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Gouty Arthritis Patients' Health Economic Disease Burden and Healthcare Resource Consumption

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Abstract: *Objective:* To investigate the health economic burden of disease and healthcare resource utilization among patients with gouty arthritis. *Methods:* Medical records of patients with gouty arthritis documented in the Langchao database from January 1, 2020, to December 31, 2024, were selected. Descriptive analysis and statistical tests were conducted on healthcare resource consumption, types of medications used, and corresponding recurrence and new-onset disease events during patients' visits. For between-group comparisons of normally distributed continuous variables, *t*-tests or analysis of variance (ANOVA) were employed; for non-normally distributed continuous variables, Wilcoxon rank-sum tests or Kruskal-Wallis H tests were used; for categorical variables, Pearson's χ^2 tests or Fisher's exact tests were applied. *Results:* This study included 96,199 patients with gouty arthritis, with a mean age of 50.49 years, of whom 68.65% were male. Patients used nonsteroidal anti-inflammatory drugs (NSAIDs), colchicine, and glucocorticoids a total of 1,089,800 times, with NSAIDs accounting for 57.32%, colchicine for 1.38%, and glucocorticoids for 41.30%. From 2020 to 2024, patients had 4,440,466 outpatient visits (annual average of 12.65 visits) and 85,078 hospitalizations (annual average of 0.55 admissions). Hospitalized patients had an average length of stay of 8.73 days per admission, with an average of 10.27 laboratory tests and 1.74 examinations per hospitalization, substantially higher than for outpatients. In terms of expenditures for patients with gouty arthritis, hospitalized patients incurred higher laboratory test costs (253.26 yuan/person/year) and examination costs (472.53 yuan/person/year) compared to outpatients (laboratory tests: 137.00 yuan/person/year; examinations: 257.47 yuan/person/year), suggesting greater disease complexity and resource consumption. In the one-year follow-up after acute gout flares, recurrence rates differed across the three medication groups: the glucocorticoid group had an average of 3.28 recurrences, the colchicine group 2.82, and the NSAIDs group the lowest at 2.21. For new-onset adverse events, no significant differences were observed among the groups in gastrointestinal ulcers ($P = 0.236$) or bleeding ($P = 0.069$). However, significant differences existed in hepatic dysfunction ($P = 0.033$), renal impairment ($P < 0.001$), and cardiovascular/cerebrovascular events ($P < 0.001$). The glucocorticoid group exhibited the highest rates, with 2.72% for hepatic dysfunction, 5.90% for renal impairment, and 18.45% for cardiovascular/cerebrovascular events. *Conclusion:* Based on real-world electronic medical record data from the Langchao database (2020–2024), this study systematically evaluated the health economic burden and healthcare resource utilization of patients with gouty arthritis. The findings indicate a generally high level of healthcare resource consumption in real-

world settings, particularly the substantial burden from laboratory tests and examinations among inpatients. Hospitalized patients incurred higher laboratory and examination costs than outpatients, suggesting greater disease severity, higher diagnostic and therapeutic complexity, and increased resource consumption. Regarding medication use, NSAIDs were the most frequently used agents and were associated with lower recurrence rates, although their potential adverse effects on renal function and cardiovascular risk warrant attention. The glucocorticoid group showed the highest recurrence rates and adverse event incidence, indicating that these agents should be used cautiously, particularly in patients with hepatic or renal dysfunction or elevated cardiovascular risk. Individualized medication management and monitoring should be strengthened to reduce recurrence frequency and adverse events, thereby alleviating disease burden and optimizing healthcare resource utilization. Clinicians are advised to comprehensively consider drug efficacy, recurrence risk, adverse events, and resource consumption when developing individualized treatment plans to achieve cost-effectiveness optimization and provide a scientific basis for healthcare policy formulation.

Keywords: Gouty arthritis; Disease burden; Healthcare resource consumption; Gastrointestinal events; Liver function; Renal function; Cardiovascular disease; Nonsteroidal anti-inflammatory drugs (NSAIDs); Colchicine; Glucocorticoids

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1. Introduction

Gouty arthritis (GA) is a metabolic disorder caused by hyperuricemia, characterized by the deposition of monosodium urate crystals in joints and soft tissues, triggering acute, recurrent inflammatory arthritis often accompanied by severe pain, redness, swelling, and functional impairment. With changes in lifestyle and dietary patterns, the prevalence of gout has been increasing annually and shows a clear trend toward younger age groups. Epidemiological surveys indicate that the prevalence of gout among Chinese adults is 3.2% [1].

The onset and progression of gout are influenced by multiple factors, including age, sex, genetic predisposition, dietary structure, lifestyle habits, and comorbid metabolic conditions (such as obesity, diabetes, and hypertension) [2]. In clinical practice, key management goals for gout include effectively controlling inflammation during acute attacks, relieving pain, preventing recurrence, and protecting organ systems such as the liver and kidneys.

As a progressive disease, the health economic burden and healthcare resource consumption associated with gouty arthritis hold significant implications for healthcare systems, medical insurance payers, and patient families in terms of medical and payment decision-making.

With the advancement of medical informatization, real-world data provide valuable resources for evaluating treatment effectiveness, safety, and economics. Compared with traditional clinical trials, real-world studies better reflect medication patterns and outcomes across diverse patient populations in routine clinical practice, particularly for chronic and multifactorial diseases in terms of efficacy and risk assessment.

To gain deeper insight into the current health economic burden and healthcare resource consumption of patients with gouty arthritis in clinical settings, this study comprehensively analyzed hospitalization, outpatient visits, medication use, and other related healthcare resource consumption based on electronic medical record data from the Langchao database between 2020 and 2024. The findings are intended to provide evidence-based support for individualized treatment of gouty arthritis and to inform the formulation and optimization of public health policies.

2. Subjects and methods

2.1. Study population

Medical records of patients with gouty arthritis documented in the Langchao database from January 1, 2020, to December 31, 2024, were selected. Inclusion criteria required at least one diagnosis of hyperuricemia or gout, a history of acute gout attack, or receipt of gout-related treatment during the study period. Patients younger than 18 years were excluded.

2.2. Statistical methods

From a healthcare system perspective on resource consumption, this study primarily considered two categories of costs: total inpatient expenses and total outpatient expenses.

In descriptive analyses, continuous variables were reported as mean ± standard deviation (SD) to characterize their distribution. Categorical variables were reported as frequencies and percentages (%). For between-group comparisons of categorical variables, Pearson's χ^2 test or Fisher's exact test was used. All analyses were performed using R (version 4.4.3), with a two-sided $P < 0.05$ considered statistically significant.

3. Results

3.1. General patient characteristics

A total of 96,199 patients were included in the analysis. There were 66,038 male patients and 30,161 female patients, with a mean age of 50.49 years (see **Table 1**).

Table 1. Baseline characteristics

	Number of patients (*n* = 96,199)
Age (mean ± SD)	50.49 ± 15.95
Gender	
Male [*n* (%)]	66038 (68.65%)
Female [*n* (%)]	30161 (31.35%)

3.2. Healthcare resource consumption for inpatient and outpatient care

As shown in **Table 2**, among the 96,199 patients included in the analysis, 70,332 underwent outpatient treatment and 30,668 underwent hospitalization. Compared with the median total cost of 413.41 yuan for outpatients, the median total cost for inpatients was approximately 30 times higher at 12,558.24 yuan.

Table 2. Per-visit outpatient and inpatient costs for gout patients from January 1, 2020, to December 31, 2024

Patient type	**Type (unit)**	**Mean**	**Standard deviation**	**Median**	**Maximum**	**Minimum**	**Number of patients**
Outpatient	Total cost (RMB)	571.75	764.82	413.41	23099.9	0.4	70,232
Inpatient	Total cost (RMB)	18208.25	22572.85	12558.24	508423.3	111	30,668

As shown in **Table 3**, among the 70,332 outpatient patients, the total number of outpatient visits during the 5-year period from January 1, 2020, to December 31, 2024, was 4,440,466, with an average annual outpatient visit

rate of 12.65 per person. Among the 30,668 inpatient patients, the total number of hospitalizations was 85,078, with an average annual hospitalization rate of 0.55 per person, and an average length of stay per hospitalization of 8.73 days.

Table 3. Outpatient and inpatient status of gout patients during the 5-year period from January 1, 2020, to December 31, 2024

During the 5-Year Period from January 1, 2020, to December 31, 2024: Gout Patients			
1	Outpatient patients	Total outpatient visits	4440466
	Outpatient patients	Total number of outpatient patients	70232
	Outpatient patients	Annual average outpatient visits	12.65
2	Inpatient patients	Total hospitalizations	85078
	Inpatient patients	Total number of inpatient patients	30668
	Inpatient patients	Annual average hospitalizations	0.55
3	Inpatient patients	Total hospitalization days	742743
	Inpatient patients	Total hospitalizations	85078
	Inpatient patients	Average length of stay per hospitalization	8.73

In this study, a total of 96,199 patients with gouty arthritis were included. During the study period (January 1, 2020, to December 31, 2024), patients used three types of drugs—nonsteroidal anti-inflammatory drugs (NSAIDs), colchicine, and glucocorticoids—a total of 1,089,800 times. Among them, NSAIDs were used the most, accounting for 57.32%, colchicine for 1.38%, and glucocorticoids for 41.30% (see **Table 4**).

Table 4. Usage of the three drugs

Drug	Total usage times (n = 1,089,800)	Percentage (%)
Nonsteroidal anti-inflammatory drugs (NSAIDs)	624677	57.32%
Colchicine	15028	1.38%
Glucocorticoids	450095	41.30%

To compare potential new-onset adverse events one year after different drug treatment regimens, this study included acute gout patients in different treatment groups using NSAIDs, colchicine, and glucocorticoids. After excluding individuals with missing new-onset adverse events between groups, the total numbers in each group were 8,366, 249, and 958, respectively. The results of event incidence comparisons using chi-square or Fisher's exact tests are shown in **Table 5**.

Among adverse event types related to gastrointestinal adverse reactions, the incidence of gastrointestinal ulcer adverse events was close to 0 in all three treatment groups, with one post-medication gastrointestinal ulcer event in the NSAIDs group and the glucocorticoid group. There was no significant difference in post-medication gastrointestinal ulcer adverse event incidence between different drug groups (P = 0.236). For gastrointestinal bleeding, the incidence was 0.42% in the NSAIDs group and 0.96% in the glucocorticoid group, with no gastrointestinal bleeding events in patients taking colchicine; no significant differences were found between the drug groups (P = 0.069). The incidence of hepatic insufficiency was 2.72% in the glucocorticoid group, higher

than 1.54% in the NSAIDs group and 1.23% in the colchicine group. The results indicate statistical differences in this type of adverse event between different medication groups ($P = 0.033$).

Regarding renal insufficiency, the glucocorticoid group had the highest incidence (5.90%), followed by the NSAIDs group at 2.94%, and the colchicine group the lowest at 0.81%, with statistically significant differences ($P < 0.001$), suggesting significant differences in the impact of different anti-inflammatory drugs on renal function.

For cardiovascular/cerebrovascular events, the glucocorticoid group had the highest incidence (18.45%), the NSAIDs group 11.37%, and the colchicine group the lowest (7.41%), with significant differences ($P < 0.001$). The results suggest that glucocorticoids may be associated with higher cardiovascular/cerebrovascular risks in clinical use compared to NSAIDs and colchicine.

Table 5. New-onset adverse events within 1 year after anti-inflammatory drug treatment

Variable	Occurrence	NSAIDs	Colchicine	Glucocorticoids	*P*-value
Gastrointestinal ulcer	No	100.0% (8361/8362)	100.0% (249/249)	99.99% (956/957)	0.236
	Yes	0.01% (1/8362)	0% (0/249)	0.10% (1/957)	
Gastrointestinal bleeding	No	99.58% (8272/8307)	100.0% (248/248)	99.04% (932/941)	0.069
	Yes	0.42% (35/8307)	0% (0/248)	0.96% (9/941)	
Hepatic insufficiency	No	98.46% (8069/8195)	98.77% (241/244)	97.28% (895/920)	0.033
	Yes	1.54% (126/8195)	1.23% (3/244)	2.72% (25/920)	
Renal insufficiency	No	97.06% (7665/7897)	99.19% (245/247)	94.10% (765/813)	<0.001
	Yes	2.94% (232/7897)	0.81% (2/247)	5.90% (48/813)	
Cardiovascular/ cerebrovascular diseases	No	88.63% (3531/3984)	92.59% (150/162)	81.55% (336/412)	<0.001
	Yes	11.37% (453/3984)	7.41% (12/162)	18.45% (76/412)	

Note: NSAIDs, nonsteroidal anti-inflammatory drugs; cardiovascular/cerebrovascular diseases include hypertension, acute myocardial infarction, heart failure, atrial fibrillation, stroke, and coronary atherosclerotic heart disease.

3.3. Recurrence after drug treatment

To compare the impact of different treatment regimens for acute gouty arthritis on long-term disease control, this study analyzed the acute recurrence within one year after treatment in 9,573 patients with acute gouty arthritis attacks who received three treatments: colchicine, glucocorticoids, and NSAIDs. The results showed that, in terms of average recurrence times, patients treated with glucocorticoids had the highest recurrence frequency (3.28 times), followed by the colchicine group (2.82 times), while the NSAIDs group had the lowest recurrence times (2.21 times).

The analysis results suggest that although different treatment regimens can alleviate symptoms in the acute phase, their impacts on subsequent disease control are inconsistent. NSAIDs treatment is not only the most widely applied in the acute phase but also associated with lower recurrence frequency, possibly indicating that this class of drugs has certain advantages in suppressing subsequent attacks while relieving inflammation. The higher recurrence rates in the glucocorticoid and colchicine groups may be related to their use in patients with more severe conditions or frequent attacks, and also reflect that the efficacy of these two treatments gradually weakens one year after in the acute gout patient population, leading to higher recurrence times.

4. Discussion

Gout, also known as gouty arthritis, is a metabolic disease caused by the deposition of urate crystals in joints and soft tissues, with typical manifestations including redness, swelling, heat, and pain reactions in single joint areas such as the ankle, dorsum of the foot, and knee; acute attacks are often accompanied by severe pain, and in severe cases, tophi may form, significantly reducing patients' quality of life [3]. With changes in lifestyle, the prevalence of gout is increasing year by year and showing a trend toward younger ages, imposing tremendous pressure on medical resources and economic burden.

Characteristics of healthcare resource consumption: This study shows that gout patients in real-world settings primarily seek outpatient care, with a relatively low proportion of inpatients. This result is highly consistent with the acute attack characteristics of the disease itself and the accessibility of outpatient drug treatment. Although the proportion of inpatients is low, their costs are relatively high, approximately 30 times those of outpatients. Therefore, from the perspective of healthcare resource consumption, management of gout patients should focus on disease control, prevention of severe cases, and hospitalization.

Medication use and recurrence risk: Compared to chronic gout patients, acute gout populations, once onset, experience the aforementioned symptoms more rapidly and prominently [4]. Therefore, research on the treatment prognosis quality for acute gout patients has certain practical significance. Previous clinical studies have shown that short-term use of glucocorticoids and other steroid drugs has superior efficacy [5], and using glucocorticoid drugs as a safe alternative for short-term treatment regimens is an acceptable option [6]. The results of this study show that treatment in the acute attack phase is primarily based on NSAIDs, consistent with first-line treatment regimens [7,8]. NSAIDs have the highest usage frequency, and in the one-year follow-up, their recurrence times are the lowest (annual average 2.21 times), suggesting that NSAIDs have good effects in controlling acute attacks and reducing recurrence risks. In comparison, the glucocorticoid group has the highest recurrence times (3.28 times), which may be related to this class of drugs being mostly used in patients with more severe conditions or multiple comorbid underlying diseases, and also reflects the limited efficacy of glucocorticoids in long-term gout control. Colchicine, as an adjunct drug, has a lower usage frequency, with recurrence rates between the two, suggesting that its clinical application remains primarily for adjunct short-term control.

Safety and differences in adverse events: This study found differences in new-onset adverse events within one year after treatment with different therapeutic drugs. The glucocorticoid group had the highest incidence of hepatic insufficiency (2.72%), renal insufficiency (5.90%), and cardiovascular/cerebrovascular events (18.45%), suggesting that this class of drugs has a significant impact on organ function and the cardiovascular system, requiring cautious use, especially in elderly patients and those with comorbid underlying diseases. Although the NSAIDs group performed well in recurrence control, it still had certain renal function damage (2.94%) and cardiovascular/cerebrovascular event risks (11.37%), consistent with previous studies, namely that NSAIDs should be used cautiously in middle-aged and elderly patients or those with concomitant cardiovascular diseases [9,10]. No significant differences in gastrointestinal adverse events were observed among the three groups, possibly related to real-world patients receiving concomitant gastric mucosal protective treatment. The colchicine group had the lowest overall adverse event incidence, but due to the small sample size, the results should be interpreted with caution.

Clinical significance and practical recommendations: The results of this study have important implications for clinical management and healthcare resource allocation. First, clinicians should comprehensively consider patients' underlying diseases, hepatic and renal function status, and cardiovascular risks when formulating treatment

plans, rationally selecting drug types to avoid secondary hospitalizations or additional medical expenditures due to drug-related adverse events. Second, patient adherence management should be strengthened, advocating low-purine diets and lifestyle interventions to reduce recurrence risks and decrease long-term healthcare resource consumption. Additionally, the study results suggest that medical insurance payers should emphasize comprehensive management of gout, optimize payment structures, rationally allocate resources, and reduce the economic burden on high-risk patients.

Study limitations and future prospects: This study, based on real-world data, can reflect the current treatment status and healthcare resource consumption of gout patients under routine clinical practice. However, certain limitations remain: (1) Due to database restrictions, the application effects of combination drug treatment regimens in real-world settings could not be evaluated; (2) Some patients lacked key biological indicators, preventing in-depth exploration of the long-term impacts of drug treatments on uric acid levels and inflammatory markers; (3) As a retrospective study, potential confounding factors could not be completely excluded. In the future, prospective, multicenter studies are needed to validate the results of this study and further evaluate the cost-effectiveness relationships of different treatment strategies, providing higher-quality evidence for clinical decision-making and healthcare policy formulation.

5. Conclusion

In summary, this study systematically reveals the medication characteristics, healthcare resource consumption, and drug safety differences in patients with gouty arthritis in real-world settings. The study results suggest that clinical practice needs to balance efficacy and safety, strengthen individualized management, optimize disease burden, and improve patient quality of life through precise resource allocation and risk control.

Disclosure statement

The authors declare no conflict of interest.

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