Group-based trajectory modeling to assess adherence to chronic urate-lowering therapies among commercially insured US adults with gout

John G. Rizk[1], Danya M. Qato[1,2], Clifton O. Bingham[3], Susan dosReis[1]

1. Department of Practice, Sciences, and Health Outcomes Research, University of Maryland School of Pharmacy, Baltimore
2. Department of Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore
3. Johns Hopkins Arthritis Center, Johns Hopkins University School of Medicine, Baltimore, MD

Why study adherence in gout patients?

Adherence to urate-lowering therapies (ULTs) is critical to prevent flares	Proportion of days covered (PDC) fails to capture dynamic patterns	Targeted interventions require understanding of adherence trajectories

Methods

Study Design and Data Source

- ❑ Retrospective cohort study using IQVIA PharMetrics® Plus claims data (25% random sample), from 2016–2021.
- ❑ Includes medical, pharmacy, and enrollment data for commercially insured adults in the U.S.

Study Population

Adults aged 30–84 years with:

- ❑ New initiation of ULT (allopurinol or febuxostat) between 2017–2020 (first claim as *index date*)
- ❑ ≥1 inpatient or ≥2 outpatient gout diagnoses (ICD-10) on index date and/or prior year
- ❑ Continuous insurance coverage 12 months before and after index date

Adherence Measurement

- ❑ Monthly adherence to ULT measured using PDC
- ❑ Calculated over a 12-month period post-index date
- ❑ Overlapping prescriptions were truncated

Trajectory Modeling

- ❑ Group-based trajectory modeling (GBTM) used to identify longitudinal adherence patterns
- ❑ Models estimated using PROC TRAJ in SAS
- ❑ Optimal number of trajectory groups selected based on:
  - ❑ Bayesian Information Criterion (BIC)
  - ❑ Group size ≥ 5%
  - ❑ Average posterior probability > 0.7
  - ❑ Odds of correct classification > 5.0

Statistical Analysis

- ❑ Multinomial logistic regression identified factors associated with adherence trajectory group membership
- ❑ Independent variables included:
  - ❑ Demographics: age, sex, region
  - ❑ Clinical characteristics: comorbidities (e.g., hypertension, hyperlipidemia, obesity)
  - ❑ Medication use for gout flares: NSAIDs, colchicine, oral glucocorticoids

Results

GBTM ULT adherence trajectories identified for 9,404 beneficiaries:

- ❑ **Continuously High** PDC ≥0.8: 60.5%
- ❑ **Early Decline** PDC = 0 by month 6: 15.0%
- ❑ **Intermediate** PDC ≈ 0.4–0.6: 16.6%
- ❑ **High-then-Low** PDC = 0 by month 10: 8.0%

Figure 1. ULT Adherence trajectories over 12 months post-index date.

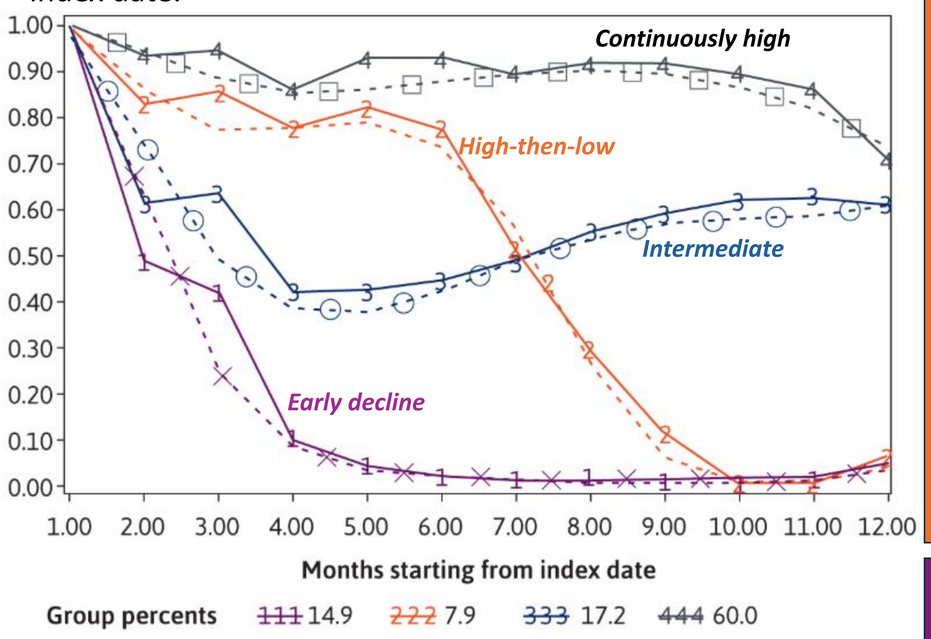
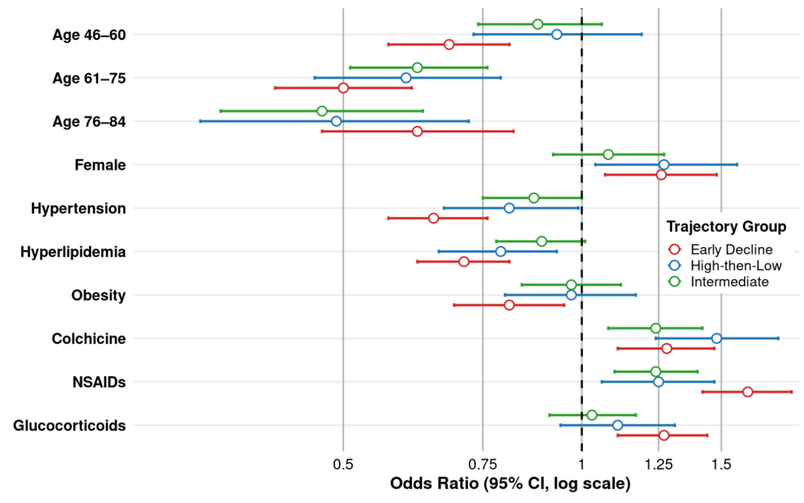


Table 1. Demographic and clinical profiles for 9,404 beneficiaries by ULT adherence trajectory groups.

Characteristic	Early decline (n=1408)	High-then-low (n=748)	Intermediate (n=1558)	Continuously high (n=5690)
Age category, (%)				
30 – 45	286 (20.3)	109 (14.6)	235 (15.1)	534 (9.4)
46 – 60	551 (39.1)	321 (42.9)	672 (43.1)	1934 (33.9)
61 – 75	445 (31.6)	264 (35.3)	555 (35.6)	2578 (45.3)
76 – 84	126 (8.9)	54 (7.2)	96 (6.2)	644 (11.3)
Male sex, (%)	1151 (81.8)	597 (79.8)	1289 (82.7)	4609 (81.0)
Hypertension, (%)	888 (63.1)	529 (70.7)	1101(70.7)	4452 (78.2)
Hyperlipidemia, (%)	759 (53.9%)	446 (59.6%)	958 (61.5)	3936 (69.2)
Obesity, (%)	252 (17.9)	165 (22.1)	328 (21.1)	1269 (22.3)
Colchicine use‡, (%)	369 (26.2)	208 (27.8)	370 (23.8)	1098 (19.3)
NSAID use‡, (%)	654 (46.5)	297 (39.7)	621 (39.9)	1804 (31.7)
Oral glucocorticoid use‡, (%)	620 (44.0)	303 (40.5)	587 (37.7)	1960 (34.5)

‡Baseline use of medications for gout flares.

Figure 2. Factors associated with ULT adherence trajectory group membership.



Reference groups: Age 30–45 years, Male, no hypertension, no hyperlipidemia, no obesity, no colchicine use, no NSAID use, no oral glucocorticoid use. Reference adherence trajectory: Continuously High. Adjusted for all variables in the table, besides region (Midwest, South, West), diabetes, ischemic heart disease, chronic kidney disease, ischemic stroke, other arthritic conditions, peripheral vascular disease, depression, dementia, COPD or asthma, cancer, liver disease, atrial fibrillation.

Key Messages

Compared to the continuously high adherence group, groups showing declining or intermediate adherence to ULT

were more likely to be:

1. ***<60 years***
2. ***Female***
3. ***Users of NSAIDs, colchicine, and oral glucocorticoids in the baseline period***

…but were less likely to have *hypertension, hyperlipidemia, or obesity*

Conclusions

- ❑ Adherence to ULTs varies considerably, with 40% of beneficiaries exhibiting suboptimal patterns.
- ❑ Adherence to ULT is essential to prevent recurrent flares, improve health-related quality of life, reduce functional disability, lower health care utilization, and maintain work productivity.
- ❑ Compared to a static PDC value to assess adherence, GBTM provides a nuanced understanding of adherence behaviors and can inform future adherence-improvement strategies.

Want to Learn More?
See Full Paper in JMCP's August 2025 issue!

Full reference list is available in the link above

Contact Information

John G. Rizk: john.rizk@umaryland.edu