Reduction in Corticosteroid Use Among Patients With Focal Segmental Glomerulosclerosis, Membranous Nephropathy, or IgA Nephropathy After Acthar® Gel in a Large Administrative Claims Database

Kyle Hayes,[1] Feng Sheng Hu,[2] Mohammed Fahim,[2] Mary Panaccio,[3] John Niewoehner,[4] and George J Wan[3]

[1]Mallinckrodt Pharmaceuticals, Murrieta, CA, USA; [2]KMK Consulting, Inc., Morristown, NJ, USA; [3]Mallinckrodt Pharmaceuticals, Bridgewater, NJ, USA; [4]Mallinckrodt Pharmaceuticals, St Louis, MO, USA

Mallinckrodt Pharmaceuticals

BACKGROUND

- Nephrotic syndrome (NS) is a disease state characterized by edema, hypoalbuminemia, hyperlipidemia, and proteinuria.[1]
  - Focal segmental glomerulosclerosis (FSGS), membranous nephropathy (MN), and IgA nephropathy (IgAN) are glomerular disorders with nephrotic-range proteinuria.[1-4]
- First-line treatments are corticosteroids (CSs) and/or calcineurin inhibitors (CNIs).[5]
  - However, these treatments require close monitoring due to their therapeutic windows and potential risk of adverse effects.[5]
- Further, studies have demonstrated that about half of patients with NS who achieve remission with glucocorticoids experience subsequent relapse of proteinuria.[6,7]
  - Treatment with CNIs has been associated with remission rates in clinical trials, but high relapse rates occur upon treatment discontinuation.[8-10]
  - The combination of mycophenolate mofetil and glucocorticoids offers an alternative to CNIs but treatment with this combination has been associated with a low remission rate in clinical trials.[11]
- Consequently, patients with NS depend on second-line and later therapies to induce further remission and prolong the progression to end-stage renal disease.
- Acthar® Gel (repository corticotropin injection [RCI]) is indicated for the treatment of proteinuria in NS and is a short-term option for patients who do not respond to CSs or CNIs.[12]

OBJECTIVE

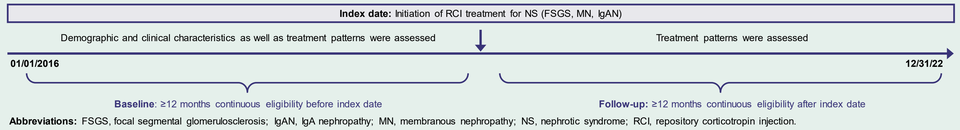
To describe real-world use and treatment patterns in patients with FSGS, MN, and IgAN after RCI initiation using a large retrospective claims database (Symphony Health).

METHODS

Study design and data source

- A retrospective cohort study of administrative health insurance claims from Symphony Health's Integrated Dataverse
- Study period: 01/01/2016 to 12/31/2022
  - Integrated Dataverse contains approximately 168 million longitudinally tracked patients with both a prescription and medical claim in any recent year of the database.
  - These patients are representative of the age and gender mix in the United States population.
- The index date was considered the date of the first prescription for RCI **(Figure 1).**

Figure 1. Study design schematics



Abbreviations: FSGS, focal segmental glomerulosclerosis; IgAN, IgA nephropathy; MN, membranous nephropathy; NS, nephrotic syndrome; RCI, repository corticotropin injection.

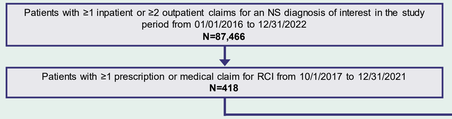
Patient selection criteria

Detailed patient selection criteria are presented in **Figure 2**.

Key inclusion criteria:

- Confirmed diagnosis of NS based on International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes N02.8, N04.0–N04.9, and N04.A
- Initiated therapy with RCI from 2016 through 2022, confirmed based on submitted prescription fill identified based on National Drug Codes (63004-8710-1, 63004-8710-2, and 63004-8710-3) and Healthcare Common Procedure Coding System code (J0800)
- Confirmed diagnosis of NS etiologies based on ICD-10-CM codes; FSGS (N04.1), MN (N04.2), and IgAN (N02.8)
- Age ≥18 years at index date
- Continuous eligibility ≥12 months before and ≥12 months after treatment

Figure 2. Patient selection criteria



Criteria	FSGS	MN	IgAN
Patients with ≥1 inpatient or ≥2 outpatient claims for a confirmed diagnosis of FSGS, MN, or IgAN before an RCI index claim	N=101	N=91	N=41
Patients ≥18 years of age	N=92	N=90	N=39
No diagnosis for conditions[a] contraindicated to RCI in the 3-month baseline period	N=75	N=80	N=37
Continuous eligibility of ≥12 months before to ≥12 months after index date	N=72	N=72	N=36

Abbreviations: FSGS, focal segmental glomerulosclerosis; IgAN, IgA nephropathy; MN, membranous nephropathy; NS, nephrotic syndrome; RCI, repository corticotropin injection.
[a]Diagnosis for scleroderma, osteoporosis, ocular herpes simplex, peptic ulcers, congestive heart failure, primary adrenocortical insufficiency, or adrenocortical hyperfunction.

Statistical analyses

- Means and standard deviations were reported for continuous variables, and numbers and proportions were reported for categorical variables.
- Paired sample t-tests were used to assess changes in treatment patterns across the NS cohorts.

RESULTS

Patient demographics and clinical characteristics

- RCI-treated MN vs FSGS and IgAN cohorts, respectively
  - was older (54 vs 46 and 44 years),
  - comprised more males (60% vs 56% and 56%), and
  - were mostly of White/Caucasian race (54% vs 25% and 44%) **(Table 1)**.

Table 1. Patient demographics and clinical characteristics

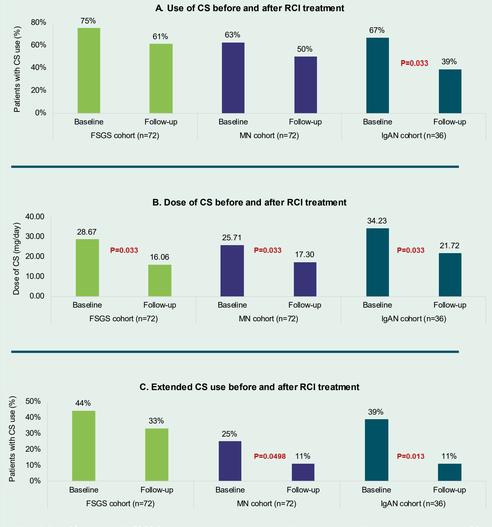
Characteristic	FSGS cohort (N=72)	MN cohort (N=72)	IgAN cohort (N=36)
Age, mean (SD)	46.0 (19.38)	54.4 (16.66)	44.1 (16.59)
Age group, N (%)			
18-34	24 (33%)	14 (19%)	11 (31%)
35-44	11 (15%)	8 (11%)	9 (25%)
45-54	14 (19%)	8 (11%)	6 (17%)
55-64	5 (7%)	18 (25%)	7 (19%)
65 and above	18 (25%)	24 (33%)	3 (8%)
Gender, N (%)			
Male	40 (56%)	43 (60%)	20 (56%)
Female	32 (44%)	29 (40%)	16 (44%)
Ethnicity, N (%)			
Black/African American	13 (18%)	12 (17%)	3 (8%)
Hispanic	8 (11%)	6 (8%)	4 (11%)
White/Caucasian	18 (25%)	39 (54%)	16 (44%)
Other	7 (10%)	3 (4%)	5 (14%)
Unknown	26 (36%)	12 (17%)	8 (22%)
Region, N (%)			
Northeast	11 (15%)	16 (22%)	10 (28%)
Midwest	15 (21%)	14 (19%)	7 (19%)
South	42 (58%)	36 (50%)	16 (44%)
West	4 (6%)	6 (8%)	3 (8%)
Insurance type,[a] N (%)			
Cash	1 (1%)	1 (1%)	3 (8%)
Commercial	11 (15%)	13 (18%)	8 (22%)
Medicaid	6 (8%)	5 (7%)	3 (8%)
Medicare	16 (22%)	21 (29%)	5 (14%)
Multiple	11 (15%)	8 (11%)	3 (8%)
PBM	17 (24%)	17 (24%)	10 (28%)
Other/unknown	10 (14%)	7 (10%)	4 (11%)
Individual comorbidities, N (%)			
Hypertension	66 (92%)	56 (78%)	28 (78%)
Chronic kidney disease (stages 1-5 and unspecified)	55 (76%)	45 (63%)	24 (67%)
Hypercholesterolemia, hyperlipidemia, triglyceridemia	35 (49%)	40 (56%)	14 (39%)
Hypertensive chronic renal disease	39 (54%)	33 (46%)	12 (33%)
Anemia	34 (47%)	31 (43%)	13 (36%)
Renal failure (acute)	27 (38%)	26 (36%)	10 (28%)
Diabetes without complications	17 (24%)	19 (26%)	13 (36%)
General infection	18 (25%)	11 (15%)	6 (17%)
Obesity	11 (15%)	14 (21%)	7 (19%)
Diabetes with complications	10 (14%)	15 (19%)	6 (17%)
Chronic pulmonary disease	5 (7%)	11 (15%)	4 (11%)
Arrhythmia	13 (18%)	7 (10%)	6 (17%)
Depression	5 (7%)	7 (10%)	6 (17%)

Abbreviations: FSGS, focal segmental glomerulosclerosis; IgAN, IgA nephropathy; MN, membranous nephropathy; RCI, repository corticotropin injection; SD, standard deviation
[a]Insurance type is based on the Symphony Pharmacy procedure table and surgical table at index date.

Treatment pattern of CSs after RCI treatment

- All 3 cohorts (FSGS, MN, and IgAN) had a lower proportion of patients who were receiving CSs at follow-up vs baseline **(Figure 3A)**.
  - A lower proportion of patients in the IgAN cohort was receiving CSs at follow-up vs baseline, and this difference was statistically significant (39% vs 67%, p=0.033).
- All 3 cohorts had a lower mean average daily dose for extended use of CSs at follow-up vs baseline, and this difference was statistically significant (p<0.001) **(Figure 3B)**.
  - Further, all 3 cohorts had a lower proportion of patients with at least 60 days of continuous use of CSs with a pharmacy claim at follow-up vs baseline; a decrease in the use of CSs was statistically significant for the MN and IgAN cohorts **(Figure 3C)**.
- All 3 cohorts had fewer mean number of claims for CSs at follow-up compared with baseline.
  - The MN cohort had fewer mean number of claims for CSs at follow-up vs baseline, and this difference was statistically significant (1.4 vs 2.7, p=0.046).
  - The number of claims for CSs at follow-up vs baseline was 2.9 vs 3.7 for the FSGS cohort and was 1.6 vs 3.1 for the IgAN cohort; findings were not statistically significant.

Figure 3. Treatment pattern of CS use before and after RCI treatment

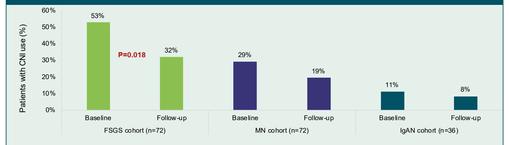


Abbreviations: CS, corticosteroid; FSGS, focal segmental glomerulosclerosis; IgAN, IgA nephropathy; MN, membranous nephropathy; RCI, repository corticotropin injection

Comedication use after RCI treatment

- All 3 cohorts had a lower proportion of patients using CNIs compared with baseline **(Figure 4)**.
  - The FSGS cohort had a lower proportion of patients who were receiving CNIs at follow-up vs baseline, and this difference was statistically significant (32% vs 53%, p=0.018).
- All 3 cohorts had a lower proportion of patients using nonsteroidal anti-inflammatory drugs (NSAIDs) and opioids at follow-up vs baseline.
  - Use of NSAIDs at follow-up vs baseline: FSGS 37.5% vs 50.0%; MN 34.7% vs 43.1%; IgAN 25.0% vs 33.3%.
  - Use of opioids at follow-up vs baseline: FSGS 43.1% vs 56.9%; MN 38.9% vs 52.8%; IgAN 38.9% vs 55.6%.

Figure 4. Use of CNIs before and after RCI treatment



Abbreviations: CNIs, calcineurin inhibitors; FSGS, focal segmental glomerulosclerosis; IgAN, IgA nephropathy; MN, membranous nephropathy; RCI, repository corticotropin injection.

CONCLUSIONS

- This study demonstrated a reduction in the use and dose of CSs as well as a reduction in CNIs, NSAIDs, and opioids after RCI initiation.
- Further, reduction in concomitant medication use after RCI initiation varies by NS etiology.
- These data further our understanding of the clinical impact of RCI treatment on concomitant therapies, particularly the potential to reduce the use of CSs and CNIs for patients with FSGS, MN, and IgAN.

LIMITATIONS

This study is an observational administrative claims analysis of real-world evidence on patient outcomes and has the inherent limitations of claims data.

- Administrative claims data can be incomplete, inaccurate, or missing and can lack clinical detail on the patient.
- Although claims data can show prescription medications have been filled, it cannot confirm the patients have taken the medications.
- Diagnosis, procedures, and outcomes are based on ICD-10, Current Procedural Terminology (CPT), and/or Healthcare Common Procedure Coding System (HCPCS) codes and do not directly measure the conditions.

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DISCLOSURES

KH, MP, JN, and GJW are employed by Mallinckrodt Pharmaceuticals; FSH and MF are employees of KMK Consulting.