN (6.0 g/g; IQR: 3.2 to 8.8). Median estimated glomerular filtration rate (eGFR) was below 60 ml/min for IgAN (40 ml/min; IQR: 22 to 69) and ARPKD (52 ml/min; IQR: 33 to 75). Diseases had differing rates of corticosteroid use on day of diagnosis, ranging from 1.1% for ADPKD to 51.4% for SSNS and calcineurin inhibitor use ranged from 1.7% for ADPKD and Alport syndrome and 26.3% for SRNS patients.

Figure 1. Disease prevalence per 100,000.

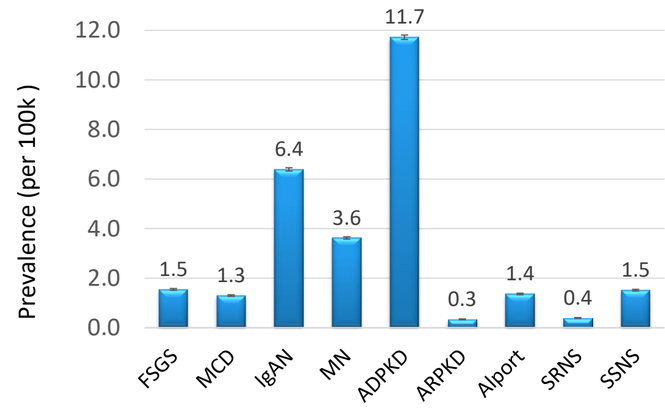

Table 1. Demographics, clinical characteristics, and treatment of the nine rare kidney disease conditions.

Variables	FSGS	MCD	IgAN	MN	ADPKD	ARPKD	Alport	SRNS	SSNS
N	1,057	889	4,329	2,461	7,922	237	934	272	1,036
Age									
Median (IQR)	35 (15, 53)	36 (13, 55)	38 (25, 50)	52 (30, 65)	28 (0, 45)	1 (0, 20)	18 (4, 36)	7 (2, 29)	6 (3, 26)
Race, n (%)									
Asian	107 (10%)	126 (14%)	405 (9%)	192 (8%)	233 (3%)	18 (8%)	41 (4%)	51 (19%)	160 (15%)
Black	79 (8%)	33 (4%)	68 (2%)	89 (4%)	194 (2%)	9 (4%)	15 (2%)	11 (4%)	49 (5%)
Caucasian	757 (72%)	627 (71%)	3364 (78%)	1817 (74%)	5877 (74%)	162 (68%)	613 (66%)	163 (60%)	580 (56%)
Other/Unknown	114 (11%)	103 (12%)	492 (11%)	363 (15%)	1618 (20%)	48 (20%)	265 (28%)	47 (17%)	247 (24%)
Renal replacement therapy, n (%)									
Yes	419 (40%)	63 (7%)	2205 (51%)	518 (21%)	3146 (40%)	103 (44%)	382 (41%)	112 (41%)	81 (8%)
Corticosteroid use, n (%)									
Yes	150 (38%)	126 (34%)	91 (11%)	51 (10%)	6 (1%)	5 (15%)	3 (2.5%)	33 (34.7%)	144 (51.4%)
Calcineurin inhibitor use, n (%)									
Yes	86 (22%)	49 (15%)	20 (2%)	26 (5%)	9 (2%)	7 (21%)	2 (2%)	25 (26%)	18 (6%)
Immunosuppressive drug use, n (%)									
Yes	16 (4%)	12 (4%)	50 (6%)	31 (6%)	7 (1%)	2 (6%)	3 (3%)	2 (2%)	9 (3%)
Protein creatinine ratio (PCR)									
Median (IQR)	5.3 (2.7, 9.4)	6.1 (2.4, 10.0)	1.7 (0.7, 3.4)	6 (3.2, 8.8)	0.1 (0.1, 0.2)	0.3 (0.1, 1.7)	0.5 (0.1, 1.5)	7.4 (3.4, 19.8)	6.8 (2.6, 10.8)
Estimated glomerular filtration rate (eGFR)									
Median (IQR)	68 (34, 104)	82 (56, 109)	40 (22, 70)	69 (43, 92)	66 (33, 93)	52 (33, 75)	86 (51, 109)	86 (42, 119)	95 (58, 137)

CONCLUSION

- Registries provide a rich and valuable source of information to estimate prevalence and describe clinical characteristics and treatments of patient populations, particularly in rare conditions where data is scarce.
- RaDaR is not a population-based registry, and therefore these estimated prevalence rates underestimate the true rate of rare kidney diseases. However, the estimates could be interpreted as absolute minimum rates.
- Patient numbers and demographics may be useful in assessing the feasibility of studies or clinical trials in rare kidney diseases.

REFERENCES

1. Wühl E, Van Stralen KJ, Wanner C, *et al.* Renal replacement therapy for rare diseases affecting the kidney: an analysis of the ERA–EDTA Registry. *Nephrol Dial Transplant* 2014; **29**: 1–8.
2. Population and household estimates, England and Wales - Office for National Statistics. https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/populationandhouseholdestimatesenglandandwales/census2021 (accessed October 2022).