A USRDS Retrospective Cohort Study: Epidemiology, Treatment Modalities, and Burden of End-Stage Kidney Disease Attributed to Immunoglobulin A Nephropathy (IgAN)

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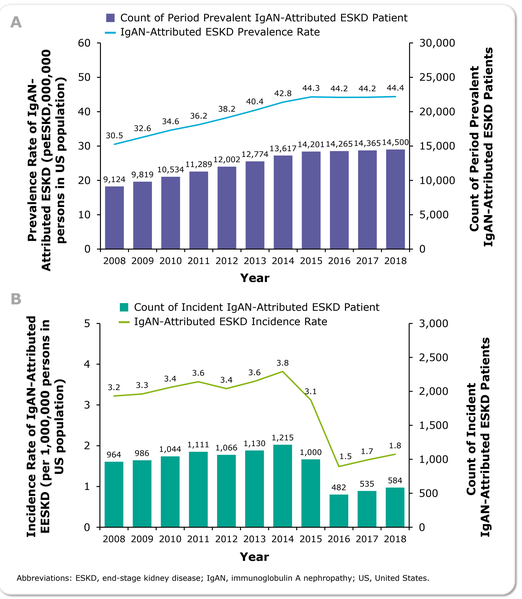
Poster# EE55

RESULTS

Epidemiology Results

- From 2008-2018, an average of **920** IgAN patients were diagnosed with ESKD annually with approximately **12,400** prevalent IgAN-attributed ESKD patients each year
- The average annual incidence and prevalence rates were **2.9** and **39.3** per million in the US population, respectively
- The sharp decrease in incidence of IgAN-attributed ESKD starting in 2015 may be due to the removal of the reference list of diagnosis codes from the Medical Evidence form, as there may have been uncertainty among physicians about which codes to use for IgAN

Figure 1. Prevalence and Incidence of IgAN-Attributed ESKD



Abbreviations: ESKD, end-stage kidney disease; IgAN, immunoglobulin A nephropathy; US, United States.

Patient Characteristics

- 10,101 patients with IgAN-attributed ESKD were included in the analyses
- At ESKD registration, median age was 47 years; 66% were male; 76% and 14% were White and Asian, respectively

Table 1. Patient Characteristics

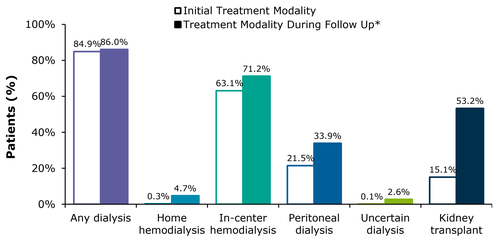
Demographic Characteristics	IgAN-Attributed ESKD Patients (n=10,101)
Age as of the Index Date, mean ± SD [median]	47.7 ± 15.9 [47.0]
Male, n (%)	6,650 (65.8%)
Race, n (%)	
White	7,661 (75.8%)
Asian	1,446 (14.3%)
Black	644 (6.4%)
Native Hawaiian or Other Pacific Islander	168 (1.7%)
American Indian/Alaska Native	135 (1.3%)
Other	47 (0.5%)
Employment Status 6-Months Prior to Index, n (%)	
Employed Full-time	4,845 (48.0%)
Retired	2,261 (22.4%)
Unemployed	1,705 (16.9%)
Employed Part-time	619 (6.1%)
Other Employment Status	374 (3.7%)
Student	297 (2.9%)
Medical Coverage as of the Index Date*, n (%)	
Employer Group Health Insurance	5,185 (51.3%)
Medicare Coverage	2,237 (22.1%)
Other Medical Insurance	1,748 (17.3%)
Medicaid Coverage	1,682 (16.7%)
No Medical Insurance	758 (7.5%)
Medicare Advantage	299 (3.0%)
Clinical Characteristics	
eGFR (mL/min/1.73m²)†, mean ± SD [median]	9.1 ± 5.3 [8.2]
Comorbidities, n (%)‡	
History of Hypertension	8,843 (87.5%)
Diabetes	1,301 (12.9%)
Congestive Heart Failure	736 (7.3%)

*Patients may have had multiple types of medical coverage. †Estimated glomerular filtration rate (eGFR) was calculated using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation and reported directly in the Medical Evidence file of the USRDS data. ‡The top 3 comorbidities are shown.

Treatment Modalities

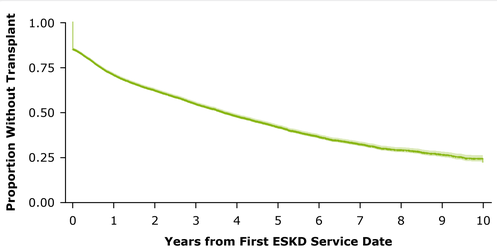
- The mean [median] follow-up time of IgAN-attributed ESKD patients was **64.0 [62.7] ± 36.4 months**
- **84.9%** of patients started on dialysis, mostly in-center hemodialysis. Patients spent an average of **3.2 years** on dialysis; this was impacted by patients receiving a kidney transplant and patient mortality
- **15%** of patients received a kidney transplant at ESKD registration. Over the entire study period, **53%** of IgAN-attributed ESKD patients in the USRDS database received a kidney transplant

Figure 2. Treatment Modalities Throughout the Study



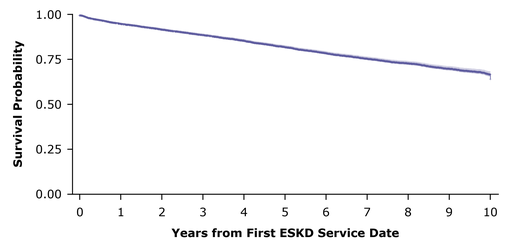
*Average length of follow-up was 64.0 months. During the follow-up period, patients may have received more than one treatment modality. Therefore, these categories are not mutually exclusive.

Figure 3A. Clinical Outcomes (KM Analysis) – Time to Transplant



Number of Transplants	5,376 (53.2%)
Median Time to Transplant in Years (95% CI)	3.8 (3.6, 3.9)
Proportion Without Transplant at 1 Year (95% CI)	0.71 (0.70, 0.72)
Proportion Without Transplant at 3 Years (95% CI)	0.55 (0.54, 0.56)
Proportion Without Transplant at 5 Years (95% CI)	0.42 (0.41, 0.44)
Proportion Without Transplant at 10 Years (95% CI)	0.24 (0.22, 0.26)

Figure 3B. Clinical Outcomes (KM Analysis) – Overall Survival



Number of Deaths	2,133 (21.1%)
Median Time to Death in Years (95% CI)	Not Reached
Proportion Alive at 1 Year (95% CI)	0.95 (0.95, 0.96)
Proportion Alive at 3 Years (95% CI)	0.89 (0.88, 0.90)
Proportion Alive at 5 Years (95% CI)	0.82 (0.82, 0.83)
Proportion Alive at 10 Years (95% CI)	0.64 (0.63, 0.66)

Table 2. HRU During the 1 Year Following USRDS Registration*

IgAN-Attributed ESKD Medicare Subgroup (n=1,510)	Proportion with ≥1 visit n (%)	Number of Visits† Mean ± SD [median]
Inpatient Admissions	1,091 (72.3%)	1.9 ± 2.2 [1]
Inpatient Length of Stay‡ (Days)	—	21.1 ± 35.1 [7]
Outpatient Visits	1,482 (98.2%)	29.7 ± 17.8 [27]
Emergency Room Visits	972 (64.4%)	2.3 ± 3.6 [1]
Home Health Agency Visits	816 (54.0%)	5.1 ± 7.6 [1]
Skilled Nursing Facility Visits	144 (9.5%)	4.6 ± 28.9 [0]
Hospice	6 (0.4%)	0.4 ± 9.4 [0]

*HRU was assessed for the 1,510 patients in the Medicare subgroup. †Number of visits was calculated among all patients in the Medicare subgroup. ‡Inpatient length of stay was calculated among patients in the Medicare subgroup with at least 1 inpatient admission.

CONCLUSIONS

- IgAN-attributed ESKD in the US is associated with a substantial burden to patients and the healthcare system
- There is a high unmet medical need for IgAN treatments that delay or prevent the need for dialysis and/or transplantation and reduce the risk of death

DISCLOSURES

Mark Bensink is the managing director of Benofit Consulting which received consulting fees from Travere Therapeutics, Inc. **Deborah Goldschmidt, Riley Taiji, and Zheng-Yi Zhou** are employees of Analysis Group, which received consulting fees from Travere Therapeutics, Inc. **Kaijun Wang** is an employee of Travere Therapeutics, Inc. and has an equity or other financial interest in Travere Therapeutics, Inc. **Richard Lieblich** is an employee of VJA Consulting, which received consulting fees from Travere Therapeutics, Inc. **Martin Bunke** is the director of CM Bunke Consulting, which received consulting fees from Travere Therapeutics, Inc.

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INTRODUCTION

- IgA nephropathy (IgAN) is characterized by the glomerular accumulation of immune complexes containing IgA with or without IgG, which may lead to damage of the glomerular filtration barrier, resulting in proteinuria, hematuria, and progressive loss of glomerular filtration rate
- Patients with IgAN usually remain undiagnosed until they present with symptoms of kidney disease, such as significant proteinuria, kidney insufficiency, gross hematuria, and hypertension[1]
- The progression to kidney failure can be slow and varies among populations, with studies showing that 15% to 40% of patients with IgAN develop end-stage kidney disease (ESKD), also called chronic kidney failure (CKF),[2] within 10 to 20 years of diagnosis[3,4]
- There are currently limited therapeutic options specifically for the treatment of IgAN
- ESKD poses significant economic burden to healthcare systems around the world, largely due to high costs associated with dialysis and transplantation[5,6]
- Real-world evidence on prevalence and incidence rates, patient characteristics, treatment modalities, clinical outcomes, and healthcare resource utilization (HRU) related to IgAN-attributed ESKD is lacking

Objective

- This retrospective observational study aimed to describe the prevalence and incidence rates, patient characteristics, treatment modalities, clinical outcomes, and HRU related to IgAN-attributed ESKD in the US

METHODS

Data Source

- US Renal Data System (USRDS) is the national data registry that collects, analyzes, and distributes information on the ESKD population in the US, including treatments and outcomes. All ESKD patients, regardless of insurance coverage and age, are included in the USRDS database
- Linked information on HRU is available for ESKD patients with Medicare coverage
- This study included USRDS data from 2008–2018

Sample Selection

- Patients registered to the USRDS with IgAN as the primary cause of ESKD in 2008–2018 were identified using ICD-9-CM code **583.81** and ICD-10-CM code **N02.8** (see limitations section for details)
- The *index date* was defined as the date of ESKD registration (i.e., in the USRDS data, the earliest date of first dialysis or transplant)
- The *follow-up period* was defined as the period from the index date until death, loss to follow-up, or end of data availability, whichever came first
- For the *Medicare subgroup,* patients were required to have at least 1 year of continuous medical coverage (i.e., Medicare Part A and B) following the index date

Statistical Methods

Epidemiology

- Prevalence and incidence estimates for IgAN-attributed ESKD in the US were calculated on a per 1,000,000 persons per year basis from 2008–2018
- Prevalence was estimated as the number of IgAN-attributed ESKD patients who were alive and whose index dates occurred before the reporting year, divided by the size of the US population
- Incidence was estimated as the number of IgAN-attributed ESKD patients whose index dates occurred during the reporting year, divided by the size of the US population

Patient Characteristics

- Demographics, laboratory values, and comorbidities as reported at USRDS registration were summarized with descriptive statistics, consisting of means, medians, and standard deviations (SDs) for continuous variables, and frequency counts and proportions for categorical variables

Treatment Modalities

- The types of dialysis and/or kidney transplant incurred by IgAN-attributed ESKD patients, at and after the index date, were summarized as frequency counts and proportions

Clinical Outcomes

- Time to kidney transplant and time to death were assessed from index date through the follow-up period using Kaplan-Meier (KM) analyses
- Median times to kidney transplant and overall survival were reported with associated 95% confidence intervals (CIs)

Health Resource Utilization

- Among the *Medicare subgroup,* all-cause HRU was summarized in the one-year period after the index date, stratified by place of service
- Frequency counts and proportions of patients with ≥1 visit in each HRU category were reported; means, medians, and SDs of the number of visits were reported by HRU category

DISCUSSION

- The prevalence of IgAN-attributed ESKD rose steadily from 2008 to 2015. The sharp drop in annual incidence, and leveling off of prevalence, starting in 2015 may be due to the removal of the reference code list from the Medical Evidence forms, resulting in uncertainty in which codes to use to identify IgAN
- These data show that patients in the USRDS database with IgAN-attributed ESKD rely more on kidney transplantation as treatment than the general ESKD population, with 53% receiving a transplant over the entire study period compared to 30% in the general prevalent ESKD population;[7] 36% of patients died within 10 years
- Healthcare resource use is high for this population; among patients with Medicare claims data, 72% required hospitalization and 64% visited the emergency room in the first year after USRDS registration, and the mean number of outpatient visits was 30 per patient per year

Limitations

- Patients are included in the USRDS registry if they receive treatment for ESKD (dialysis or transplant); as such, for this study (and all studies using USRDS data), ESKD should be interpreted as "treated ESKD"
- Analyses of HRU are limited to patients with Medicare coverage for the 12-month period following the index date. Patients with Medicare as of the index date are more likely to be aged 65 or older; their HRU may not be representative of the general IgAN-attributed ESKD population
- When registering a patient with ESKD, physicians fill out a Medical Evidence Report form, which includes a field for the primary cause of kidney failure using ICD-9-CM (for patients from 1995 to mid-2015) or ICD-10-CM (mid-2015 onward) codes. The forms used from 1995 until mid-2015 provided disease names and ICD-9-CM codes to choose from, while the forms used from mid-2015 until 2018 did not. This may have led to under-reporting of IgAN starting in mid-2015 if there was uncertainty among physicians about which codes to use

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