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Urate lowering therapy in primary care: rheum for improvement

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Abstract

Primary care physicians (PCPs) play a critical role in the management of gout worldwide. However, significant gaps in gout care persist, underscoring the need for improved approaches to its management. While some guidelines, such as those from the American College of Physicians (ACP) published in 2016, support a more reactive treat-to-symptoms approach, others from the American College of Rheumatology (ACR) and the European Alliance Of Associations For Rheumatology advocate for a proactive treat-to-target (TTT) strategy—focused on achieving optimal serum urate levels through urate lowering therapy (ULT). This divergence reflects differing clinical priorities and differential interpretation of the evidence and it may contribute to variability in care delivery. Improving gout management requires greater engagement from both patients and healthcare providers, with particular emphasis on increasing adherence to ULT. Patients need enhanced support to better understand the importance of sustained urate lowering treatment, while healthcare providers may benefit from clearer guidance aligned with evidence-based strategies to foster greater patient trust and confidence. This article provides an overview of the current state of guidelines, highlights areas of agreement and discordance between them, and identifies key areas for improving care delivery. It additionally offers insight into alternative care delivery strategies, such as those involving non-physician health professionals, which have shown promise in enhancing patient outcomes. Future research should focus on continued development of innovative, multi-modal interventions to improve ULT adherence, including health system-based initiatives and collaborative care models.

Keywords

Gout, primary care, urate lowering therapy, treat-to-target, medication adherence

Introduction

Primary care is the cornerstone of gout management with overwhelming evidence showing that the majority of patients turn to primary care physicians (PCPs) for their treatment [1–5]. A claims-based

analysis of over one million American gout patients found that internists and family physicians are most frequently involved in their care [1]. This trend is international and has been reported in the United States (US), Canada, Norway, the United Kingdom (UK) and Saudi Arabia [2–5]. However, there are major concerns about how effectively gout is managed in primary care since significant gaps in care have frequently been identified [1, 6, 7].

The mark we are missing: current gout care recommendations

Current state of gout care recommendations and guidelines

Over the previous decades, various groups and organizations have published quality of care indicators, put forth as minimum standards [8]. More recently, various societies have released more extensive best-practice guidelines. The recommendations of three such organizations, the American College of Rheumatology (ACR), the European League Against Rheumatism (EULAR), and the American College of Physicians (ACP) are summarized in Table 1 [9–11]. By providing best practices, clinical practice guidelines are designed to improve patient outcomes and have proven effective in improving management in other chronic conditions like diabetes mellitus [12, 13]. However, these benefits have not been achieved in the management of gout. Reasons for this unrealized improvement include lack of consensus among the most recently proposed guidelines, leading to variable application of proposed best practices, which differ slightly across guidelines. This disagreement primarily centers on the utilization of urate lowering therapy (ULT).

Table 1. Comparison of major societies' gout guidelines

Guideline	2020 American College of Rheumatology (ACR) [9]	2016 European League Against Rheumatism (EULAR) [10]	2016 American College of Physicians (ACP) [11]
Discordant recommendations			
ULT initiation (in patients with ≥ 2 flares/year)	Start ULT	Start ULT	Consider ULT
Target SU level	Target < 6 mg/dL	Target < 6 mg/dL, or less	No specific target; treat to manage symptoms
ULT titration	Titrate to target SU level	Titrate to target SU level	Titrate based on patient symptoms and side effects
First-line ULT	Allopurinol (start at ≤ 100 mg/day and titrate up)	Allopurinol (start at ≤ 100 mg/day and titrate up)	Allopurinol or febuxostat
Anti-inflammatory prophylaxis (during ULT initiation)	Low-dose colchicine, NSAIDs, or low-dose corticosteroids (3–6 months)	Low-dose colchicine or NSAIDs (6 months)	Low-dose colchicine or NSAIDs (> 8 weeks)
Concordant recommendations			
Gout flare management	NSAIDs, colchicine, or corticosteroids	NSAIDs, colchicine, corticosteroids, or intra-articular steroids	NSAIDs, colchicine, or corticosteroids
Patient education	Emphasize lifestyle modifications, including dietary changes and weight loss	Emphasize lifestyle modifications, including dietary changes and weight loss	Emphasize lifestyle modifications, including dietary changes and weight loss
Lifestyle modifications	Recommend weight loss, reduced alcohol intake, and dietary changes	Recommend weight loss, reduced alcohol intake, and dietary changes	Recommend weight loss, reduced alcohol intake, and dietary changes

NSAIDs: non-steroidal anti-inflammatory drugs; SU: serum urate; ULT: urate lowering therapy

Opposing doctrines: treat to target vs. treat to avoid symptoms

The variation in approaches to gout management with ULT, including differing recommendations for initiation and monitoring of serum urate (SU) is potentially rooted in alternate endorsements of either a treat-to-target (TTT) or a treat-to-avoid-symptoms (TTASx) approach to gout management.

The TTT approach promulgated by rheumatology societies aims to achieve and maintain a specific SU level, typically below 6.0 mg/dL, to prevent the recurrence of gout flares, and mitigate long-term complications such as tophi and joint damage. It represents a longitudinal perspective on gout as a chronic

condition, punctuated by flares that are mediated by SU levels that are above the serum threshold for crystal precipitation [14]. Indeed, one of the most frequent and still compelling arguments in favor of a TTT approach relies on our understanding of the pathophysiology of gout, and recognition that deposition of monosodium urate (MSU) crystals is a necessary prerequisite for development of symptoms. Therefore, targeting a threshold (such as the commonly accepted 6.0 mg/dL) below the solubility point of uric acid (6.8 mg/dL) is physiologically reasonable. Most rheumatology guidelines agree with this urate target, with the special exception being the British Society of Rheumatology, which recommends a more aggressive target of < 5.0 mg/dL (or < 300 μmol/L) in the setting of tophaceous gout [15].

Conversely, the ACP 2016 recommendations for the treatment of gout alternatively advocate a TTASx approach. This strategy instead frames gout as an intermittent inflammatory condition [14]. In addition, the recommendations from the ACP are also notably different in their brevity, providing only 4 recommendations, regarding use of non-steroidal anti-inflammatory drugs (NSAIDs), colchicine or steroids for gout flare management, recommending against ULT initiation for most patients following a first gout flare or with infrequent flares, and a vague recommendation about discussing the risks and benefits of ULT [11].

Controversy in gout management across national society guidelines

The conflicting approaches among different groups stems in part from this disagreement over the appropriate approach to gout management. While the ACPs somewhat more reactive guidelines faced criticism, particularly among rheumatologists, they also garnered some support, primarily from those who believed that the 2012 ACR guidelines were too bullish in adopting a TTT approach. Specifically, supporters argued there was a paucity of randomized control trials (RCTs) (at least at the time of these guidelines) to confirm that lowering SU to a threshold leads to a clinical outcome of fewer gout flares [16, 17]. In advocating their position, the ACP guidelines further point to the fact that fewer clinician visits and fewer medications make a TTASx strategy less demanding in terms of time, medication burden, potential side effects for urate lowering therapies, and cost, compared to a more costly and time intensive TTT approach. However, the disease burden of gout itself can be costly both in terms of time debilitated, missed work, and financial burden [18]. If TTASx approaches fall short in preventing the long-term complications associated with chronic hyperuricemia, such as joint damage, the cost over a lifetime may indeed be greater for this strategy. Ultimately, the “lack of evidence” criticism cuts both ways, since there is little to no evidence put forth to support a TTASx approach that is to be operationalized in an unclear way [14, 19, 20]. In recognition of this uncertainty, a modified Delphi panel consisting of rheumatologists, PCPs, nurses, and patient representatives convened to design a clinical trial that could shed light on this controversy. This panel sought to address key questions related to trial design, including defining the TTASx strategy, determining its clinical endpoints, and establishing the appropriate comparator for a randomized study [21].

Support for the TTT strategy in gout

Conversely, the 2020 guidelines from the ACR fully endorse a TTT approach for all patients taking ULT, including SU monitoring and dose titration. These recommendations are in line with those recently made by other rheumatology groups around the world, such as those already mentioned by EULAR, the British Society of Rheumatology [15], the Hong Kong Society of Rheumatology [22], and the French Society of Rheumatology [23].

Recent studies have offered further support for the TTT strategy. One such study is a 2019 US trial that demonstrated improved adherence and outcomes through a pharmacist-led TTT intervention [24]. Similarly, a RCT in the UK exploring a protocol for nurse-led care with patient education and TTT urate-lowering strategies, demonstrated better disease control compared to usual care [25]. Additional studies, which were not available for consideration by the ACP Clinical Guideline Committee, have also shown that TTT strategies can effectively reduce key indicators of disease severity, such as tophi and joint destruction. One study demonstrated that escalating allopurinol doses per a TTT approach effectively reduces bone erosion and urate volume as shown through dual energy computed tomography [26]. A 2024 systematic

review of TTT strategies for management of multiple rheumatologic diseases additionally demonstrated that for gout, SU could be more effectively controlled through TTT strategy than usual care and offered significant benefits in preventing flares, decreasing deposition of MSU crystals, improving tophi, and limiting bone erosion [27]. A recent analysis of two randomized controlled trials conducted in the UK and New Zealand examined the effects of ULT with allopurinol and febuxostat in gout patients aged 40 years and over, with a history flares and varying levels of baseline SU. The findings demonstrated that patients who achieved a SU level < 6 mg/dL were significantly less likely to experience gout flares 12–24 months following initiation of ULT therapy. This analysis also demonstrated that of patients presenting with a tophus at baseline, 69.1% of those who achieved target SU levels lost the sentinel tophi compared with 36.4% of those patients who had not achieved target urate levels [28]. Lastly, additional data not included in the ACP review showed that pegloticase, which profoundly reduces SU rapidly, also led to fewer gout flares [29].

At the time, the argument that rigorous primary analyses of clinical trial data supporting a reduction in SU reducing flares was lacking was not without merit. However, studies published since, such as those cited above, have provided evidence to counter this claim. Furthermore, this argument fails to acknowledge the strong biologic association of urate in the causal pathway to gout, as well as the difficulty in accurately capturing gout flares (that occur outside a clinical setting) in studies that are typically too short and too small to measure a messy signal such as gout flares.

Overall, the evidence to support the association of lower SU and reduced disease activity appears strong. However, what remains to be seen is whether the same or similar results can be achieved through the TTASx approach, and titration of ULT based on disease activity alone. The NIH-sponsored TRUST trial which was modelled on the findings of the Delphi panel discussed above, aims to compare these outcomes of these strategies and is currently underway [30]. The results of this study will be pivotal in answering this question, and will likely shape future guidance.

Urate lowering therapy guideline ambiguity: initiation of therapy

More pressing perhaps than the lack of agreement between these guideline groups, is the fact that the ACP guidelines, which many PCPs may reference, omit guidance pertaining to who would benefit from ULT and how to initiate and titrate it in those patients. Beyond an implicit implication in the guidelines that some patients would benefit from ULT, the vague nature of the ACP's recommendations surrounding this critical aspect of disease may do relatively little to help guide practitioners in effective use of one of the most critical tools available for managing gout [1, 9, 10, 19].

An area that has been particularly controversial is the timing of initiation: specifically, whether or not ULT should be initiated during a gout flare [31]. The 2020 ACR recommendations conditionally endorsed starting during a flare for some patients (e.g., those with chronic kidney disease (CKD) stage 3 or greater, SU > 9 mg/dL, urolithiasis), a departure from the previously held belief that doing so would prolong or worsen gout symptoms. This new recommendation is based in part on small RCTs and a systematic review that failed to find significant correlation between initiating ULT during a flare and flare duration [32, 33].

While there is hope that this new approach could increase the numbers of patients on ULT, particularly given evidence suggesting initiating during a flare is not associated with higher rates of discontinuation, this recommendation is also at odds with those put forth by other rheumatology organizations [33]. For example, the 2017 British Society of Rheumatology guidelines recommend against starting ULT during a flare (although these recommendations do agree that ULT should be offered to all patients at the time of diagnosis) [15]. The conditional nature of the ACR's recommendation aligns with recent reviews by the UK's National Institute for Health Care Excellence (NICE). NICE's evidence review acknowledges that the decision on when to start ULT is case-dependent and that initiating ULT either during or after a flare can be justified [34]. Results of a recent systematic review also reinforced the ambivalence of this question, with data depicting neither harm nor benefit regarding initiating ULT during a flare [35]. Our practice is to reserve this approach for patients in whom the "treatable moment" of a flare offers an unparalleled opportunity to hopefully promote longer-term adherence to therapy.

Current state of gout care delivery in primary care

Suboptimal treatment of gout has been a persistent and well documented issue [7, 36–38]. Challenges in adherence to treatment guidelines noted above have been identified as contributing factors. Within this context, PCPs play a central role in delivering gout management, given their position as the first point of contact for many patients. However there remain opportunities to enhance the consistent application of guideline-based care, especially compared to benchmarks set by rheumatology standards. In the following sections we review the current state of gout management in primary care and explore areas for alignment with rheumatology guidelines.

Use of ULT

A 2008 survey of 170 Irish general practitioners (GPs) revealed that 91% managed gout exclusively in their primary care practice, but only 66% initiate ULT, and even fewer monitored SU for those on ULT [39]. A recent meta-analysis of 30 studies from various continents demonstrated that only 52% of gout patients were receiving ULT. Of those, only 53% were getting SU testing, and only 34% reached SU target [40]. Among patients experiencing gout flares or gout (with or without tophi) treated in primary care settings, urate testing frequency was significantly less than the timelines suggested by current guidelines [9]. Similarly, fewer than 80% of all patients, including those with tophaceous gout, were given ULT. Of note, patients having at least one rheumatology visit were less likely to visit an emergency room for flares [1].

A 2023 study examined compliance with EULAR treatment guidelines among gout patients living in the Dalarna region of Sweden. Seventy-six percent of these patients met criteria to receive ULT but only 21–25% were prescribed allopurinol in any of the years studied (2014–2018) [41]. UK general practice data from 2004–2020 found that of the nearly 290,000 who received a gout diagnosis outside of a hospital setting only 27.9% initiated ULT within the next 12 months [42]. There were no improvements in the rates of ULT initiation or achievement of target SU values over the 17-year duration of the study period.

A 2015 systematic review examining gout management in general practice in the US, UK and Germany found that the proportion of patients on ULT varied widely, ranging from 23% to 84.5% [43]. However, studies including the largest cohorts, (n = 115,608, and n = 56,483) both demonstrated low levels of ULT therapy among patients, reporting 37.63% and 29.5%, respectively [44, 45].

Serum urate monitoring in gout

This 2015 systematic review revealed another shortcoming that leads to suboptimal gout management: only about 25% of gout patients had their SU checked regularly. Rates of urate monitoring failed to significantly improve even when separating patients specifically prescribed allopurinol, with studies showing that 24% of these had SU checked 6 months after initiation of allopurinol and another demonstrating that 34% currently on allopurinol were tested within a year prior to the study date [43]. In a 2023 retrospective cohort study, when compared to rheumatologists, family physicians were less likely to monitor SU [odds ratio (OR) 0.26; 95% confidence interval (95% CI) 0.23–0.29]. However, the proportion of family physicians monitoring SU within 6 months in this case improved somewhat from 54.6% over the study period to 67.4% in 2019 [3].

Similarly, a retrospective chart review of gout patients within a Veterans Affairs (VA) hospital system investigating physician adherence to the 2012 ACR guidelines [46] found that only 38% of the patients seen by PCPs had their SU checked within the first 6 months of initiating allopurinol or febuxostat. Additionally, in 35% of patients, SU was never checked during the 2-and-a-half-year study period. Overall, less than half of patients—including those seen by specialists, who were more likely to monitor and titrate ULT accordingly—were found to have SU under 6 mg/dL at the end of the study, despite reportedly high adherence [47].

Duration and persistence of gout therapy

A multi-year audit of an Australian GP clinic that implemented a gout package of care based on the 2012 ACR and 2016 EULAR recommendations identified the duration of ULT therapy as an additional area of

suboptimal practice, with only a third of physicians endorsing long-term therapy [48]. While this recommendation was not made in the 2012 ACR guidelines, which were available at the time of the survey, it was noted in the EULAR 2016 recommendations and has been added to the 2020 ACR recommendations [14].

Even when ULT therapy is appropriately initiated, persistence of treatment is and has been a challenge. A retrospective analysis of UK primary care patients newly diagnosed with gout demonstrated poor persistence of allopurinol. Of the nearly 50,000 patients identified from the UK Clinical Practice Research Datalink, who were initiated on allopurinol as the first-line agent, non-persistence (defined as a gap greater than or equal to 90 days) at year 1 was measured at 38.5%, increasing to 56.9% at year 5 [49].

Beyond the guidelines: other reasons why suboptimal care persists

While non-adherence to guidelines is a major contributor to suboptimal gout care, other multifactorial challenges also play a significant role. One barrier to the success of a TTT strategy was identified in a multi-year audit of an Australian GP clinic discussed above. The local lab used a value of 7.1 mg/dL as the upper limit for "normal range" of SU. Therefore, values that fell above the currently recommended 6.0 mg/dL, but still within this normal range being used, were more easily missed by reviewing physicians, and therefore ULT drugs may not have be appropriately titrated to recommended targets [50]. Similarly, in the VA study discussed above, manual review of medical records found one provider who also chose not to titrate ULT because the patient's SU of 7.3 mg/dL was within the lab's "reference range" of 3.5–8.5 mg/dL [47]. Ongoing flares further led some physicians not to titrate; despite the 2012 [46] and 2020 ACR [9] guidelines recommending the potential to titrate urate lowering drugs even during flares [47]. Furthermore, various labs provide different SU reference ranges for men and women. This distinction has little clinical utility as the threshold for crystallization and harmful consequences of elevated SU is understood to be largely independent of sex. Rather than being helpful, these gender-specific ranges may contribute to unnecessary confusion for clinicians. These findings highlight other challenges in achieving potentially better gout outcomes, if subscribing to a TTT strategy.

An additional pitfall seen in ULT management of gout is discontinuation of treatment during gout flares. There is limited data regarding this phenomenon, but a 2011 review of patients admitted to a Sydney, Australia, hospital for gout flares found that allopurinol was discontinued in 56% of the 36 patients who were already taking it at the time of admission [51]. While additional research is needed, particularly regarding management of outpatient flares, this finding raises concerns that inappropriate cessation of ULT during a flare could be contributing to high rates of discontinuation, especially if therapy is not promptly resumed.

Several studies have sought to identify patient characteristics associated with failure to achieve target SU values. In the STOP Gout trial, "younger age, non-White race, worse health-related quality of life (HRQoL), higher enrollment SU values, the presence of tophi, concomitant use of diuretics, and reduced ULT adherence" were all associated with lower likelihood of achieving target SU values [52]. These findings echo previous results that also identified older age and ULT adherence as predictors of reaching SU values [53–55]. Comorbid conditions such as cardiovascular disease (CVD), hypertension, diabetes, and obesity were not associated with SU response [52]. The results suggested the same was true of CKD, though this is at odds with previous findings indicating that while an increased number of comorbidities is associated with higher likelihood of reaching target, renal dysfunction was specifically associated with a lower likelihood of doing so [56].

Future directions towards better gout care

Methods to improving adherence to gout guidelines

The Australian general practice audit discussed above demonstrated marked improvement in both frequency of SU testing and the proportion of patients who reached SU targets within the year following implementation of the package of care [50]. This suggests that the easy availability of a more cohesive and streamlined protocol aided physicians in following and implementing guidance around ULT and could offer

a clear path forward for the broader medical community. Thus, a streamlined guidance could improve guideline adherence and care delivery at scale.

In 2018, the ACR developed electronic clinical quality measures (eCQM) for gout, which have been incorporated into the Rheumatology Informatics System for Effectiveness (RISE), an electronic health record (EHR) enabled rheumatology registry and which can be incorporated into EHR systems more broadly [57]. In particular, the three eCQM incorporated into RISE address key areas of confusion that are perhaps insufficiently addressed by current guidelines: indications for ULT, SU monitoring, and treating to target SU. The incorporation of such measures into EHR systems can provide real-time feedback for clinicians to enhance their ability to manage their patients' care, as well as provide accountability measures that may guide future efforts to continue to improve disease management.

Physician adherence drives patient adherence to gout therapies

Improved physician adherence to guidelines may in turn improve medication adherence in patients. A 2023 post-hoc analysis of the STOP Gout trial, which compared the efficacy of allopurinol to febuxostat when administered via TTT strategies, found that in the context of this highly regulated implementation of TTT 81% of patients were able to reach target SU of 6.0 mg/dL as well as the more aggressive 5.0 mg/dL target for patients presenting with tophi [52]. While the rigor of a clinical trial is not a practical standard for day-to-day care, it demonstrates the significant improvement achieved by close adherence to guidelines, and perhaps increased frequency of contact with a care team.

Increased frequency of physician contact may also drive adherence. More frequent appointments correlated with increased persistence on allopurinol [56]. This might help explain both the higher rates of successful achievement of SU targets seen in clinical trial settings and in the context of higher numbers of comorbid conditions where patients are likely to have more doctor visits, though Singh et al. [56] found that increased comorbidities (measured by Charlson Comorbidity Index) had a negative effect on the chances of reaching SU [49].

Patient engagement and education improves gout outcomes

To improve patient adherence to ULT, several strategies show promise. Use of telehealth has the dual benefits of increasing patient-provider touchpoints while minimizing the challenges of repeated and frequent in-person visits. A 2018 randomized trial demonstrated that a pharmacist-led interventions and automated telephone contact significantly enhance patient adherence to ULT and increase the likelihood of achieving target SU levels [24]. A subsequent 2021 study also found that telephone-based management of patients yielded high rates of SU target achievement, with 70% reaching < 6.0 mg/dL [58]. Telephone-based management also showed high patient satisfaction, with 98% rating 5/5 on a Likert scale. And while this 2021 intervention was led by rheumatologists and/or their physician assistants, the methodology has the potential to be easily translated for PCPs or nurse-led care. A similar Norwegian 2022 nurse-led intervention with SU monitoring monthly or every three months (depending on whether or not target had been reached) and corresponding dose titration also demonstrated high levels of achieving target SU values, as 85.5% of patients reached target within a 12 month period either with allopurinol (first-line) or febuxostat [59].

These findings mirror those of the 2018 UK-based randomized controlled trial mentioned above, in offering support both for TTT strategies and demonstrate promise in gout management protocols led by healthcare personnel other than doctors. This study, which compared usual GP-led care with nurse-led TTT-based care incorporating patient education, demonstrated significantly higher adherence to ULT in the nurse-led group. At one and two years, 96.70% and 96.10% of patients were still taking ULT compared to 46.83% and 56.13% for those receiving usual care [25]. After two years, 95% of the nurse-led group reached target SU levels and were taking a mean allopurinol dose of 460 mg/day, compared to 30% and 230 mg/day in the control group. These high rates of adherence in nurse-led group explain the improvements observed in flare frequency, presence of tophi, quality of life, and cost per quality-adjusted life year (QALY).

These results confirmed the findings of an earlier proof-of-concept study by some of the same investigators which involved 106 patients recruited from primary care practices [60]. A survey following up with 75 of these patients 5 years after the intervention showed that the trends persisted with 90.7% still on ULT and 86.4% of those for whom SU data was available had values under 6.0 mg/dL [61]. While there may be selection bias influencing these results since only 75 of 100 patients returned the survey, the concordance of the SU values and reported adherence is encouraging.

Qualitative interviews of some patients who underwent the UK-led nurse-led intervention demonstrated that the frequent contact encouraged them to persist with ULT, and as they experienced fewer and less severe flares, they felt more determined to continue with ULT [62]. The authors also noted that patients attributed improvements to "a treatment approach which prioritized long-term management of gout" rather than one that focused "just on the flares in the way primary-care practitioners had often done in their earlier consultations". While the generalizability of these remarks is of course limited by size of the study and its qualitative nature, these remarks perhaps hint at the idea that improving patient adherence to ULT may begin with changing their perception of the disease, which in turn, might start with shifting how PCPs view and communicate about gout emphasizing comprehensive, long-term strategies over episodic flare management.

Recent developments in narrative storytelling interventions have also shown potential for improving patient education around gout, subsequently boosting ULT adherence [63, 64]. Visual aids, especially personal medical images, have been found to positively impact patient attitudes toward medication necessity and understanding of gout treatments [65]. Despite the small sample size in these studies, incorporating such materials into patient discussions could be beneficial and easily done, as medical imaging is likely to be readily at hand if available.

A recent survey of patients from a rheumatology practice that revealed reasons for intentional non-adherence to allopurinol were more likely to cite attitudes or beliefs about medications (such as "I want to live a normal life again" or "To see if I really need it") than medical sensitivity ("Because the medicine is harsh on my body") [66]. While this study again comprised a small sample size, these results suggest that non-adherence that may be overcome through improved strategies of patient education.

Conclusions

Gout is predominantly managed in primary care, presenting unique opportunities to address gaps and optimize current management practices. The efficacy of TTT strategies, advocated by nearly all rheumatology groups, and the potential improvements to medication adherence and outcomes can only be realized via increased patient and provider engagement. Despite near consensus among rheumatology groups on the TTT strategy, controversy exists around an alternative, unproven approach of a TTASx strategy advocated by the ACP. Ultimately, the path to improved management of gout, particularly in primary care, involves both patients and health care providers. For health care practitioners, we must clarify areas where recommendations are insufficient or conflicting and for patients, we need to help develop improved strategies to increase engagement and understanding of the disease. Key areas for future research include developing novel methods to improve ULT adherence through innovative multi-modal interventions, some of which may be health system initiated or delivered by non-physician health professionals. Developing as much parsimony as possible across clinical guidelines will go a long way towards defining and ultimately improving gout care quality.

Abbreviations

ACP: American College of Physicians

ACR: American College of Rheumatology

CKD: chronic kidney disease

CVD: cardiovascular disease

eCQM: electronic clinical quality measures

EHR: electronic health record

EULAR: European League Against Rheumatism

GPs: general practitioners

HRQoL: health-related quality of life

MSU: monosodium urate

NICE: National Institute for Health Care Excellence

NSAIDs: non-steroidal anti-inflammatory drugs

PCPs: primary care physicians

QALY: quality-adjusted life year

RCTs: randomized control trials

RISE: Rheumatology Informatics System for Effectiveness

SU: serum urate

TTASx: treat-to-avoid-symptoms

TTT: treat-to-target

UK: United Kingdom

ULT: urate lowering therapy

US: United States

VA: Veterans Affairs

Declarations

Author contributions

ES: Investigation, Writing—original draft, Writing—review & editing. EMH: Investigation, Writing—original draft, Writing—review & editing. KGS: Conceptualization, Writing—review & editing, Supervision. All authors read and approved the submitted version.

Conflicts of interest

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