Patient Characteristics and Improved Outcomes With Greater Adherence to Acthar® Gel in Nephrotic Syndrome

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BACKGROUND

- Nephrotic syndrome (NS) is a glomerular disorder with an incidence of 3-5 new cases per 100,000 people in the United States
- First-line treatment consists of corticosteroids and/or calcineurin inhibitors (CNIs),[1] but complications, resistance, or relapses to first-line treatment warrant additional treatment options
- Treatment with adrenocorticotropic hormone (ACTH) has been shown to reduce proteinuria in NS[2]
- Acthar® Gel (repository corticotropin injection [RCI])—a naturally sourced complex mixture of ACTH analogs and other pituitary peptides—has an indication for the treatment of proteinuria in NS[3]
  - Several small studies support the use of RCI for NS[4-11]

OBJECTIVE

- To describe real-world use of RCI in NS patients
- To evaluate the impact of higher adherence to RCI on corticosteroid use and treatment pattern

METHODS

Study design and data source

We performed a retrospective cohort analysis of NS patients treated with RCI using data from a large commercial open-source claims database (Integrated Dataverse from Symphony Health)

- Study period: 01/01/2016 to 12/31/2022
- Index date: Date of first RCI claim following confirmed NS diagnosis

Patient selection criteria

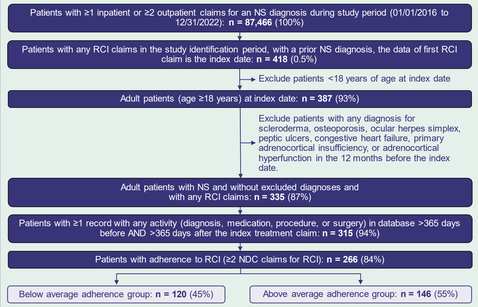
- Inclusion criteria:
  - Confirmed NS diagnosis identified using International Classification of Diseases, 9th/10th Revision, Clinical Modification (ICD-9/10-CM) diagnosis codes N02.8, N04 (ie, ≥1 inpatient diagnosis or ≥2 outpatient diagnosis)
  - Initiated therapy with RCI (identified using National Drug Code [NDC] and Generic Product Identifier [GPI] drug codes and/or Current Procedural Terminology [CPT] and Healthcare Common Procedure Coding System [HCPCS] procedure codes)
  - Age ≥18 years at index date
  - ≥12 months of eligibility before the index date and ≥12 months of eligibility following and including index date
- Exclusion criteria:
  - Contraindicated diagnosis for RCI in 12 months before the index date

Analyses

- We defined RCI adherent patients as those with ≥2 NDC claims for RCI
- We used mean proportion of days covered (PDC) to stratify patients into 2 RCI adherence cohorts:
  - Above average (AA) adherence—Defined as adherent patients from each cohort with >average overall PDC of each cohort PDC
  - Below average (BA) adherence—Defined as adherent patients with ≤ average overall PDC of each cohort PDC
- We analyzed patient demographic and clinical characteristics, treatment patterns, healthcare resource utilization, cost, and NS-related outcomes by adherence cohorts
- P-value statistical testing was performed by chi-square test for categorical variables and t-test for continuous variables

RESULTS

Figure 1. Selection of Study Population. NDC, National Drug Code, NS, nephrotic syndrome; RCI, repository corticotropin injection.



- The study population comprised 315 adults with NS and any RCI claims, including 120 patients in the BA adherence cohort and 146 patients in the AA adherence cohort **(Figure 1)**

Table 1. Baseline Demographic Characteristics of Patients Treated with RCI

Characteristic	All patients treated with RCI (n = 315)	RCI adherence cohort		
		Below average (n = 120)	Below average (n = 146)	P value
Age at index date, mean ± SD	49.4 ± 18.2	48.3 ± 18.9	50.9 ± 17.7	0.239
Gender, n (%)				**0.506**
Female	142 (45.1)	51 (42.5)	68 (46.6)	
Male	173 (54.9)	69 (57.5)	78 (53.4)	
Race/ethnicity, n (%)				**0.354**
Black/African American	55 (17.5)	16 (13.3)	32 (21.9)	
Hispanic	29 (9.2)	14 (11.7)	11 (7.5)	
White/Caucasian	123 (39.0)	50 (41.7)	60 (41.1)	
Other	22 (7.0)	9 (7.5)	8 (5.5)	
Unknown	86 (27.3)	31 (25.8)	35 (24.0)	
Region in United States, n (%)				**0.407**
Northeast	64 (20.3)	27 (22.5)	29 (19.9)	
Midwest	76 (24.1)	33 (27.5)	31 (21.2)	
South	151 (47.9)	51 (42.5)	77 (52.7)	
West	24 (7.6)	9 (7.5)	9 (6.2)	
Insurance type, n (%)				**0.019**
Cash	9 (2.9)	0	8 (5.5)	
Commercial	47 (14.9)	10 (8.3)	23 (15.8)	
Medicaid	38 (12.1)	18 (15.0)	17 (11.6)	
Medicare	68 (21.6)	23 (19.2)	37 (25.3)	
Multiple	37 (11.7)	16 (13.3)	14 (9.6)	
PBM	75 (23.8)	32 (26.7)	32 (21.9)	
Other/unknown	41 (13.0)	21 (17.5)	15 (10.3)	

AA, above average; BA, below average; PBM, pharmacy benefit manager; RCI, repository corticotropin injection.

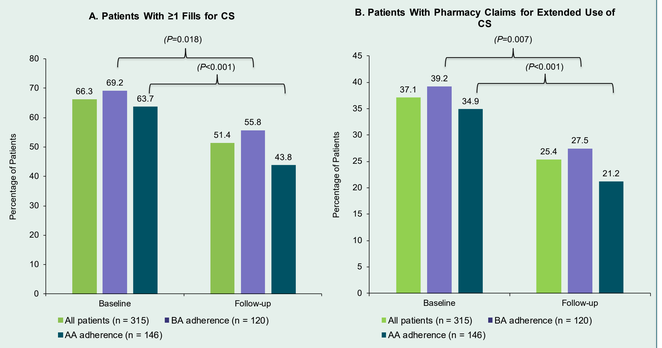
- Most baseline demographic characteristics were similar in the AA and BA adherence cohorts **(Table 1)**
  - However, the BA adherence cohort had a lower proportion of patients with Black/African American race/ethnicity compared with the AA adherence cohort (13.3% vs 21.9%)

Table 2. Baseline Clinical Characteristics

Characteristic	All patients treated with RCI (n = 315)	RCI adherence cohort		
		Below average (n = 120)	Below average (n = 146)	P value
CDMF CCI, mean ± SD	2.26 ±1.77	2.48 ± 1.71	2.08 ± 1.81	0.065
Individual CDMF-CCI comorbidities in > 5% of patients in any group, n (%)				
Congestive heart failure	26 (8.3)	10 (8.3)	13 (8.9)	0.869
Cerebrovascular disease	18 (5.7)	6 (5.0)	9 (6.2)	0.682
Chronic pulmonary disease	46 (14.6)	18 (15.0)	22 (15.1)	0.988
Rheumatic disease	23 (7.3)	13 (10.8)	8 (5.5)	0.107
Liver disease (mild)	20 (6.3)	12 (10.0)	7 (4.8)	0.101
Diabetes without chronic complication	33 (10.5)	18 (15.0)	10 (6.8)	0.031
Renal disease (mild, moderate)	192 (61.0)	67 (55.8)	94 (64.4)	0.156
Diabetes with chronic complications	50 (15.9)	20 (16.7)	24 (16.4)	0.960
Renal disease (severe)	67 (21.3)	31 (25.8)	24 (16.4)	0.060

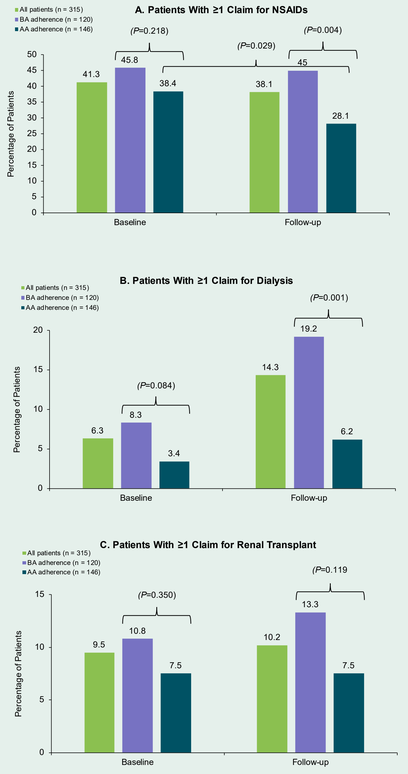
AA; above average; BA, below average; CCI, Charlson comorbidity index; CDMF, claims-based disease-specific refinements; RCI, repository corticotropin injection.

Figure 2. Overall Use of CS (A) and Extended Use of CS (B) at Baseline and Follow-up



- During the follow-up period, both the AA and BA adherence cohorts had significant reductions (P<0.05) in the percentage of patients with ≥1 fill for corticosteroids (CS) **(Figure 2A)** and with pharmacy claims for extended-use CS, defined as ≥60 days of continuous use **(Figure 2B)**.

Figure 3. Patients With Claims for NSAIDs, Dialysis, or Renal Transplant



- During the follow-up period, the AA adherence cohort had a lower proportion of patients who were taking nonsteroidal anti-inflammatory drugs (NSAIDs) (Figure 3A: 28% vs 45%; P=0.03), dialysis **(Figure 3B**: 6% vs 19%; P=0.001), and receiving renal transplant **(Figure 3C**: 8% vs 13%) compared with the BA adherence cohort

Table 3. RCI Treatment Duration and Patterns During Follow-up Period

Characteristic	All patients treated with RCI (n = 315)	RCI adherence cohort		
		Below average (n = 120)	Above average (n = 146)	P value
RCI fills, mean ± SD	7.00 ± 5.55	4.16 ± 1.84	10.78 ± 4.09	< 0.001
Duration from RCI initiation to last RCI fill in patients with ≥ 2 RCI fills				
No. of patients	270	120	146	
Mean ± SD	198.11 ± 111.60	104.99 ± 65.28	274.61 ± 80.36	< 0.001

AA; above average; BA, below average; RCI, repository corticotropin injection.
[a]Follow-up period defined as index date + 365 days

- During the followup study period, the AA adherence cohort had significantly longer duration of RCI treatment (274.61 vs 104.99 days, P< 0.001) and more fills (10.78 vs 4.16, P<0.001) than the BA adherence cohort **(Table 3)**

LIMITATIONS

This study has the inherent limitations of observational administrative claims data analyses, including:

- Administrative claims data can be incomplete, inaccurate, or missing and lack clinical details on patients.
- Although claims data can show that prescription medications have been filled, they cannot confirm that patients have taken the medications.
- Diagnosis, procedures, and outcomes are based on ICD-10, CPT, and/or HCPCS codes and do not directly measure the conditions.

CONCLUSIONS

This observational administrative claims analysis of real-world evidence shows that RCI is a viable treatment option for patients with NS who don't respond to CS and/or CNIs. Compared with the RCI BA adherence cohort at follow-up, the AA adherence cohort had improved outcomes such as:

- Slightly greater reduction in use of CS, including extended use CS
- Significantly fewer patients receiving dialysis and/or renal transplant

Thus, higher adherence to RCI was associated with greater steroid-sparing effect, less need for renal transplantation, and reduced healthcare resource utilization.

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DISCLOSURES

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

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