**Original Research Article**

**Physicians’ Knowledge, Attitudes, and Practices in Gout Management: A Cross-sectional Study at Soba Teaching Hospital**

**Abstract**

**Background:** Gout is a disease caused by an overload of uric acid in the body, which leads to the formation of urate crystals that deposit in tissues, particularly in the joints. The deposition of these crystals causes recurring episodes of joint inflammation. This study aims to evaluate the knowledge, attitude, and practice (KAP) of physicians in the Department of Medicine at Soba Teaching Hospital regarding gout management.

**Methods:** A cross-sectional study was conducted to assess physicians' KAP related to gout management. A structured and validated questionnaire was developed, and a total of 67 physicians participated in the study. Descriptive statistics were used for demographic characteristics, inferential statistics was used to identify the relationship between KAP scores with and physician-related factors.

**Results:** Among the 67 respondents, 50.4% were registrars, 37.2% were house officers, and 12% were consultants. Most respondents (61.2%) had less than five years of work experience, and 86.6% reported seeing patients with active gout monthly. Overall, 69% of physicians demonstrated poor knowledge of gout management. Consultants and physicians with more than five years of experience scored higher in knowledge, with statistically significant differences (p = 0.001 and p = 0.016, respectively). Regarding attitudes, 91% of respondents believed that gout is a disease that can significantly impact quality of life, and 74.8% thought that gout is a lifelong condition. Furthermore, 51% of respondents had poor practice scores. Consultants and physicians with over five years of experience also had higher practice scores, with p-values of 0.036 and 0.048, respectively. No significant association was found between knowledge and practice scores.

**Conclusion:** The results indicate that physicians have below-average knowledge of gout management, particularly in the context of renal disease and prophylactic treatment. Additionally, 51% of the respondents demonstrated poor practice regarding gout management, and there was no significant association between knowledge and practice scores. However, physicians exhibited a positive attitude toward gout management

**Keywords:** Gout, Uric acid, Knowledge, Attitude, Practice, Sudan

**1. Introduction**

Gout is a disorder that manifests as a spectrum of clinical and pathologic features built on a foundation of an excess body burden of uric acid, manifested in part by hyperuricemia, which is variably defined as a serum urate level greater than either 6.8 or 7.0 mg/dl (1). Gout is one of the most prevalent rheumatic conditions in adults, with recent self-reported prevalence estimates in the United States at 3.9% of adults, equivalent to approximately 8.3 million individuals (2). The incidence of gout has increased in many countries, including New Zealand, and particularly in the United States, over recent decades. This rise can be attributed to various factors, such as the growing prevalence of comorbidities that contribute to hyperuricemia, including hypertension, obesity, metabolic syndrome, type 2 diabetes, and chronic kidney disease (CKD) (3,4). Additionally, dietary trends and the widespread use of thiazide and loop diuretics for treating cardiovascular conditions have also played a role in the increasing prevalence of gout (5).

A gout flare is an acute inflammatory response in the joints triggered by monosodium urate crystals (6). Following a flare, the transition from asymptomatic hyperuricemia to gout is considered to have occurred, and it is typically regarded as a lifelong condition (7). Gouty arthritis is a chronic disorder (6,7). Secondary prevention of acute gout attacks and the progression of gouty arthritis involves addressing risk factors, such as reducing or eliminating high-purine foods, fructose, alcohol, and diuretics, as well as managing obesity. Additionally, long-term use of urate-lowering therapies is essential (8). Although the benefits of urate-lowering treatments for certain gout-related comorbidities are still under investigation, they may provide some advantage (6,7).

The underlying causes of gout reveal that renal underexcretion of uric acid accounts for 90% of cases, while the remaining 10% is attributed to purine overproduction (9). Physicians' knowledge and attitudes towards gout management are critical in ensuring accurate diagnosis and effective treatment, which ultimately improves patient outcomes. Therefore, this study aims to identify gaps in knowledge and practice among physicians regarding gout management. Understanding these gaps is essential for developing targeted educational programs and specialized training. These initiatives are designed to enhance the skills of healthcare professionals, thereby improving the quality of care provided to patients affected by these conditions.

**2. Methods**

**2.1 Study Design and Setting**

This study employed a descriptive cross-sectional design using a questionnaire-based approach. A quantitative method was chosen to target registered physicians in the Department of Medicine at Soba Teaching Hospital, located in Khartoum State, Sudan. The study was conducted from July to September 2022.

**2.2 Study Population and Sampling Procedure**

The study targeted registered physicians in the Department of Medicine at Soba Teaching Hospital who agreed to participate. All physicians working in the department during the study period were included, resulting in a total population of 67 participants.

**2.3 Data Collection Method**

The validated questionnaire was adapted from the American College of Rheumatology guidelines and published studies that assess physicians' knowledge, attitudes, and practices regarding gout management (10,11). The questionnaire consists of four sections. The first section includes questions about the physicians' demographic and baseline characteristics. The second section contains 15 questions to assess physicians' knowledge of gout management. The third section includes four questions to evaluate physicians' attitudes toward gout management. The final section contains six questions to assess physicians' practices in managing gout patients. For scoring knowledge and practice, a score of one was awarded for correct answers, and a score of zero was given for incorrect or "do not know" responses. Minor adjustments were made to the wording of several questions to improve clarity and ensure that the items accurately captured the intended concepts. These modifications were based on feedback from the physicians, resulting in a more refined and effective questionnaire for the main study.

**2.4 Data Management and Analysis**

A scoring system was implemented to provide a more comprehensive evaluation of overall knowledge (12-14). Each correct answer received 1 point, while incorrect answers received 0 points. For multiple-choice questions, 1 point was distributed among the correct answers, resulting in a total score range of 0 to 15. The practice assessment had a total score range of 0 to 6. Since the scores for both knowledge and practice were not normally distributed, they were expressed as medians and then categorized into two groups: "poor" (scores below the median) and "good" (scores at the median and above). The collected data were entered into SPSS version 24.0 (IBM SPSS Inc., Chicago, IL). Frequencies and percentages were used to represent descriptive statistics. Fisher's Exact Test was applied to assess the association between knowledge and practice scores and socio-demographic characteristics, one-way ANOVA was used to assess the associations between scores and physicians’ variables. A p-value of <0.05 was considered statistically significant.

**2.5 Ethical Approval**

The study was carried out in compliance with the 1975 Declaration of Helsinki and was approved by the Ethical Committee of the Faculty of Pharmacy at the University of Khartoum (FPEC-45-2022). Written informed consent was obtained from all participants, and confidentiality was maintained throughout the research process.

**3. Results**

**3.1 Demographic characteristics of physicians**

A total of 67 physicians participated in this study, with the majority being female (55.2%) and under 30 years old (55.2%). Most of the participants were house officers (37.2%), and 61.2% had less than 5 years of work experience. Additionally, 62.7% had read articles about gout, and 59.7% were aware of gout (Table 1).

**Table 1.** Sociodemographic characteristics of the physician (N=67)

|  |  |
| --- | --- |
| **Variables** | **Frequency (%)** |
| **Gender**  Female  Male | 37 (55.2)  30 (44.8) |
| **Age group in years**  < 30  30-45 years | 37 (55.2)  30 (44.8) |
| **Current status**  House officer  Registrar 1  Registrar 2  Registrar 3  Consultant | 25 (37.2)  6 (9)  17 (25.4)  11 (16.4)  8 (12) |
| **Work experience (Years)**  Less than 5  5-10  More than 10 | 41 (61.2)  21 (31.3)  5 (7.5) |
| **Hours in patients care**  Less than 20  20- 40  More than 40 | 26 (38.8)  26 (38.8)  15 (22.4) |
| **Read gout articles**  Yes  No | 42 (62.7)  25 (37.7) |
| **Awareness about gout**  Yes  No  I do not Know | 40 (59.7)  18 (27)  9 (13.3) |
| **Seeing gout patient/month**  1- 5  More than 5 | 58 (86.6)  9 (13.4) |

**3.2 Knowledge Assessment**

Regarding physicians' knowledge, 52.2% responded "No" when asked about administering allopurinol to patients experiencing joint pain for the first time. Concerning the recommended drugs for acute symptoms in patients with normal renal function, 60% correctly identified NSAIDs. However, in the context of renal disease, 56.7% selected colchicine. When asked about managing special patient situations, 52.2% responded "No" when asked if allopurinol should be given to a patient with joint pain for the first time, without signs of inflammation but with mild hyperuricemia. Additionally, 53.7% answered "No" when asked about giving allopurinol to a patient with signs of inflammation, and 46.3% answered "No" when asked about administering allopurinol to a patient with a confirmed gout diagnosis (Table 2).

Regarding the recommended drugs for acute symptoms in patients with normal renal function, 60% identified NSAIDs, while 56.7% correctly identified colchicine for renal disease. Nearly half of the participants (45%) responded "I don't know" when asked if ice packs could relieve pain during an acute gout attack. For the initiation and discontinuation of allopurinol therapy, 67% answered "2 weeks after an acute gout attack" for initiating allopurinol, and 43.3% stated that allopurinol should be discontinued when serum uric acid levels normalize. Finally, 75% of participants answered "Yes" when asked if diuretics could interact with hyperuricemia (Table 2). Overall, 31% of participants achieved a good knowledge score, while 69% had a poor score (Table 5).

**Table 2.** Knowledge of the physicians regarding gout management (n=67)

|  |  |  |
| --- | --- | --- |
| **Knowledge Questions** | **Responses** | **Frequency (%)** |
| **Normal Serum Uric Acid** | Less than 6 mg/dL  7 to 7.5 mg/dl  More than 7 mg /dl  I don't know | 39(58.2)  13(19.3)  5(7.5)  10(15) |
| **Patient’s situation** | | |
| **A male patient presents with chief complaint of joint pain experienced for the first time, without signs of inflammation but with mild hyperuricemia. Do you administer allopurinol to this patient?** | Yes  No  I don't know | 23(34.3)  35(52.2)  9(13.4) |
| **If signs of inflammation are present, do you administer allopurinol to the abovementioned patient?** | Yes  No  I don't know | 27(40.3)  36(53.7)  4(6) |
| **A patient is experiencing acute joint pain for the first time. The diagnosis of gout has been confirmed. Do you administer allopurinol to this patient?** | Yes  No  I don't know | 29(43.3)  31(46.3)  7(10.4) |
| **Physician’s knowledge about drugs recommended for acute symptoms in the setting of normal renal function** | Colchicine  NSAIDs  Glucocorticosteroids  Allopurinol | 14(21)  40(60)  4(6)  11(16.4) |
| **Physician’s knowledge about drugs recommended for acute symptoms in the setting of renal disease** | Colchicine  NSAIDs  Glucocorticosteroids  Allopurinol | 38(56.7)  14(21)  8(12)  9(13.4) |
| **What dose of colchicine do you usually administer in acute gout attack?** | 1 tab/ day for 3 days  2 tabs/ day for 3 days  3 tabs/ day for 3 days  Every hour until pain is relieved | 17(25)  24(36)  19(28)  7(11) |
| **Ice packs can help relieve the pain in acute gout attack** | Yes  No  I don't know | 24(36)  13(19)  30(45) |
| **Whom do you usually prescribe allopurinol to?** | Patient who has had 2-4 acute gout attack in 1 year  Patient with a symptomatic hyperuricemia  Patient who has had > 4 gout attacks in 1 year  Patient who has had 1 acute gout attack in 1 year | 39(58.2)  18(27)  9(13.4)  8(12) |
| **Time for initiate allopurinol therapy** | During acute Gout attack  1- 2 weeks after acute Gout attack  <1 week after acute Gout attack  >1 week after acute Gout attack | 4(6)  45(67)  8(12)  10(15) |
| **Time for discontinuing allopurinol therapy** | When serum uric acid normalizes  When serum acid is less than normal  After 1 year  Never | 29 (43.3)  6 (9)  9 (13.4)  23 (34.3) |
| **What prophylactic drug do you usually administer?** | NSAIDs  Corticosteroids  Do not usually give prophylactic  Others | 15(22)  6(9)  6(55)  9(14) |
| **Prior to reading this questionnaire, are you aware that gout can cause joint contracture?** | Yes  No  I don't know | 44(66)  14(21)  9(13) |
| **When initiating allopurinol therapy, how often do you give prophylactic treatment to prevent acute gout attacks?** | Rarely  Often  Sometimes  Very often | 36(53.7)  8(12)  20(30)  3(4.3) |
| **Diuretics can cause drug interaction with hyperuricemia?** | Yes  No  I don't know | 50(75)  5(7)  12(18) |

**3.3 Attitude Assessment**

Regarding physicians' attitudes, 91% agreed that "gout is a disease that can affect quality of life," and 47.8% believed that "gout is a lifelong condition." Additionally, 64% responded affirmatively to the statement "the guidelines for gout management are clear and understandable." Most participants (92.5%) thought that gout requires personal and treatment control. However, 64% of the participants felt that the gout management guidelines are not clear and understandable.

**Table 3.** Attitude of the physicians regarding gout management (n=67)

|  |  |  |
| --- | --- | --- |
| **Attitude Questions** | **Responses** | **Frequency (%)** |
| **Do you think gout is a disease that can affect quality of life?** | Yes  No  I don't know | 61 (91)  2 (3)  4 (6) |
| **Do you think gout continues forever?** | Yes  No  I don't know | 32 (47.8)  28 (41.8)  7 (10.4) |
| **Gout needs personal and treatment control** | Yes  No  I don't know | 62 (92.5)  2 (3)  3 (4.5) |
| **About guidelines of gout management, is it clear and understandable?** | Yes  No  I don't know | 43 (64)  10 (15)  14 (21) |

**3.4 Practice Assessment**

Regarding physicians' practices, 37.3% recommended synovial fluid examination for patients with suspected gouty arthritis. Additionally, 80.6% ordered serum uric acid levels for patients presenting with joint pain. Seventy-six percent advised "resting the joint," while 12% suggested frequent joint movement. When counseling patients, 76% recommended reducing beef consumption, and 38.8% advised decreasing organ meat intake. Most participants (62.7%) repeated serum uric acid measurements every 3-6 months. Furthermore, 41.8% of the participants educated patients about joint movement to prevent and manage joint contractures in gout patients. Overall, 49% of participants achieved a good practice score, while 51% had a poor score (Table 5). The p-value of 0.16 indicated that there is no statistically significant association between knowledge and practice scores in this study.

**Table 4.** Practice of the physicians regarding gout management (n=67)

|  |  |  |
| --- | --- | --- |
| **Practice Questions** | **Responses** | **Frequency (%)** |
| **Do you usually recommend synovial fluid examination to patient with suspected gouty arthritis?** | Yes  No  I don't know | 25 (37.3)  35 (52.2)  7 (10.5) |
| **Do you order serum uric acid level to patients with chief complains of joint pain?** | Yes  No  I don't know | 54 (80.6)  9 (13.4)  4 (6) |
| **What do you usually suggest the patient to do to the affected joint?** | Rest the joint  Frequently move the joint  No difference | 51(76)  8(12)  8(12) |
| **Did you counsel patient to?** | Decrease beef consumption  Decrease organ meat consumption  Decrease beer consumption  Decrease pork consumption | 51(76)  26(38.8)  22(32.8)  15(22.4) |
| **When do you usually repeat the measurement of serum uric acid level?** | Every week  Every 2 months  Every 3-6 months  Every year | 2(3)  15(22.3)  42(62.7)  8(12) |
| **How do you usually prevent and manage joint contracture in gout patients?** | Educate the patient about joint movement  Refer to the Dept. of Physical Medicine and Rehabilitation  Tightly control serum uric acid level  I don't know | 28(41.8)  27(40.3)  25(37.3)  11(16.4) |

**Table 5.** Overall knowledge and practice scores of the physicians regarding gout management and the association between knowledge and practice scores

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | **Practice score** | | **Total** | **P value** |
| **Poor** | **Good** |
| **Knowledge score** | **Poor** | 26 (56.5%) | 20 (43.5%) | 46 (69%) | 0.16 |
|  | **Good** | 8 (38%) | 13 (61%) | 21 (31%) |
| **Total** | | 34 (50.7%) | 33 (49.3%) | 67 (100%) |  |

**3.5. Association between knowledge and practice scores with physician variables**

The results indicate a significant difference in knowledge scores based on physicians' current status (p = 0.001) and years of experience (p = 0.016), suggesting that both current status and years of experience significantly influence physicians' knowledge of gout management. However, the number of hours spent in patient care did not show a statistically significant effect on knowledge scores (p = 0.056) (Table 6).

**Table 6.** Comparison between mean knowledge score and physician variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| One way ANOVA | | | | | |
| **Current status** | | | | | |
|  | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 146.493 | 4 | 36.623 | 16.700 | **.001\*** |
| Within Groups | 135.970 | 62 | 2.193 |  |
| Total | 282.463 | 66 |  |  |  |
| **Years of experience** | | | | | |
|  | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 24.092 | 1 | 24.092 | 6.061 | **.016\*** |
| Within Groups | 258.371 | 65 | 3.975 |  |
| Total | 282.463 | 66 |  |  |  |
| **Hours in patients care** | | | | | |
|  | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 24.338 | 2 | 12.169 | 3.017 | .056 |
| Within Groups | 258.124 | 64 | 4.033 |  |
| Total | 282.463 | 66 |  |  |  |

**\*Statistically Significant**

As presented in Table 7. the analysis reveals a statistically significant difference in practice scores based on current status (p = 0.036), indicating that current status has a significant impact on physicians' practice in gout management. Similarly, there was a significant difference in practice scores based on years of experience (p = 0.048), suggesting that years of experience influence physicians' practices. However, the number of hours spent in patient care did not show a significant effect on practice scores (p = 0.521), indicating that this variable does not significantly affect physicians' practice in managing gout.

**Table 7.** Comparison between mean practice score and physician variable

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| One way ANOVA | | | | | |
| **Current status** | | | | | |
|  | Sum of Squares | Df | Mean Square | F | Sig. |
| Between Groups | 10.270 | 4 | 2.568 | 2.755 | **.036\*** |
| Within Groups | 57.778 | 62 | .932 |  |  |
| Total | 68.049 | 66 |  |  |  |
| **Years of experience** | | | | | |
|  | Sum of Squares | Df | Mean Square | F | Sig. |
| Between Groups | 3.199 | 1 | 3.199 | 3.206 | **.048\*** |
| Within Groups | 64.849 | 65 | .998 |  |  |
| Total | 68.049 | 66 |  |  |  |
| **Hours in patients care** | | | | | |
|  | Sum of Squares | Df | Mean Square | F | Sig. |
| Between Groups | 1.372 | 2 | .686 | .659 | .521 |
| Within Groups | 66.676 | 64 | 1.042 |  |  |
| Total | 68.049 | 66 |  |  |  |

**\* Statistically significant**

**4. Discussion**

The results of this study offer valuable insights into the knowledge, attitudes, and practices of physicians regarding gout management in Soba Teaching Hospital, Khartoum. The demographic data show a predominantly young and female cohort of physicians, with the majority being house officers and having less than five years of work experience. This finding aligns with similar studies in developing countries, where young physicians often make up a significant portion of the workforce in teaching hospitals (15,16). However, these demographics indicated that the need for continuing medical education programs tailored to less experienced physicians. A noteworthy 62.7% of the physicians reported having read articles about gout, and 59.7% expressed awareness of the disease, which suggests a moderate level of engagement with recent medical literature on gout. However, the relatively high percentage of physicians with limited knowledge about various aspects of gout management indicates that there is a substantial gap in the comprehensive understanding of the disease.

In terms of knowledge, the study revealed that over 50% of physicians were not confident in their decision to administer allopurinol to patients with joint pain for the first time, despite the presence of mild hyperuricemia or inflammation. This gap may reflect the uncertainty surrounding the use of allopurinol in the early stages of gout, which is a common concern among practitioners (10,17). These results in agree with study in Malaysia which revealed that anti-inflammatory agents are most used for the treatment of acute and chronic gout, with corticosteroid usage at a low level (18). A similar uncertainty was found when physicians were asked about the use of ice packs during an acute gout attack, with 45% responding that they did not know. These findings underscore the importance of targeted education on the management of acute gout attacks and the initiation of urate-lowering therapy. The low knowledge about the appropriate timing for discontinuing allopurinol and the recommended dose of colchicine also highlights a potential area for improvement in clinical practice (19).

Two trials demonstrated that the use of regular colchicine (1.2–1.5 mg daily) for 6 months was associated with a reduced frequency and severity of acute gout attacks when initiating urate-lowering therapy (ULT), compared to placebo (20,21). In our study, however, only 11% of participants correctly identified the appropriate colchicine dose. Regarding acute gout attacks, it is recommended to rest, elevate, and expose the affected joint to a cool environment. Only 36% of respondents were aware that ice packs can help relieve the pain, a finding that contrasts with a study conducted in Indonesia (22). Most physicians (76%) in our study recommended resting the affected joint, which aligns with the Indonesian study's findings. Additionally, 66% of physicians recognized that gout could lead to joint contracture, but only 37.3% would prevent it by tightly controlling serum uric acid levels. Similar findings have been reported in other low-income countries like Sudan, where there are resource constraints, and gaps in undergraduate training contribute to inconsistent practice patterns (23).

The findings from the attitude assessment indicated that most physicians recognized the significant impact of gout on quality of life and agreed that the condition requires personalized and controlled treatment. However, while 64% believed that the guidelines for gout management were clear, there was a notable contradiction, as 64% also felt that the guidelines were not well-understood. This discrepancy could be due to the perceived complexity of current gout management protocols or a lack of proper training in their implementation. Such disparities in attitude and understanding suggest the need for further investigation into the clarity and accessibility of existing gout management guidelines (24). In this study, participating physicians recommended several approaches to improving gout care, such as counseling patients about joint rest and reducing beef consumption. However, fewer than 50% of physicians counseled patients on reducing organ meat consumption, pork consumption, or beer consumption. Common dietary habits such as high intake of red meat and organ meats, and medication access issues may influence both physician practices to manage gout and affecting patient adherence (25).

Regarding the practice assessment, a considerable proportion of physicians did not routinely recommend synovial fluid examination or consistently monitor serum uric acid levels in patients with gout. The decision to advise resting the joint rather than promoting joint movement is in line with standard practice for managing acute gout attacks, but a lack of uniformity in the approaches to dietary recommendations, such as reducing beef and organ meat intake, highlights the need for standardization in patient education (26). The observed variation in the frequency of serum uric acid testing and the education about joint movement for preventing contractures may also reflect differences in individual clinical practices, which could be influenced by the physicians' knowledge and their experience with gout patients (27).

The association between physician variables and both knowledge and practice scores suggests that experience and current status are important factors in shaping physicians' approaches to gout management. Specifically, physicians with more years of experience and those in more senior positions exhibited better knowledge and practice scores, which supports findings from other studies that suggest experienced physicians are more likely to provide evidence-based care (28). However, the number of hours spent in patient care did not show a significant impact on knowledge or practice scores, which may imply that simply spending more time with patients does not necessarily correlate with improved clinical decision-making in gout management. This may suggest that targeted education and structured training programs are more effective in improving healthcare providers’ performance than just increasing patient exposure (29,30).

The current study has several limitations. First, it was conducted in a single hospital, which may limit the generalizability of the findings to all physicians in Sudan. Second, the study's cross-sectional design does not allow for the determination of causal relationships between the findings and other influencing factors. Additionally, the use of a closed-ended questionnaire restricted physicians' ability to fully express their views on the research topic. Despite these limitations, the study provides valuable insights into physicians' knowledge, attitudes, and practices regarding gout management. It highlights the need for enhanced continuing education and training programs to address the identified gaps.

**5. Conclusion**

This study reveals those physicians at Soba University Teaching Hospital's Department of Medicine exhibit below-average knowledge of gout management, particularly in the context of renal disease and prophylactic treatment. Notably, 51% of participants demonstrated poor practice in gout management, and there was no significant association between knowledge and practice scores. Despite these gaps in knowledge and practice, the physicians displayed a positive attitude toward gout management, recognizing its impact on patients' quality of life and the need for personalized care. These findings underscore the importance of addressing the identified knowledge gaps through targeted educational interventions, particularly in renal disease management and prophylactic strategies, to improve both the knowledge base and practical application of gout management in clinical settings

**Disclaimer (Artificial intelligence)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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