

Quality of Care of Patients with Gout in Primary Care Settings in the Philippines

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ABSTRACT

Background. Despite established treatment guidelines, variations in the management of patients with gout in primary care settings are observed, leading to suboptimal patient outcomes.

Objective. This study aimed to describe the quality of care among adult patients with gout who consulted in selected urban, rural, and remote primary care sites in the Philippines.

Methods. This retrospective study involved review of electronic medical records (EMR) of adult patients diagnosed with gout between 2016 and 2022 in three primary care clinics in urban, rural, and remote settings in the Philippines. Quality of care was assessed based on adherence to predefined quality indicators from recommendations of the 2016 EULAR guidelines for gout management, including lifestyle counseling, comorbidity screening, prescription of recommended anti-inflammatory agents to patients with acute gout, and urate-lowering therapy (ULT) prescription.

Results. A total of 557 patients were included in the study. The cohort was predominantly male (67.1%), with a mean age of 55.2 years. Young-onset gout (age <40 years) was present in 18.1% of patients. The remote site had the lowest rate of baseline SUA determination at only 7.7%, with no patient having follow-up SUA determination. The mean baseline SUA level was 8.8 mg/dL, with the highest baseline SUA seen at the remote site (9.6 mg/dL). Screening rates for comorbidities were also suboptimal at 2.5%. Appropriate anti-inflammatory treatment for acute gouty flares was provided in 45.6% of patients, with the lowest adherence at the rural site (17.6%). The majority (90%) of the 20

patients who were identified to have indications for ULT were prescribed ULTs. Prescription of allopurinol as first-line ULT was highest in the rural (69.1%) and remote sites (65.9%) and lowest in the urban site (36.7%). Overutilization of ULT was observed across the 3 sites (36.1%), with the highest overutilization observed in the remote (52.1%) and rural sites (34.6%).

Conclusion. Health disparities were observed, with the remote site having the highest overutilization of non-recommended analgesics, the least frequent serum uric acid determination, and the least frequent follow-up consults. Highest overutilization of ULT was observed in the urban and remote sites. The rural site had the highest percentage of patients with severe disease and the lowest adherence to the prescription of appropriate anti-inflammatory therapy for acute gouty arthritis and screening for comorbidities. These findings reflect the



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need to improve gout management in primary care and highlight the need for targeted strategies appropriate according to the setting, especially in underserved populations in rural and remote areas.

Keywords: *gout, rheumatic diseases, rheumatology, primary care, quality of care, healthcare disparities, Philippines*

INTRODUCTION

Gout is a chronic metabolic disease in adults with hyperuricemia and urate crystal deposition, causing acute inflammatory arthritis and cardiovascular, metabolic, and renal disease. Gout accounts for numerous consults in primary care clinics and emergency hospital visits.¹⁻³

The cornerstone of urate-lowering in gout is a three-prong “treat-to-target” approach comprised of holistic management with treatment of comorbid conditions, lifestyle modifications, and urate-lowering medications.⁴⁻⁶ The 2016 EULAR evidence-based recommendations for gout management include the following indications for urate-lowering therapy (ULT): a) patients with recurrent flares, tophi, urate arthropathy and/or renal stones; or b) patients who are <40 years old with a very high serum uric acid (SUA) level (>8.0 mg/dL) and/or comorbidities (renal impairment, hypertension, ischemic heart disease, heart failure).⁵ The more recent 2021 Asia Pacific League of Associations for Rheumatology (APLAR) clinical practice guideline for gout treatment recommends ULT for patients with newly diagnosed gout and a SUA ≥ 9 mg/dL.⁴ Allopurinol and febuxostat are first-line hypouricemic drugs started at a low dose and slowly titrated towards the treatment target (SUA <6 mg/dL for patients without tophi, or SUA <5 mg/dL for patients with tophi). Achieving the treatment target through lifelong ULT is crucial in dissolving uric acid crystals, reducing and preventing arthritis attacks, improving quality of life, and minimizing the risks of cardiovascular, metabolic, and renal disease.^{4,6}

Despite numerous credible treatment guidelines, studies suggest suboptimal management of patients with gout, especially at the primary care level. A study reported that lower adherence to guidelines was observed among primary care physicians, who manage most patients with gout, compared to specialists.⁷ A 2017 survey of Filipino internists and family medicine practitioners showed that >50% of physicians discontinued ULT once SUA normalized, and only 13.3% gave ULT as a lifelong treatment.⁸ This was partly attributed to clinicians’ lack of awareness of these treatment guidelines.⁹

The Philippine Primary Care Studies (PPCS) program developed and implemented several strategies intended to strengthen the primary care health system. The program, initiated in 2016, included the implementation of an electronic medical record (EMR) system, health financing, augmentation and training of health human resources, and community engagement. These interventions were pilot

tested in urban, rural, and remote sites.¹⁰ The urban site, the health service facility of the University of the Philippines Diliman (UPD) in Quezon City, serves approximately 15,051 employees of this university and their dependents. The rural site was Samal, Bataan, a fourth-class municipality with 35,298 residents. The remote site in Bulusan, Sorsogon, was a fourth-class municipality with 22,824 residents, a geographically isolated and disadvantaged area (GIDA).¹¹

We conducted this study to describe the quality of care of adult patients with gout who consulted in the PPCS primary care clinics from 2016 to 2022. Quality of care indicators were based on the 2016 updated EULAR evidence-based recommendations for the management of gout. The 2016 EULAR guidelines were chosen since these were the relevant clinical practice guidelines in the time period covered by the study.

METHODS

Study Design and Participants

We conducted a retrospective cohort study of all adult patients diagnosed with gout across the three sites of the PPCS program from the year 2016 to 2022. This represents a census of all adult patients with gout seen in the 3 PPCS sites during the study period. The available records in the EMR differed due to variation in implementation dates across the three sites: August 2016 to November 2022 for the urban site; August 2019 to September 2022 for the rural site; and April 2019 to November 2022 for the remote site.

Data Collection

The demographic and clinical data of patients in the PPCS sites were encoded in real time by the healthcare workers into the EMR. The contents of the EMR included system-generated patient identification and visit identification numbers; free-text fields of the chief complaint, vital signs, present medical history, past medical history, obstetric and gynecologic history, personal and social history, physical examination, laboratory requests, laboratory results, and other treatments; and drop-down fields of prescriptions and diagnosis using ICD codes.

Data of patients with ICD codes corresponding to gout or gouty arthritis, supplemented by a free-text search to ensure comprehensive case identification, were extracted from the EMR system operating across the participating sites using standardized Structured Query Language (SQL) queries. Prior to data extraction, all patient and visit identifiers were anonymized to ensure patient safety.

A comprehensive and systematic search using ICD codes and free-text queries was done to avoid selection bias. To ensure data quality and integrity, internal validity was verified manually through a random sampling where approximately 5% of the extracted records were temporarily de-anonymized under secure conditions and manually compared against the source EMR by the data manager.

Data collected included anonymized patient ID, visit number, consultation date, demographic characteristics (age, sex, body mass index), comorbidities, clinical manifestations or reason for consultation (chief complaint, history and physical examination), prescribed gout medications (ULT, colchicine, NSAIDs, steroids), dose of urate-lowering therapy medications, provision of dietary and exercise advice, laboratory tests requested, frequency of follow-up visits, and serum uric acid measurements. Missing data were encoded as "not reported." The number of participants with missing data was reported in the results.

Data Analysis

Descriptive statistics were used to summarize data. Frequency and percentages described categorical patient characteristics: age groups, sex, comorbid conditions, chief complaint, ULT prescription, ULT dose categories, anti-inflammatory prescription, provision of dietary and exercise

advice, request for laboratory tests, presence of follow-up consultation visits, and SUA determination. The mean and standard deviation (SD) describe the continuous data, such as age, body mass index (BMI), and serum uric acid levels.

The quality-of-care indicators of gout treatment were the overarching principles and recommendations with high-quality evidence in the 2016 EULAR guideline, which was published prior to the date of the earliest data collected (August 22, 2016). The recommendations included as quality indicators were the recommendations that had GRADE evidence level A or B. Evidence level A indicates strong evidence from randomized controlled trials, meta-analyses, or strong observational evidence providing consistent findings. Evidence level B signifies results from a limited body of data with somewhat inconsistent results. The quality-of-care indicators used in this study are summarized in Table 1. Adherence to guidelines was computed as the proportion of patients who received the recommended management as

Table 1. Quality of Care Indicators

Quality of care indicators	Operational definition	Recommendation
1. Screening for cardiovascular, metabolic, and renal comorbidities	All patients should undergo screening for cardiovascular, metabolic, and renal comorbidities. Proportion of patients with diagnostics ordered, specifically: • 12L ECG and/or chest X-ray to check for cardiovascular disease • FBS, HbA1c and/or lipid tests to check for metabolic comorbidities • BUN, creatinine, urinalysis, kidney, and/or urinary bladder ultrasound to check for renal comorbidities	Every person with gout should be systematically screened for associated comorbidities and cardiovascular risk factors, including renal impairment, coronary heart disease, heart failure, stroke, peripheral arterial disease, obesity, hyperlipidemia, hypertension, diabetes, and smoking, which should be addressed as an integral part of the management of gout.
2. Treatment of acute flares of gouty arthritis		
A. Treatment of acute flares of gouty arthritis involving one joint only	Prescription of colchicine, NSAID, or oral corticosteroid as monotherapy for patients with acute gouty arthritis (presenting with joint swelling and tenderness) in one joint	Recommended first-line options for acute gout attacks are colchicine, NSAID, or oral or articular injection of corticosteroid.
B. Treatment of acute flares of gout flares involving two or more joints (severe) ⁵	Prescription of combination therapy (colchicine + NSAID, or colchicine + steroids) for patients with acute gouty arthritis involving 2 or more joints (severe gout flares)	For patients with severe gout flare, recommended treatment options are a combination of colchicine and NSAIDs, or colchicine and corticosteroids.
3. Urate-lowering therapy (ULT) for patients with gout with indications for starting and maintaining ULT	Patients with the following indications should be prescribed ULT: a) chronic tophaceous gout b) patients with gout who are <40 years old with SUA of >8.0 mg/dL, or with cardiovascular and renal comorbidity. Proportion of patients with indications for ULT that were prescribed ULT.	ULT is indicated in all patients with recurrent flares, tophi, urate arthropathy and/or renal stones. Initiation of ULT is recommended close to the time of first diagnosis in patients presenting at a young age (<40 years) or with a very high SUA level (>8.0 mg/dL; 480 mmol/L) and/or comorbidities (renal impairment, hypertension, ischemic heart disease, heart failure).
4. Choice of ULT	Prescription of allopurinol as first-line ULT.	Prescription of allopurinol as recommended for first-line ULT, starting at a low dose (100 mg/day).
5. Provision of advice on diet and exercise	All patients with gout should receive advice on diet and exercise	Every person with gout should receive advice regarding lifestyle: weight loss if appropriate, avoidance of alcohol (especially beer and spirits) and sugar-sweetened drinks, avoidance of heavy meals and excessive intake of meat and seafood. Low-fat dairy products should be encouraged. Regular exercise should be advised.

recorded in the EMR out of the ideal number of patients who should have received the management or intervention based on the EULAR 2016 guidelines.

Ethical Considerations

The study received ethical approval from the University of the Philippines Manila Ethics Review Board (UPMREB 2015-489-01). It adhered to data privacy, using anonymized patient data stored on a password-protected laptop accessed only by study investigators. Written informed consent for involvement in PPCS-related research was obtained from all patients at the PPCS sites.

RESULTS

A total of 557 patients with gout were included in the study. Figure 1 shows the flow diagram showing the selection and inclusion of study cohort participants.

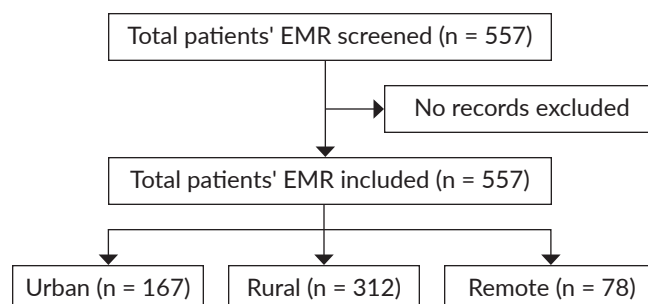


Figure 1. Flow diagram of study participant selection.

The majority of patients were male (67.1%), with a mean age at consultation of 55.2 years (SD 15.6) (Table 2). Most patients were >40 years (81.9%), but 18.1% were <40 years old (young-onset gout). The urban site had the highest prevalence of young-onset gout at 27.5%, while the remote

Table 2. Demographic and Clinical Characteristics of Patients Diagnosed with Gout in Primary Outpatient Clinics in the Philippines

Demographic Characteristic	Total, N = 557 [n (%)]	Urban, N = 167 [n (%)]	Rural, N = 312 [n (%)]	Remote, N = 78 [n (%)]
Male (n, %)	374 (67.1)	104 (62.3)	202 (64.7)	67 (85.9)
Age, in years*	55.2 (15.6)	51.7 (17.4)	56.5 (14.8)	57.4 (13.2)
Age groups, in years				
<40	101 (18.1)	46 (27.5)	46 (14.7)	9 (11.5)
40-60	224 (40.2)	60 (35.9)	128 (41.0)	36 (46.2)
>60	232 (41.7)	61 (36.5)	138 (44.2)	33 (42.3)
BMI, in kg/m²*	25.9 (5.1)	24.6 (5.3)	25.6 (5.1)	23.4 (3.9)
Comorbidities				
Obesity**	160 (53.9)	6 (42.9)	136 (58.9)	18 (34.6)
Hypertension	75 (13.5)	24 (14.4)	39 (12.5)	12 (15.4)
Dyslipidemia	32 (5.8)	9 (5.4)	22 (7.0)	1 (1.3)
Diabetes Mellitus	26 (4.7)	11 (6.6)	12 (3.8)	3 (3.8)
Cardiovascular disease	5 (0.9)	1 (0.6)	2 (0.6)	2 (2.6)
Chronic Kidney Disease	4 (0.7)	0	0	4 (5.1)
Frequency of consultation visits				
1 consultation visit	209 (37.5)	71 (42.5)	96 (30.8)	42 (53.8)
More than 1 visit	348 (62.5)	96 (57.5)	216 (69.2)	36 (46.2)
Clinical presentation				
Joint pain	114 (20.5)	31 (18.6)	72 (23.1)	11 (14.1)
Joint pain and swelling	147 (26.4)	60 (35.9)	68 (21.8)	19 (24.4)
Joint pain, swelling and tophi	1 (0.2)	0	0	1 (1.3)
With tophus/tophi	4 (0.7)	2 (1.2)	0	2 (2.6)
Asymptomatic	241 (43.3)	70 (41.9)	125 (40.1)	46 (59.0)
Serum uric acid determination				
At least 1 SUA determination	107 (19.2)	35 (20.9)	62 (19.9)	6 (7.7)
More than 1 recorded SUA	4 (0.7)	1 (0.6)	3 (1.0)	0
Baseline SUA, in mg/dL*	8.8 (1.8)	8.2 (2.3)	8.8 (1.7)	9.6 (1.5)
Severity classification***				
Non-severe	46/68 (67.6)	31/38 (81.6)	8/17 (47.1)	7/13 (53.8)
Severe	22/68 (32.4)	7/38 (18.4)	9/17 (52.9)	6/13 (46.2)

* Expressed as mean (standard deviation); only 297 study participants (53.3%) had recorded BMI (14 or 8.4% in urban site, 231 or 74% in rural site, 52 or 66.7% in remote site).

** Denominator (N) used is the total number of patients with BMI recording in total and for each site.

*** Severity classification based on number of joints involved as per 2016 EULAR guidelines. Of the 557 participants, only 68 participants had adequate data to allow classification.

Table 3. Medications Prescribed for Gout

Medications prescribed for gout	Total, N = 557 [n (%)]	Urban, N = 167 [n (%)]	Rural, N = 312 [n (%)]	Remote, N = 78 [n (%)]
Prescribed with ULT	214 (38.0)	60 (35.9)	110 (35.3)	44 (56.4)
Recommended				
Allopurinol	127 (22.8)	22 (13.2)	76 (24.4)	29 (37.2)
Not recommended				
Febuxostat	87 (15.6)	38 (22.8)	34 (10.9)	15 (19.2)
Anti-inflammatory medications				
Recommended				
Colchicine	171 (30.7)	11 (6.6)	135 (43.3)	25 (32.1)
NSAIDs	192 (34.5)	66 (39.5)	101 (32.4)	25 (32.1)
Oral steroid	38 (6.8)	3 (1.8)	25 (8.0)	10 (12.8)
Not recommended				
Analgesics	43 (7.7)	4 (2.4)	24 (7.7)	15 (19.2)

site had the lowest prevalence at 11.5%. The mean baseline SUA of the cohort was 8.8 mg/dL (SD 1.8). The baseline SUA was highest in the remote site (9.6 mg/dL), followed by the rural site (8.8 mg/dL), and lowest in the urban site (8.2 mg/dL).

Obesity was the most common comorbid condition (28.7%) and was most prevalent in the rural site (58.9%) and least prevalent in the remote site (34.62%). BMI, however, was recorded in only 297 patients (53.3%) across all sites, with the rural site having the highest rate of BMI recording in 231 patients (74.0%). The urban site only had BMI data on 14 patients (8.4%). The mean body mass index (BMI) was 25.9 kg/m² (SD 5.10), which is considered obese based on the World Health Organization Asia-Pacific classification criteria.¹² Hypertension was the second most common comorbidity, present in 13.5% of all study participants. Dyslipidemia (5.8%), diabetes mellitus (4.7%), and cardiovascular and chronic kidney diseases (<1%) were far less common. Twenty-five patients (4.5%) had more than 1 comorbid condition.

Clinical Presentation

Most patients (43.3%) were in the intercritical phase, or the asymptomatic phase in between arthritis attacks of gout, on consultation, and this was seen consistently across all sites (Table 2). There were 26.4% with joint pains and swelling, and 20.5% with joint pains only. Most patients (62.5%) had more than one recorded outpatient visit. Follow-up visits were higher in rural (69.2%) and urban (57.5%) sites, and lowest in the remote site (46.2%). Only 68 patients could be classified based on severity due to incomplete data in the EMR for the other patients. The rural site had the highest proportion of patients with severe acute gouty arthritis (52.9%), followed by the remote site (46.2%) and least in the urban site (18.4%).

Serum Uric Acid Determinations and Monitoring

Serum uric acid (SUA) determination and monitoring were low across all sites. Only 107 patients (19.2%) had at least one serum uric acid (SUA) determination, and only

4 patients (0.7%) had more than one SUA recorded. SUA determination was highest in the urban site (20.9%), and lowest in the remote site (7.7%). There was no follow-up SUA value recorded in any patient in the remote site (Table 2).

Treatment of Gout

Table 3 shows the frequency distribution of prescribed medications for patients with gout. ULT was prescribed in 38.0% of patients across all sites, with the highest prescription rates observed in the remote site (56.4%). Allopurinol, the recommended first-line ULT, was prescribed more often in the rural and remote sites. In contrast, febuxostat, which is not recommended as first-line ULT, was prescribed more often in the urban area. The dose of ULTs prescribed is found in Appendix A.

The most common anti-inflammatory medication prescribed was colchicine for the rural site (43.3%), nonsteroidal anti-inflammatory drugs (NSAIDs) for the urban site (39.5%), and colchicine and NSAIDs for the remote site (32.1%). Analgesics, which are not recommended anti-inflammatory medications, were most often prescribed in the remote site (19.2%).

Quality of Care Indicators

Assessment of quality of care of gout based on the quality-of-care indicators from the 2016 EULAR guidelines across the sites is shown in Table 4. Screening for metabolic, renal, and cardiovascular disease was done in only 2.5% of patients, with the remote site having the highest adherence (10.3%) and the rural site having the lowest adherence (1.0%).

For acute gouty arthritis patients whose severity could be definitely ascertained, adherence to appropriate anti-inflammatory treatment was 45.6% (Table 4). Prescription of appropriate anti-inflammatory treatment was highest in the urban site (55.3%), followed by the remote site (53.8%), and least in the rural site (17.6%). Most patients received the recommended combination anti-inflammatory regimen for severe gout attacks of either colchicine and NSAIDs or colchicine and steroids monotherapy (21.6%). Five patients

Table 4. Adherence to Recommended Treatment for Gout

Quality of care Indicators	Total, n*/N** (%)	Urban, n/N (%)	Rural, n/N (%)	Remote, n/N (%)
1. Screening for cardiovascular, metabolic, and renal comorbidities	14/557 (2.5)	3/167 (1.8)	3/312 (1.0)	8/78 (10.3)
2. Appropriate anti-inflammatory treatment for acute gouty flares***	31/68 (45.6)	21/38 (55.3)	3/17 (17.6)	7/13 (53.8)
A. Appropriate anti-inflammatory monotherapy for patients with acute gouty arthritis involving one joint	26/46 (56.5)	21/31 (67.7)	0/9	5/7 (71.4)
B. Appropriate combination therapy for patients with acute gouty arthritis involving 2 or more joints	5/22 (22.7)	0/7	3/9 (33.3)	2/6 (33.3)
3. Urate-lowering therapy (ULT) for patients with indications	18/20 (90.0)	9/10 (84.2)	3/3 (100)	6/7 (85.7)
4. Prescription of allopurinol as first-line ULT	127/214 (59.3)	22/60 (36.7)	76/110 (69.1)	29/44 (65.9)
5. Provision of advice on diet and exercise	9/557 (1.6)	8/167 (4.8)	1/312 (0.3)	0/78 (0)

* n refers to the number of patients who received the recommended management

** N refers to the ideal number of patients who received the recommended management

*** The rest of the patients could not be classified based on severity due to incomplete data

(3.3%) received a combination of colchicine, NSAID, and steroid, which is not considered a recommended combination regimen (Appendix B).

A total of 214 patients were prescribed ULT, but only 20 had indications based on EULAR recommendations for starting and maintaining ULT. There were 194 patients who were prescribed ULT without appropriate indications, yielding an overutilization rate of 36.1% (194 out of 537). Overutilization was highest in the remote site (37 out of 71, 52.1%), followed by the rural site (107 out of 309; 34.6%), and least in the urban site (50 out of 157, 31.8%). Of the 20 patients with indications to start ULT, 18 were appropriately given ULT (90% adherence). Adherence was highest in the rural site (100%) and lowest in the urban site (84.2%).

Of the 214 patients in the cohort who were prescribed ULT, 127 patients were prescribed the first-line drug allopurinol (adherence rate of 59.3%). The rest of the patients were prescribed febuxostat. Adherence to the prescription of allopurinol as first-line drug was highest in the rural site (69.1%) and lowest in the urban site (36.7%).

Only 9 patients (1.6%) had recorded diet and exercise advice. The urban site also had the most patients with recorded diet advice alone (9.5%) and exercise advice alone (0.6%) (Table 4 and Appendix B).

DISCUSSION

Our study examined gout management in real-world primary care settings in the Philippines using EMR data from 2016 to 2022. The majority of patients were male (67.1%) and middle-aged (mean age of 55.2 years). Young-onset gout patients make up 18.1% of our patient population, and our cohort also has a relatively larger proportion of female patients (32.9%) compared to previous epidemiologic studies showing only 20 to 25% prevalence in females among cohorts of gout patients, which may be due to ethnic or racial differences.¹³ The majority (76.7%) of the female patients in our population were older than 50 years old. This

reflects the sharp increase in gout incidence among post-menopausal women due to the decline in estrogen which exerts a uricosuric effect.¹³

Health disparities can be seen across the different primary care settings—the remote site, which represents the most resource-limited and disadvantaged site, had the highest proportion of patients with severe gout, the highest baseline SUA at consult, the least frequent serum uric acid determination, and the highest overutilization of ULT. These findings in the remote areas reflect health inequities and disparities in health-seeking behavior. Our study also shows several disparities between primary care practice and CPG recommendations (Figure 2). Only a small percentage of patients had provision of lifestyle advice, including diet and exercise, recorded in the EMR, likely due to poor recording in the EMR (Figure 2). Similar findings are reported in other studies, such as a study in 2007 by Roddy et al. in the UK showing advice regarding alcohol consumption was recorded in only 41%, weight loss in 25%, and diet in 29% of patients.¹⁴ A more recent Austrian survey found that 93.8% of physicians correctly acknowledged diet and lifestyle as important modifiable factors; however, this improved awareness did not consistently translate into practice.¹⁵

Our data also showed poor adherence to screening for cardiovascular, metabolic, and renal comorbidities, with screening rates lowest in the rural site (Figure 2). Sub-optimal screening for comorbid conditions, particularly in disadvantaged settings like the rural and remote sites, ultimately may lead to suboptimal patient care. However, since it could not be determined based on the EMR whether patients were newly diagnosed or previously diagnosed with gout, it is possible that screening was conducted prior to the study period, leading to underestimation of adherence rates. Incomplete EMR recording of existing comorbid conditions could also be a factor in the low screening rates.

Comorbidities such as obesity (53.9%) and hypertension (13.5%) were the most frequently observed in the cohort, both of which are recognized risk factors for hyperuricemia and

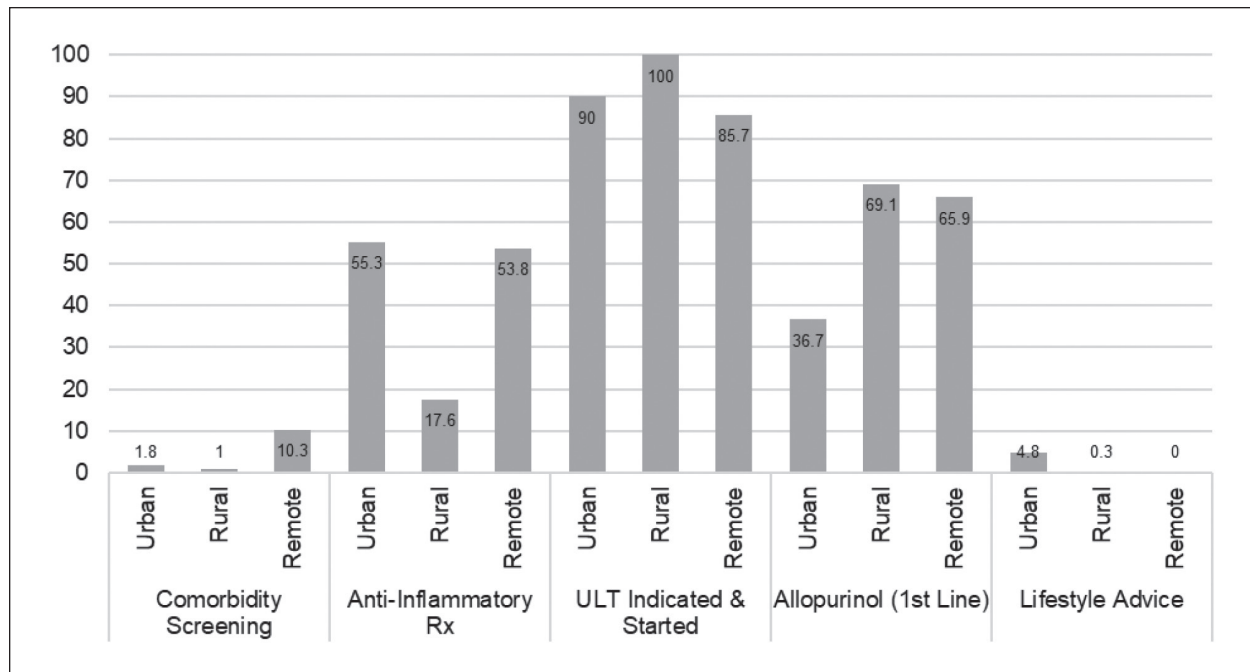


Figure 2. Comparison of adherence to quality of care indicators across 3 primary care sites.

gout. However, the prevalence of obesity and hypertension in our cohort is much lower than the known prevalence of these diseases among patients with gout. In the 2007–2008 National Health and Nutrition Examination Survey (NHANES), the prevalence of hypertension was 69.1% (95% CI, 59.4–78.8), while the prevalence of abdominal obesity was 62.9% (95% CI, 50.9–74.8).^{16,17} Similarly, the prevalence of chronic kidney disease (0.7%) and cardiovascular disease (0.9%) was very low in our population compared to the known prevalence of CKD (16% to 35%) and heart disease (11–14%) in gout.¹⁸ The low prevalence of known comorbid conditions in our cohort may be due to missed diagnosis from inadequate screening. In our study, only 53.3% of patients had recorded BMI, a simple screening tool for obesity. This finding has an implication on the holistic management of gout, as under-screening and underdiagnosis of comorbid conditions lead to missed opportunities for treating these comorbid conditions. These findings highlight an opportunity for education of both primary care physicians and patients on the known prevalence of cardiovascular, metabolic, and renal diseases in gout and how they impact treatment and outcomes.¹⁷ Incomplete recording of existing comorbid conditions in the EMR could also be a factor in the low rates of comorbidities in our study, highlighting the need to do regular quality control checks of EMR systems and periodic training and re-training of their users.

A high rate of appropriate ULT prescription was observed among patients with tophaceous gout and patients who are younger than 40 years old with a serum uric acid of >8.0 mg/dL or with cardiovascular and renal comorbidities. This is much improved compared to the rate of ULT

prescription of only 13.3% seen in a 2017 survey of Filipino general practitioners managing gout.⁸

Overutilization of ULT was observed, with the most resource-constrained sites (remote and rural sites) having the highest rates of inappropriate prescription of ULT. This is in contrast with international studies reporting overall low prescription rates of ULT in gout patients.^{8,19,20} In a 2008 survey of 170 Irish general practitioners, only 66% initiated ULT, and a 2021 meta-analysis which included 30 studies from different countries showed that only 52% of gout patients were receiving ULT.^{21,22} This finding highlights health inequity, with disadvantaged sites having higher rates of inappropriate expenditure of limited resources on medications that are unnecessary.

Allopurinol was most commonly prescribed ULT in the rural and remote sites, which complies with the EULAR 2016 recommendation of allopurinol as the first-line ULT for gout patients. Other medications used for gout in this cohort are the anti-inflammatory medications colchicine, NSAIDs and corticosteroids. These medications are recommended in the management of acute gouty arthritis, with colchicine also being recommended as prophylaxis against flares during the first months of ULT initiation.^{4–6} Our study could not determine the use of colchicine prophylaxis as this was not recorded in the EMR, but this is an important aspect of gout management that should be emphasized.

In the treatment of acute gouty arthritis, our study showed a low rate of adherence (22.7%) to recommended combination anti-inflammatory drugs of colchicine and NSAID or colchicine and steroid in patients with severe gout attacks or patients with acute flares in multiple joints.

The lowest adherence was observed in the urban site. For patients with acute gouty arthritis that are not considered severe, or those with flares affecting one joint only, a better rate of adherence (56.5%) to appropriate anti-inflammatory monotherapy was observed. The lowest adherence was observed in the rural site. This again highlights the inequitable distribution of appropriate care in the remote and rural areas.

We also observed an overall higher rate of NSAID prescription compared to colchicine and corticosteroids. Although colchicine is traditionally considered the first-line anti-inflammatory for gout, most studies show similar efficacy between colchicine, NSAIDs and steroids, with the choice of anti-inflammatory agent depending on the patient's comorbid conditions, presence or absence of contraindications for the drug, concomitant use of drugs and patient's previous experience.^{5,23} The overall adherence rate to appropriate anti-inflammatory treatment of acute gouty arthritis, both severe and non-severe, is only 45.6%, suggesting an area for improvement in gout management in primary care settings.

Another crucial strategy in the management of gout is the "treat-to-target" approach, which includes regular SUA monitoring and titration of ULT dose until target SUA is achieved.^{5,6} The EULAR and ACR guidelines recognize that a "treat-to-target" approach is critical in preventing recurrent arthritis flares, tophi formation, and long-term comorbidities.^{5,6} Our findings revealed that SUA monitoring was performed infrequently in the three primary care clinics, with only 19.2% of patients having at least one SUA measurement, and a mere 0.7% undergoing more than one test during the study period. The remote site had the lowest rate of SUA monitoring, which may reflect challenges in healthcare services in this disadvantaged area. Since laboratory requests and results were integrated into the EMR, the low rate of SUA determination in our study likely reflects actual clinical practice patterns rather than missing EMR data. Compared to previous studies, the overall rate of SUA determination in this study is lower. In a 2015 systematic review, only 25% of gout patients had regular SUA monitoring.^{19,22}

A retrospective chart review of gout patients within a Veterans Affairs (VA) hospital system found that only 38% of the patients seen by primary care physicians had their SUA checked within the first 6 months of ULT initiation.^{19,24}

Our study has several limitations. The retrospective design inherently limits data completeness and control over confounders. We could not reliably assess the prevalence of comorbid disease, gout disease duration, ULT duration and dose titration, colchicine prophylaxis, SUA monitoring, follow-up, and adherence to treatment since this is dependent on the accuracy and completeness of data recording. Furthermore, our study could not capture other important factors that may influence treatment outcomes, such as primary care physician and patients' attitudes, health literacy, diagnostic testing, and medication accessibility and affordability. The slight variation in data collection periods per site may also have an impact on the pattern of treatment practices. Although

a sensitivity analysis may be done to examine period effects or temporal trends, this was not done in our study due to the small number of study participants. Lastly, while our study's findings provide a valuable insight into primary care in the Philippines, the generalizability may be restricted. The PPCS sites utilized a dedicated EMR system and received specific health system interventions. Application of the study results to other primary care sites in the Philippines must be done with caution.

CONCLUSIONS AND RECOMMENDATIONS

This study described the clinical profile and the quality of care of patients with gout in the primary care setting. Overall, adherence to recommended treatment of gout was low in this setting. Health disparities were observed, with the remote site having the highest percentage of patients with severe disease, overutilization of non-recommended analgesics and ULTs, the least frequent serum uric acid determination, and the least frequent follow-up consults. The rural site had the lowest adherence to prescription of appropriate anti-inflammatory therapy for acute gouty arthritis and screening for comorbidities, and the highest overutilization of ULTs. The urban site had the lowest adherence to prescription of allopurinol as first-line ULT. These findings reflect inequities in resource-limited primary care settings: patients in remote areas have more severe disease, but often receive inappropriate or even non-recommended interventions that further aggravate health inequity. These findings reflect the need to improve gout management in primary care.

Quality of care of gout in the primary care setting in the Philippines may be improved through multi-faceted strategies. As the study highlights variations in management that are apparent across settings, targeted strategies that are contextually appropriate and feasible are important. Practical measures such as regular Continuing Professional Development (CPD) activities specifically tailored for medical health officers, rural health practitioners, and Barangay Health Workers with emphasis on non-pharmacologic and pharmacologic management of gout and holistic care, and appropriately designed gout decision aids could bridge knowledge gaps among primary care physicians. Other strategies to enhance evidence-based care include establishing referral networks with specialists, particularly rheumatologists, and regular monitoring and feedback of quality of care. As gout is the most prevalent inflammatory arthritis in adults worldwide, and most patients are seen in the primary care setting, our study highlights a significant opportunity to enhance outcomes among this patient population, especially in underserved populations in rural and remote areas.^{1,3}

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

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APPENDICES

Appendix A. Proportion of patients prescribed different doses of urate-lowering therapy

	Total, n = 214* (%)	Urban, n = 60* (%)	Rural, n = 110* (%)	Remote, n = 29* (%)
Allopurinol Dose Distribution				
100 mg/day	125 (58.4)	20 (33.3)	76 (69.1)	29 (65.9)
300 mg/day	2 (0.9)	2 (3.0)	0	0
Febuxostat Dose Distribution				
20 mg/day	4 (1.9)	3 (5.0)	1 (0.9)	0
40 mg/day	57 (26.6)	15 (25)	33 (30.0)	9 (20.4)
80 mg/day	25 (11.7)	19 (31.7)	0	6 (13.6)

*Denominator is the number of patients prescribed urate-lowering therapy

Appendix B. Proportion of patients who received recommended treatment for gout included in the quality of care indicators

Indicators	Total, n/N (%)	Urban, n/N (%)	Rural, n/N (%)	Remote, n/N (%)
Provision of advice on diet and exercise				
Advice on diet only	26/557 (4.7)	16/167 (9.5)	7/312 (2.2)	3/78 (3.8)
Advice on exercise only	1/557 (0.2)	1/167 (0.6)	0/312	0
Advice on both diet and exercise	9/557 (1.5)	8/167 (4.8)	1/312 (0.3)	0
Total	36/557 (6.4)	25/167 (15.0)	8/312 (2.6)	3/78 (3.8)
Screening for cardiovascular, metabolic, and renal comorbidities^a				
Screened for metabolic disease	122 (21.9)	26 (15.6)	73 (23.4)	23 (29.5)
Screened for renal disease	131 (23.5)	8 (4.8)	82 (26.3)	22 (28.2)
Screened for cardiovascular disease	19 (3.4)	4 (2.4)	4 (1.3)	1 (1.3)
Screened for all comorbidities	14 (2.5)	3 (1.8)	3 (1.0)	8 (10.3)
Prescription of colchicine, NSAID, oral or intra-articular corticosteroid, or combination of the above medications for patients with acute gouty arthritis^b				
Colchicine monotherapy	20/148 (13.5)	5/60 (8.3)	13/68 (19.1)	2/20 (10.0)
NSAIDs monotherapy	31/148 (20.9)	32/60 (53.3)	2/68 (2.9)	3/20 (15.0)
Steroids monotherapy	7/148 (4.7)	0	3/68 (4.4)	4/20 (20.0)
Recommended combination ^c	32/148 (21.6)	3/60 (5.0)	21/68 (30.9)	8/20 (40.0)
Non-recommended combination ^d	5/148 (3.3)	2/60 (3.3)	3/68 (4.4)	0
Prescription of ULT to all patients with chronic tophaceous gout, to all patients with gout who are <40 years old with a SUA of >8.0 mg/dL and/or cardiovascular and renal comorbidity				
With tophaceous gout	4/4 (100)	1/1 (100)	0	3/3 (100)
Patients <40 years old with SUA >8 mg/dL and/or cardiovascular and renal comorbidity	14/16 (87.5)	8/9 (88.9)	3/3 (100)	3/4 (75.0)
Total prescribed with ULT	18/20 (90.0)	9/10 (84.2)	3/3 (100)	6/7 (85.7)
Choice of ULT^e				
Recommended ULT: Allopurinol	127/214 (59.3)	22/60 (36.7)	76/110 (69.1)	29/44 (65.9)
Alternative ULT: Febuxostat	87/214 (40.7)	38/60 (63.3)	34/110 (30.9)	15/44 (34.1)

^a Screening indicates ordered diagnostic tests of 12L ECG and/or Chest x-ray to check for cardiovascular disease, fasting blood sugar (FBS), Glycosylated hemoglobin (HbA1c) and/or lipid tests to check for metabolic disease, blood urea nitrogen (BUN), creatinine, urinalysis, kidney, and urinary bladder ultrasound to check for renal comorbidities.

^b Denominator includes patients identified to have acute gouty arthritis based on history and PE findings of joint pain and swelling

^c Recommended combinations include colchicine with NSAID, and colchicine with steroids

^d Non-recommended combinations include: NSAIDs with steroids and colchicine with NSAIDs and steroids

^e Denominator includes patients who were prescribed ULT regardless of the criteria for ULT indication.