PHARMACIST & TECHNICIAN CE:

Implementation and Evaluation of Pharmacist-Led Interventions for Patients with Gout in Primary Care

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Abstract

Background: Gout is an inflammatory arthritis affecting approximately 9.2 million adults (3.9%) in the United States (US). The Veterans Health Administration (VHA) recently developed a dashboard, which identifies patients with a gout diagnosis who are on urate lowering therapies (ULT). The dashboard identifies patients with missing or outdated uric acid levels or those who are above goal based on the American College of Rheumatology (ACR) recommendations. The dashboard resource allows primary care clinical pharmacy practitioners to complete timely and specific population health-based interventions to optimize ULT and quality of care for gout management.

Methods: This pilot project included veterans with gout who are established with a primary care provider in a single clinic at the Tomah Veterans Affairs Medical Center (TVAMC). Patients had to be on allopurinol and either had uric acid levels greater than or equal to 6mg/dL, or had no uric acid level checked over 18 months, or had a missing uric acid level. Veterans were excluded if they had an outside provider managing gout. Eligible veterans were contacted to update uric acid labs or titrate their allopurinol regimen. The primary endpoint was the change in uric acid level of patients after allopurinol titration. Secondary endpoints include the change in proportion of patients with updated uric acid levels and change in proportion of patients who achieved uric acid levels less than 6mg/dL after dose adjustments.

Results: Eighty-two patients were identified by the gout dashboard. Of these patients, 17 met exclusion criteria. Of the 65 patients included in this project, 20 patients had serum urate (SU) above goal at baseline, 7 patients had missing SU lab, and 38 patients had old SU labs at the TVAMC. We saw pre-post serum urate (SU) changes in 15 patients after allopurinol titration. There was a statistically significant reduction in SU levels after allopurinol titration, with a mean difference of 1.047 mg/dL (p= 0.0155; 95% CI 0.231 to 1.862). Seven out of 15 patients (46%) achieved a goal SU level of less than 6 mg/dL, which led to an overall increase of patients at goal by 11%. At the beginning of the project, 45 patients had old or missing baseline SU labs, and 35 (78%) had updated SU level by the end of the project period.

Conclusion: From this quality improvement project, we can conclude that pharmacist-let gout interventions following a treat-to-target strategy showed significant reduction in uric acid levels.

Keywords: Gout, primary care, chronic disease management, allopurinol, pharmacist

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Learning Objectives

- Summarize the treatment target or goals for gout management according to the American College of Rheumatology (ACR) guidelines.
- Describe the current ACR guidelines for the pharmacological management of chronic gout and acute gout flares.
- Recommend lifestyle modifications and dietary interventions in the management of gout to complement pharmacological therapy and prevent disease progression.
- Recognize the significance of a gout dashboard within the context of population health, highlighting its role in monitoring and addressing gout-related healthcare outcomes.
- Construct a treatment plan for an example patient case based on recommendations from ACR guidelines and patient-specific factors.

Gout, the most prevalent type of inflammatory arthritis, affects approximately 9.2 million adults (3.9%) in the United States (US).[1] Despite a clear understanding of its causes and the availability of effective and affordable medications for its treatment, there are persistent gaps in the quality of care provided to patients with gout. Guidelines established by the American College of Rheumatology (ACR) in 2020 emphasize the importance of employing treat-to-target strategies with urate-lowering therapy (ULT), aiming for a serum urate (SU) level of less than 6mg/dL.[1,2] This treat-to-target strategy has been determined to be beneficial in terms of reduction in SU levels, reduction in tophi, and overall reduction in gout flares.[1] However, despite these recommendations, the use of ULT has not increased over the past two decades.[1,2] Gout imposes a substantial burden on healthcare costs, with estimated annual direct costs for employed patients ranging from $4,733 to $9,353 per person, with higher costs for older adults ($16,925) and those with treatment-resistant gout ($18,362).[2] Emergency department visits for gout increased by 14% between 2006 and 2012, leading to an 80% rise in healthcare charges in the US. In contrast to a significant decline in hospitalization rates for rheumatoid arthritis patients from 1993 to 2011, hospitalization rates doubled for individuals with gout.[2] Additionally, gout patients incur substantial indirect costs associated with work impairment and productivity loss.

Inadequately managed gout poses a significant health risk, potentially resulting in joint damage and permanent disability.[3] Effective long-term gout management focuses on the consistent reduction of serum urate levels to a recommended target of less than 6 mg/dl.[1,3] Regrettably, despite the existence of efficacious treatments, gout management remains suboptimal for patients, predominantly due to poor adherence to therapeutic regimens. Gout stands out for its particularly poor adherence rates, even when compared to other chronic conditions characterized by prolonged asymptomatic periods. Merely 10-46% of patients consistently adhere to ULT regimens, as corroborated by electronic prescription records.[3] This introduces significant variability in treatment responses, both across different patients and within the same individual over time, increasing the risk for suboptimal urate control and less favorable treatment outcomes.

A systematic review of 11 studies evaluated a range of clinical interventions designed to enhance adherence to ULT among gout patients.[3] These interventions predominantly centered on improving communication channels between patients and healthcare providers, employing methods such as telephone reminders and face-to-face visits, offering comprehensive education and support, and fostering self-care opportunities for patients. The duration of interventions ranged from 2 months to up to 60 months. The systematic review indicated that four of eight observational studies showed improvement in adherence from 33% to 91%, while two of three randomized studies reported a 13% increase in mean proportion of days covered.[3] Although the different types of interventions in this review were not compared to each other, this study highlighted the continued need for interventions targeted at improving gout management and adherence to urate lowering regimens.

Additionally, the 2020 ACR guidelines for gout management highlight the importance of delivering an augmented protocol of ULT dose management by nonphysician providers, aimed at optimizing treat-to-target strategies, patient education (e.g., risk of rash with allopurinol, reducing alcohol intake), and shared decision-making.[1] Pharmacists are highlighted by the guidelines as integral members of the health care team who can deliver such interventions for patients. Currently, the Tomah Veterans Affairs Medical Center (TVAMC) can use a newly developed gout dashboard to identify patients on ULT with or without uric acid level at target. This dashboard provides pertinent information such as patient demographics, prescriber name, prescribed medication and dose, most recent uric acid level with date drawn, and most recent ULT refill date. This tool presents a significant opportunity for primary care pharmacists within this institution to offer targeted optimization for ULT and gout management. Adopting the ACR guideline recommendations and availability of our informatic tool, the aim of this pilot is to optimize urate lowering regimens to achieve a goal uric acid level less than 6mg/dL and improve SU monitoring among veterans with gout through pharmacist-led interventions.

Methods

This prospective, single-center quality improvement project took place between October 1, 2023, and March 31, 2024. The institutional goal was to implement pharmacist-led population health management interventions to improve the care for gout patients at the TVAMC. Notably, this project was denoted as quality improvement through a self-certification from the University of Wisconsin-Madison Institutional Review Board. The project was conducted exclusively within a single primary care clinic consisting of three primary care pharmacists and six primary care providers at the TVAMC, specifically at the Tomah location—a rural area in Wisconsin. The TVAMC serves as a hub, with four community-based outpatient clinics across western and central Wisconsin providing primary care services, along with limited specialty care. When patients need specialty services for rheumatology, they are referred to regional VA medical centers or to community partner facilities. At the TVAMC, primary care pharmacists hold a scope of practice with prescriptive authority, enabling them to independently manage chronic disease states including gout.

A post-graduate year 1 pharmacy resident led this project and collaborated with a clinical pharmacy technician and a primary care clinical pharmacy practitioner (CPP), who also served as the project supervisor and co-signer for notes, prescriptions, and lab orders. A patient panel was compiled from a primary care clinic and organized in a spreadsheet, divided into three main groups: patients with uric acid levels above the goal, those with outdated SU labs (not monitored in the past 18 months based on the design of the dashboard), and those with missing SU labs. Chart reviews were conducted by the resident and technician to verify and add additional baseline information for each patient, including demographics, past medical history, and baseline labs. This information was added to the spreadsheet as needed.

Patient information collected at baseline included:

- Demographics: Name, age, biological sex, unique medical record number, and ethnicity
- Name of primacy care provider
- Past medical history (e.g., gout, chronic kidney disease (CKD), other comorbidities)
- Baseline labs: Estimated glomerular filtration rate (eGFR), serum creatinine, creatinine clearance and liver function tests
- Baseline allopurinol dose
- Baseline use of acute gout agents: colchicine, non-steroidal anti-inflammatory drugs (NSAIDs), and/or corticosteroid
- Number of gout attacks in the past year
- Most recent uric acid level and last date it was checked

Eligible patients with missing or outdated SU labs were contacted by phone by the resident, CPP, or pharmacy technician to discuss updating their labs and ordering them if consent was given. Patients with SU levels greater than or equal to 6mg/dL were contacted by the CPP or resident to discuss allopurinol titration with follow-up labs approximately 6 weeks later. During these conversations, adherence concerns were addressed, and patients were educated on lifestyle modifications to decrease the risk of gout flares. If agreeable to allopurinol titration, prophylactic colchicine was prescribed for at least a three-month duration following 2020 ACR guideline recommendations. Patients were followed up with in four- to six-week intervals with pertinent labs to assess treatment safety, efficacy, and tolerability. All phone calls were unscheduled, and patient interactions were documented in the electronic health record.

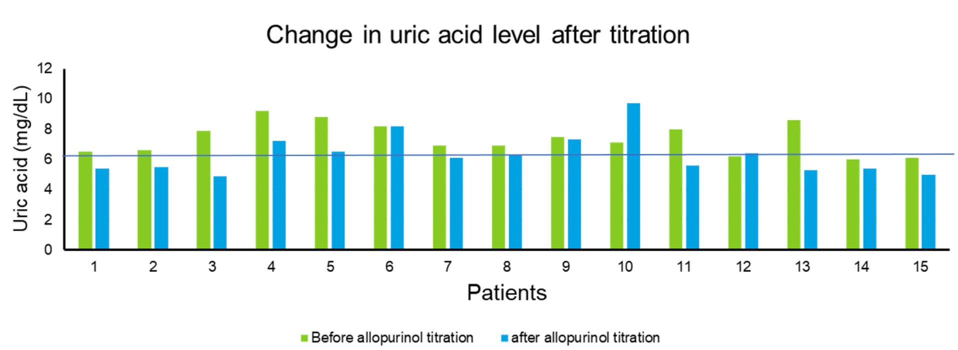
The gout dashboard is an informatics toolset, built with a population health management approach, enhancing the efficiency of interventions through timely and specific interventions to the patients who need additional care. The dashboard identified whether patients were at SU goal, and patients with outdated and missing uric acid labs. Patients were included in this project if they already had a gout diagnosis and had been prescribed allopurinol as ULT. Other criteria included patients with uric acid level at 6mg/dL and above or outdated uric acid labs (not checked in the past 18 months). Patients were excluded if they were managed by an outside rheumatology provider or a community care partner facility, if the primary care provider was actively treating gout at the time of the project, or if other ULTs (febuxostat, pegloticase, probenecid) were prescribed.

This quality improvement project had one primary and two secondary outcomes. The primary outcome evaluated the mean change in uric acid level after allopurinol titration compared to baseline. The secondary outcomes assessed the change in the number of patients achieving a SU level less than 6mg/dL from baseline to end of project period. This was analyzed for those achieving goal SU level after titration and the overall change in the proportion of patients within the primary care clinic. The other secondary outcome evaluated the change in the proportion of patients with updated SU lab from baseline to end of project period. Inferential statistics

TABLE 1. Baseline Characteristics

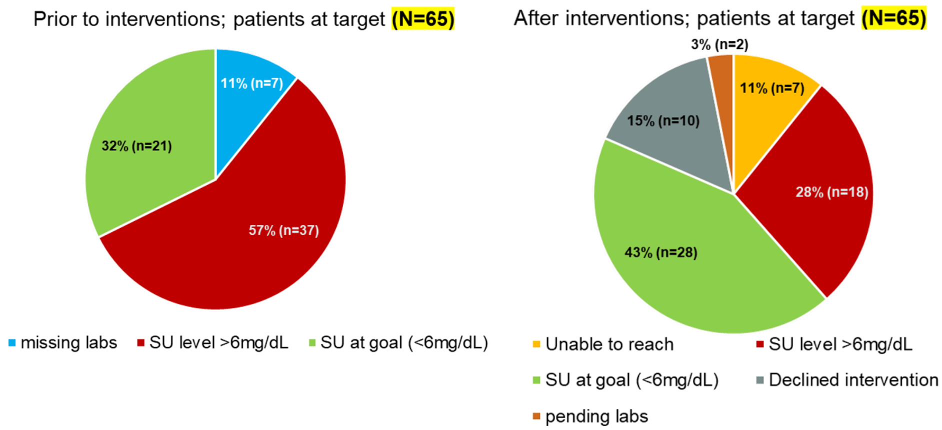
Demographics	*Number; total N=65*
Age (years)	70
Biological Sex	Male (64)
Female (1)	Oral
Average baseline uric acid level	6.5mg/dL
Baseline allopurinol dose, mean range	250mg (50-300mg)
Average no. of gout flares in the past 12 months	1
Patients with cardiovascular disease (Hypertension, history of coronary artery disease, stroke, Atrial fibrillation)	56 (86%)
Patients with chronic kidney disease	20 (30.7%)
Patients with Type 2 diabetes	42 (65%)
Patients with obesity	30 (46%)

FIGURE 1. Primary Outcome: Change in Serum Urate After Allopurinol Titration



were conducted for the primary outcome, which used a paired T-test before and after allopurinol titration. Descriptive statistics were used for the secondary outcomes.

FIGURE 1. Secondary Outcome: Patients Who Achieve Goal Serum Urate



Results

Eighty-two patients were identified by the gout dashboard, with 17 excluded from the project. Sixty-five patients were ultimately included, split into those who need updated labs (n=45) and those who needed allopurinol titration (n=20). Most included patients were male (98%) with an average age of 70 years. The average baseline uric acid level was 6.5mg/dL, and the baseline allopurinol dose ranged from 50 to 300mg with an average of 250mg per day (Table 1). Of the seventeen patients excluded, thirteen patients were managed by a provider outside the VA. One patient had passed away by the time interventions began. The final three patients were being actively managed by a TVAMC primary care provider.

There was a statistically significant reduction in SU levels after allopurinol titration (n=15) with a mean difference of 1.047 mg/dL [95% CI 0.231 to 1.862; p =0.0155] (Figure 1). Note that five patients were awaiting follow-up after their initial titration and so were not included in this analysis. One patient had an increase in SU level, likely due to a falsely low baseline level during a gout flare. Of those with allopurinol titration, 46% reached goal SU level by project period end, with the others still in the titration process. The overall proportion of all patients in the clinic at the goal SU level increased by 11% from baseline (Figure 2). Among sixty-five patients included in this project, 15% declined interventions, 11% were unable to be reached and 3% had pending labs by the end of the project period (Figure 2). Furthermore, 35 out of 45 (78%) patients obtained updated SU labs.

Discussion

The quality improvement project showed significant benefits from primary care pharmacists' involvement in gout monitoring and management following a treat-to-target strategy. Improvements in uric acid levels and updated SU labs could reduce urgent care visits due to gout flares and improve adherence. Utilization of the gout dashboard enables the identification of patients needing optimized gout management. Adherence issues and limited knowledge about long-term allopurinol regimen were identified, highlighting opportunities for patient education. For example, one patient reported taking allopurinol as needed for what he thought to be gout-related pain. Another patient stopped taking allopurinol due to gout flares with initiation of the medication. Additionally, one patient completely stopped allopurinol and was treating his gout flares with NSAIDs. This project provided these opportunities for patient education, which would have gone unnoticed until after an adverse event.

Comparatively with our project, Mikuls and colleagues aimed to optimize urate-lowering therapies through pharmacist-led interventions by enhancing patient adherence to treatment and increasing the percentage of individuals achieving the target serum urate level of less than 6.0 mg/dl.[4] This initiative involved updating uric acid lab tests and making necessary adjustments to allopurinol initiation or dosages. This study found that pharmacist involvement increased adherence 50% versus 37% (OR1.68; 95% CI 1.30-2.17) and patients were more likely to reach serum urate goal (30% versus 15%) compared to patients of usual care (OR 2.37; 95% CI 1.83-3.05).[4] The findings in this study emphasize the need for our quality improvement project and validates similar findings from our project. Our pilot project showed similar promising results with the statistically significant reduction in uric acid levels and increase in patients with a SU goal after pharmacist-led ULT optimization. Stamp and colleagues' study focused on treat-to-target strategies for gout management.[5] They randomized 183 patients to either an allopurinol dose escalation group or a control group (patients who continued with current dose). Similarly with our findings, they found a statistically significant reduction in SU levels with a mean difference of 1.2 mg/dL (95% CI 0.67 to 1.5, p<0.001).

The strengths of this quality improvement project include the patient population, which included patients with multiple comorbidities including obesity, chronic kidney disease, and cardiovascular diseases, all of which represent real-world encounters in a primary care setting. Hence, the findings from this project can be applied to real-life clinical practice. Furthermore, the prescriptive authority of primary care pharmacists within our organization eliminated potential barriers to care including delays in primary care providers signing laboratory orders and approving medication titrations.

There are some limitations to this project. First, this pilot was of short duration, which led to limited tracking of gout flare reduction and attainment of SU goals, as some patients needed multiple dose titrations to reach SU goal. Prior studies were conducted for a one- to two-year duration with more outcomes, such as reduction in gout flares, achieved.[5,6] To ensure continued management, patients needing follow-up by the end of this project were scheduled into the clinic grid of the supervising CPP and other CPPs within the clinic. Given that the location of our clinic was in rural Wisconsin, phone calls were mainly utilized to ensure access for our veteran population. However, this modality did not provide opportunities for assessment and tracking of tophi, since patients were not seen in-person. To mitigate this, in-depth chart reviews were conducted to identify any documentation of tophi, and none were found. Additionally, given the scope of this project, allopurinol was chosen as the ULT of focus. This approach is similar to previously highlighted randomized controlled trials, as allopurinol is the first line ULT and the most prescribed ULT in the United States.[4,6] While this project may not fully represent all ULT options, we could expect similar improvements with other agents.

Based on the positive findings, some future considerations include expanding the active management of gout to additional clinics within the system. Given the broad scope of practice within our organization, primary care pharmacists can undertake active management of gout after diagnosis or after a gout flare with or without a referral from a primary care provider. A grand rounds presentation was provided to all clinical staff, which focused on educating clinicians on the 2020 ACR guideline recommendations for gout management and utilization of the gout dashboard. By providing this education, all care team members can utilize this tool to improve gout management within the organization. Another future direction based on this project is the updated uric acid labs, which identify patients who qualify for ongoing pharmacist ULT management. Finally, gout flare occurrence at one year post titration compared to one year prior could be collected to show clinical outcome impact.

Conclusions

Overall, pharmacist-led gout interventions following a treat-to-target strategy showed significant reduction in SU levels within the veteran population. This quality improvement project solidifies the benefit for continued pharmacist involvement in treat-to-target strategies to optimize gout management.

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PR *This article has been peer-reviewed. The contribution in reviewing is greatly appreciated!*

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Assessment Questions

Questions 1-4 are based on the following case.

LA is a 50-year-old male, with a two-day history of excruciating pain in left big toe. Had similar episode 6 months ago; took naproxen, which resolved pain after a few days. No signs of infection. Medical history included hypertension and chronic kidney disease. Taking lisinopril 10mg daily. He is overweight with a BMI of 26 kg/m2 and he drinks 3-4 beers/day; maybe 6 daily on weekends.

1. What are the **modifiable risk factors** for gout associated with LA's symptoms?
   a. Age
   b. Naproxen use
   c. Alcohol intake
   d. Obesity (BMI >30)

2. He returns to clinic, and he has a uric acid level at 7 mg/dL. LA's physician assesses him and finds a tophus in the synovial fluid and confirms that he has gout. How should we treat his gout flare?
   a. Colchicine
   b. Acetaminophen
   c. Anakinra
   d. Apply ice pack to affected area daily only

3. You discuss urate lowering therapy (ULT) with LA, and he is fine with starting one immediately to prevent this from happening again. What ULT would be most appropriate?
   a. Febuxostat
   b. Allopurinol
   c. Pegloticase
   d. Probenecid

4. LA is agreeable to start allopurinol. What additional educational points would be appropriate for you provide to LA?
   a. He is at very high risk for allopurinol hypersensitivity syndrome
   b. Encourage adherence to his medications
   c. He should take allopurinol with colchicine for 1 month to prevent gout flares
   d. Possible benefits of elevating the legs at least 2 hours each day

5. A patient with chronic tophaceous gout and a history of coronary artery disease develops a rash after two weeks on allopurinol and colchicine. His serum urate level was 7.8 mg/dL prior to therapy. What is the best treatment option?
   a. Stop allopurinol; continue colchicine monotherapy
   b. Continue allopurinol and colchicine; start loratadine
   c. Stop colchicine; continue allopurinol; start naproxen
   d. Stop allopurinol; continue colchicine; start febuxostat

6. According to the ACR, what is the goal uric acid level for most patients with gout?
   a. < 8 mg/dL
   b. > 7 mg/dL
   c. < 6 mg/dL
   d. > 5 mg/dL

7. A dashboard to improve primary care management of urate lowering therapy should have what metrics?
   a. Last uric acid lab level and date
   b. Last prescription for a non-steroidal anti inflammatory
   c. Smoking history
   d. Current urate lowering therapy and dose

e. Both A and D

8. **True or False:** According to the ACR, treat-to-target strategy led by a pharmacist is an appropriate model of care for treatment with urate lowering therapy in gout.
   a. True
   b. False

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