



Physician Adherence to Common Cold Clinical Practice Guidelines: an Electronic Medical Record Audit Using SIMKES Khanza

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INTRODUCTION

The common cold (ICD-10 J00) is an Upper Respiratory Tract Infection (URTI) that is common and self-limiting, while also being one of the leading reasons for visits to healthcare facilities. Rational clinical management is essential because clinical decisions are often influenced by non-specific symptoms, limited consultation time, and patients' expectations of receiving medication (Pietrzykowska et al., 2021). Globally, URTIs contribute substantially to inappropriate antibiotic use; a multicenter study in Ethiopia found that 83.8% of URTI patients received antibiotics, and 64.2% of these prescriptions were not in accordance with clinical guidelines (Kasse et al., 2025). Non-adherence to clinical guidelines occurs in both developed and developing countries and has become a global health challenge (Pietrzykowska et al., 2021).

In primary healthcare settings, particularly primary care clinics, Clinical Practice Guidelines (CPGs) play a strategic role in ensuring appropriate management of the common cold—which, clinically, does not require antibiotic therapy (Indonesia, 2022). However, variations in clinical practice that do not comply with CPGs remain common (Habsari & Wulan, 2022) and directly affect service quality and patient safety (Asmirajanti et al., 2021; Mutia & Dhamanti, 2023). Irrational antibiotic prescribing for the common cold not only increases the risk of adverse effects but also exacerbates antibiotic resistance as a global public health problem (Patandung et al., 2024). Therefore, adherence to CPGs is considered a critical indicator in evaluating the quality of clinical services (Zaadoud & Chbab, 2021).

Common cold was selected as the focus of this study because it is a common and self-limiting condition that represents an important proportion of primary healthcare consultations and has relatively standardized recommendations for clinical management. Unlike more complex diseases that may require individualized treatment based on disease severity and comorbidities, the management of common cold emphasizes symptomatic treatment, non-pharmacological measures, patient education, and avoidance of unnecessary antibiotic use. Therefore, adherence to CPGs for common cold provides an appropriate indicator for evaluating the consistency of routine clinical practice with evidence-based recommendations. Evaluating adherence is particularly important in primary healthcare facilities because frequent encounters with common cold mean that inappropriate management, especially unnecessary antibiotic prescribing or inadequate patient education, can occur repeatedly and affect the overall quality of care. Assessing adherence to common cold CPGs can therefore help identify gaps in routine clinical practice and support efforts to improve appropriate treatment and rational antibiotic use in primary healthcare settings.

Advances in health information technology through Electronic Medical Records (EMRs) provide significant opportunities for objective and repeatable data-driven clinical audits. EMRs enable systematic and integrated documentation of clinical data, making them valuable tools for assessing the conformity of physicians' clinical practices with established CPGs (Purnamasari, 2025; Putra et al., 2024). The use of the Khanza Hospital Management Information System (SIMRS Khanza), for example, facilitates structured analysis of patient diagnoses, therapies, and follow-up care (Yigzaw et al., 2022; Zhang et al., 2022). Thus, EMRs function not only as administrative tools but also as effective instruments for quality control by providing structured templates and automated reminders to ensure documentation completeness (Purnamasari, 2025).

Sehati Primary Clinic in Kudus has implemented SIMRS Khanza as its information system, which records the entire clinical service process, including patient history taking, physical examinations, diagnoses, medical procedures, treatments, and patient education within the EMR. Nevertheless, the existence of an EMR does not automatically guarantee adherence to CPGs, as the quality of documentation largely depends on the consistency and compliance of healthcare professionals in recording clinical information (Fauzil et al., 2022; Sari et al., 2025). A study conducted in a teaching hospital in Yogyakarta reported good EMR acceptance rates (85% perceived usefulness and 82% perceived ease of use), but also identified challenges such as delayed data entry, dependence on nurses, and data security concerns (Arini et al., 2025). The gap between CPG standards and actual practices documented in EMRs remains a quality management challenge in primary healthcare facilities (Haryadi et al., 2024).

Although SIMRS Khanza has been widely implemented, research specifically measuring physicians' adherence to Common Cold (ICD-10 J00) CPG through EMR-based audits in primary care clinics remains very limited. Existing studies generally focus on assessing SIMRS readiness or documentation completeness (Nurfitria et al., 2024; Purnamasari, 2025; Choirunnah et al., 2022; Yossiant & Hosizah, 2023), without examining the relationship between information system quality, clinical compliance behavior, and the factors that facilitate or hinder such compliance. Furthermore, no studies have combined quantitative EMR audits with qualitative interviews to comprehensively explore these factors (Creswell & Plano Clark, 2018). This study seeks to address this gap by examining physicians' adherence to Common Cold Clinical Practice Guidelines through EMR audits at Sehati Primary Clinic, Kudus, while also identifying factors influencing adherence within the context of primary healthcare services.

METHOD

This study employed a retrospective descriptive clinical audit design using Electronic Medical Record (EMR) data extracted from the SIMKES Khanza system. The study was conducted at Sehati Kudus Primary Clinic using EMR data obtained from the SIMKES Khanza system. The study was conducted at Sehati Kudus Primary Clinic, Central Java, Indonesia. Medical records of patients diagnosed with common cold (ICD-10 J00) between July and December 2025 were included in the audit. The clinical audit aimed to assess physician adherence to Clinical Practice Guidelines (CPG) for the management of common cold (ICD-10 J00) based on documented clinical services in the EMR.

The study population included all outpatient EMR records of patients diagnosed with common cold (ICD-10 J00) at Sehati Kudus Primary Clinic from July to December 2025. Records were included if they documented a diagnosis of common cold (ICD-10 J00) and contained complete clinical service information required for assessment of physician adherence to the CPG, including anamnesis, physical examination, diagnosis, management, and relevant EMR documentation. Records were excluded if they had a diagnosis other than common cold (ICD-10 J00), were duplicate records, or lacked essential clinical information required for adherence assessment. A total sampling technique was applied to all eligible records, resulting in 753 EMR records included in the analysis.

The study variable was physician adherence to CPG for common cold management, which was operationally defined as the level of conformity between documented clinical services and CPG recommendations. Adherence was measured using a structured CPG-based clinical audit checklist consisting of 32 assessment items covering anamnesis, physical examination, diagnosis, management (including non-pharmacological therapy, symptomatic therapy, and antibiotic use), and EMR documentation completeness. Each item was scored dichotomously, with a score of 1 indicating adherence and a score of 0 indicating non-adherence or absence of documentation.

Each checklist item was scored as 1 if the documented clinical service was consistent with CPG recommendations and 0 if it was not performed or not documented. Adherence was categorized as very good ($\geq 80\%$), good (60–79%), sufficient (40–59%), poor (20–39%), and very poor ($< 20\%$) based on a predefined scoring classification established for this study (Zaadoud & Chbab, 2021). Data were analyzed using descriptive statistics with Statistical Package for the Social Sciences (SPSS) version 26 and presented as frequencies, percentages, mean scores, and adherence categories.

RESULTS

Physician adherence to Common Cold Clinical Practice Guidelines at Sehati Kudus Primary Clinic was categorized as sufficient, with an overall adherence rate of 59.9%. Adherence was highest in EMR documentation completeness and diagnostic components, whereas lower adherence was observed in anamnesis, physical examination, and particularly management-related practices, including non-pharmacological interventions, patient education, and rational antibiotic use. These findings indicate that although the implementation of SIMKES Khanza supported structured clinical documentation and facilitated EMR-based

clinical audits, the availability of an EMR system alone does not guarantee full compliance with guideline-recommended clinical practice.

The findings highlight the need for regular clinical audits and targeted quality improvement initiatives to strengthen adherence to evidence-based management of common cold in primary healthcare settings. Future efforts may include continuous professional education, audit-feedback mechanisms, and optimization of EMR-based clinical decision support features to promote rational antibiotic prescribing and improve overall guideline adherence.

Sehati Kudus Primary Clinic is a primary healthcare facility located in Jati District, Kudus Regency, Central Java, Indonesia. The clinic provides comprehensive outpatient services, including general medical care, dental services, maternal and child health services, minor medical procedures, vaccination, and integrated pharmacy services. As a Primary Healthcare Facility (FKTP) collaborating with the Indonesian National Health Insurance (JKN) program, Sehati Kudus Primary Clinic serves both general patients and JKN participants, supported by qualified healthcare professionals and adequate medical facilities.

To support healthcare digitalization, Sehati Kudus Primary Clinic has implemented the SIMKES Khanza system as its Electronic Medical Record (EMR) platform, developed by the SIMRS Khanza Indonesia Foundation (YASKI). This open-source system supports patient registration, outpatient services, clinical documentation including anamnesis, physical examination, diagnosis, treatment, pharmacy services, and clinic financial management. In this study, SIMKES Khanza served as the primary source of EMR data used to evaluate physician adherence to Clinical Practice Guidelines (CPG) for common cold (ICD-10 J00) management and to facilitate clinical audit through structured and integrated medical documentation.

The characteristics of patients diagnosed with common cold (ICD-10 J00) who received healthcare services at Sehati Kudus Primary Clinic between July and December 2025 are presented in Table 1. The patient characteristics include age group, sex, educational level, and occupational status based on Electronic Medical Record (EMR) data obtained from the SIMKES Khanza system.

Based on Table 1, the majority of common cold patients were adults aged 19–59 years, comprising 377 cases (50.0%), followed by children aged 0–12 years with 273 cases (36.0%). This finding indicates that common cold cases were more frequently recorded among the productive age group, although a considerable proportion also occurred among children, who are generally more susceptible to upper respiratory tract infections due to their developing immune systems. A smaller proportion was observed among elderly patients aged ≥ 60 years

(7.0%) and adolescents aged 13–18 years (6.0%). Regarding sex distribution, female patients represented a slightly higher proportion than male patients, accounting for 424 cases (56.0%) and 329 cases (44.0%), suggesting that women had a slightly greater utilization of healthcare services for common cold management during the study period.

Table 1. Characteristics of Patients (n = 753)

Characteristics	Category	N	%
Age	Children (0–12 years)	273	(36.0)
	Adolescents (13–18 years)	47	(6.0)
	Adults (19–59 years)	377	(50.0)
	Elderly (≥60 years)	56	(7.0)
Sex	Male	329	(44.0)
	Female	424	(56.0)
Education	Low education	387	(51.0)
	Higher education	366	(49.0)
Occupation	Working	445	(59.0)
	Not working	308	(41.0)

In terms of socio-demographic characteristics, patients with lower educational levels accounted for 387 cases (51.0%), slightly higher than those with higher education (49.0%). This distribution suggests that common cold affected individuals across different educational backgrounds, with a slightly higher representation among those with lower education levels. Furthermore, most patients were categorized as working individuals (59.0%), indicating that common cold frequently affected the active and productive population, which may influence daily activities and healthcare utilization.

After describing the demographic characteristics of common cold patients, the next analysis focused on evaluating physician adherence to Clinical Practice Guidelines (CPG) in the management of common cold cases. Physician adherence to CPG based on Electronic Medical Record (EMR) data from the SIMKES Khanza system is presented in Table 2. The adherence assessment covered several clinical service components, including anamnesis, physical examination, diagnosis, management consisting of non-pharmacological therapy, symptomatic therapy, and antibiotic use, as well as EMR documentation completeness.

Based on Table 2, physician adherence to Clinical Practice Guidelines (CPG) for common cold management varied across different clinical service components. The anamnesis component showed a sufficient level of adherence, with a mean score of 4.44 out of 8 items (55.5%). This finding indicates that patient history taking was performed for more than half of the recommended CPG components; however, some important clinical information related to patient complaints and potential risk factors was not consistently documented. This suggests that the anamnesis process still requires improvement to achieve a more comprehensive

understanding of the patient's clinical condition.

Table 2. Physician Adherence to Clinical Practice Guidelines (n = 753)

Clinical Service Component	Number of Items	Mean Score	Adherence (%)	Category
Anamnesis	8	4.44	55.5	Sufficient
Physical examination	6	3.16	52.7	Sufficient
Diagnosis	2	1.30	65.0	Good
Management (non-pharmacological therapy, symptomatic therapy, and antibiotic use)	10	4.55	45.5	Sufficient
EMR documentation completeness	6	4.85	80.8	Good
Overall adherence	32	19.19	59.9	Sufficient

The physical examination component also demonstrated sufficient adherence, with a mean score of 3.16 out of 6 items (52.7%). This result indicates that basic physical examinations were generally conducted, but not all required examination components were consistently performed and recorded. Complete physical examination is essential to support accurate clinical assessment and assist physicians in making appropriate clinical decisions. The diagnosis component showed good adherence, with a mean score of 1.30 out of 2 items (65.0%). This finding suggests that most physicians were able to establish common cold diagnoses according to the clinical criteria recommended in the CPG. Better adherence in the diagnostic component reflects a relatively appropriate process of disease identification, which supports suitable patient management.

The management component, including non-pharmacological therapy, symptomatic treatment, and antibiotic use, had the lowest adherence among all components, with a mean score of 4.55 out of 10 items (45.5%) and was categorized as sufficient. This finding indicates that common cold management has not been fully aligned with CPG recommendations, particularly regarding patient education, non-pharmacological recommendations, and rational antibiotic prescribing. Lower adherence in this component highlights the need to improve evidence-based management practices and promote appropriate antibiotic use.

The EMR documentation completeness component demonstrated the highest adherence level, with a mean score of 4.85 out of 6 items (80.8%) and was categorized as good. This result indicates that the implementation of the SIMKES Khanza EMR system effectively supported more systematic and structured documentation of clinical services. However, high documentation completeness does not necessarily indicate that all clinical practices have fully complied with CPG recommendations; therefore, the quality and appropriateness of

documented clinical actions should also be evaluated.

Physician adherence to CPG for common cold management achieved a mean score of 19.19 out of 32 assessment items, equivalent to an adherence rate of 59.9%, which was categorized as sufficient. These findings indicate that CPG implementation at Sehatu Kudus Primary Clinic has reached a moderate level, with strengths in EMR documentation and diagnosis, but improvements are still needed in anamnesis, physical examination, and particularly management components. This emphasizes that although EMR systems can facilitate documentation and clinical audits, improving adherence to clinical standards still requires strengthening physicians' clinical practices.

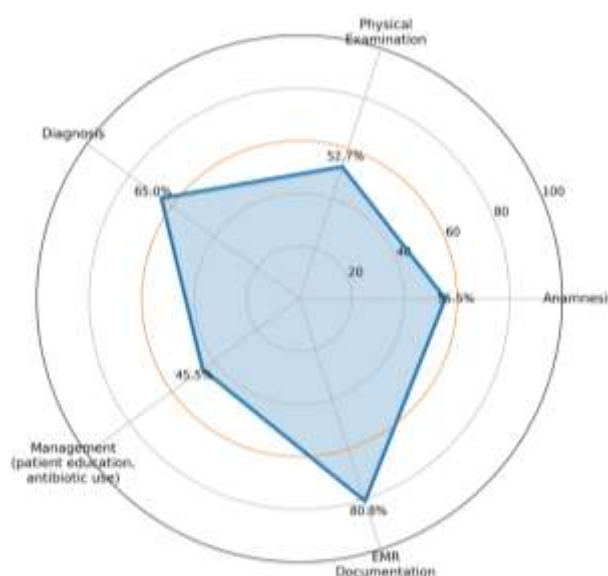


Figure 1. Radar chart of physician adherence across clinical service domains (n = 753).

Figure 1 provides a visual overview of physician adherence across the five clinical service domains. The polygon formed by the radar chart is asymmetrical, indicating substantial variability in adherence between domains. EMR documentation completeness achieved the highest adherence (80.8%), followed by diagnosis (65.0%), whereas management demonstrated the lowest adherence (45.5%). Intermediate adherence levels were observed for anamnesis (55.5%) and physical examination (52.7%).

The approximately 35 percentage-point difference between the highest-performing domain (EMR documentation) and the lowest-performing domain (management) highlights a considerable performance gap. This finding suggests that although physicians consistently completed electronic documentation, adherence to evidence-based management recommendations was considerably lower. The radar chart therefore identifies management as the principal area requiring improvement, followed by physical examination and anamnesis,

while diagnosis and EMR documentation represent relatively stronger aspects of clinical practice.

DISCUSSION

This study evaluated physician adherence to Clinical Practice Guidelines (CPG) for common cold management using Electronic Medical Record (EMR) data from the SIMKES Khanza system at Sehati Kudus Primary Clinic. The majority of common cold patients were adults of productive age, followed by children. This finding may be associated with higher social interaction and occupational exposure among adults, increasing the risk of respiratory virus transmission. The substantial proportion of cases among children also reflects their greater susceptibility to upper respiratory tract infections due to developing immune systems and increased exposure in school and community environments (Pietrzykowska et al., 2021).

The present study found that overall physician adherence to common cold Clinical Practice Guidelines reached 59.9%, indicating that guideline implementation in routine primary healthcare practice remains suboptimal. Although this level of adherence was categorized as sufficient, the findings suggest that a substantial gap still exists between recommended clinical standards and documented clinical practice. Similar findings have been reported in previous studies showing that healthcare professionals' adherence to CPGs remains variable and is influenced by factors such as healthcare system support, availability of resources, clinician knowledge, workload, and perceptions regarding the usefulness of clinical guidelines (Liu et al., 2022; Sada et al., 2023). Therefore, regular evaluation of adherence remains essential as part of continuous quality improvement and patient safety initiatives.

The anamnesis and physical examination components demonstrated only sufficient adherence. Comprehensive history taking and physical examination are fundamental processes in primary healthcare because they provide essential information to establish differential diagnoses and determine appropriate management. Inadequate clinical assessment may reduce the ability of physicians to identify risk factors, recognize warning signs, and distinguish common cold from other respiratory conditions. This indicates that greater attention should be given to improving the consistency of clinical assessment according to established clinical standards (Kementerian Kesehatan Republik Indonesia, 2022).

The findings indicate that the use of SIMKES Khanza facilitated documentation and enabled retrospective clinical auditing, as reflected by the high adherence observed in the EMR documentation domain. However, the availability of an EMR system did not automatically translate into adherence to CPG recommendations, particularly in non-pharmacological

management and patient education. This may be related to the current function of SIMKES Khanza as a relatively passive repository of clinical information, in which many clinical activities are documented through free-text entries rather than being supported by active prompts, mandatory fields, reminders, or clinical decision-support functions. Consequently, physicians may prioritize completing the clinical encounter and prescribing medication while overlooking documentation of patient education and other guideline-recommended non-pharmacological interventions. The findings therefore suggest that improving EMR-based adherence requires more than simply maintaining electronic documentation. SIMKES Khanza could be enhanced with structured CPG-based templates, mandatory fields for key clinical indicators, automated reminders, and clinical decision-support alerts, particularly for antibiotic prescribing and patient education. Such features could prompt physicians at the point of care to complete essential CPG indicators and reduce the likelihood that guideline-recommended actions are overlooked during routine consultations.

The relatively moderate adherence observed in these components may reflect challenges commonly encountered in primary healthcare settings, including limited consultation time, high patient volume, and competing clinical priorities. Under such circumstances, clinicians may focus primarily on documenting information necessary to establish a diagnosis while omitting other recommended assessment elements. Although such omissions may not always affect diagnostic accuracy, they can reduce conformity with guideline-recommended practice and limit the comprehensiveness of patient assessment.

The diagnosis component showed good adherence, indicating that most physicians were able to establish common cold diagnoses according to the recommended clinical criteria. Appropriate diagnosis is an important step in ensuring evidence-based management because common cold is generally a self-limiting viral infection and does not require unnecessary medical interventions, especially inappropriate antibiotic therapy (Kementerian Kesehatan Republik Indonesia, 2022; Pietrzykowska et al., 2021).

Interestingly, diagnostic adherence was considerably higher than adherence to management-related recommendations. This finding suggests that physicians were generally capable of recognizing and diagnosing common cold appropriately, but experienced greater challenges in translating diagnostic decisions into fully guideline-concordant management. Similar discrepancies between diagnostic performance and treatment adherence have been reported in previous studies, indicating that adherence to management recommendations often requires behavioral, organizational, and system-level support beyond clinical knowledge alone (Liu et al., 2022; Sada et al., 2023).

The management component demonstrated the lowest adherence among all clinical service components, particularly in non-pharmacological therapy, patient education, and rational antibiotic prescribing. According to the CPG, patient education regarding the natural course of common cold, expected symptom duration, self-care measures, and warning signs requiring further medical attention are essential components of management. Furthermore, irrational antibiotic use in acute respiratory tract infections remains a significant global public health concern because it contributes to antimicrobial resistance (Kementerian Kesehatan Republik Indonesia, 2022; Kasse et al., 2025). Studies on antibiotic prescribing practices in primary care have also reported that inappropriate antibiotic prescribing remains common despite the predominantly viral etiology of common cold (Pietrzykowska et al., 2021).

The low adherence observed in the management domain may indicate that physicians tend to prioritize symptomatic treatment over non-pharmacological recommendations and patient counseling. In routine clinical practice, patient expectations regarding medication prescriptions may also influence treatment decisions for self-limiting illnesses such as common cold. Consequently, opportunities to educate patients regarding disease progression, self-management, and appropriate antibiotic use may not be fully utilized. Strengthening patient education and antimicrobial stewardship practices may therefore represent important strategies for improving overall adherence to common cold CPGs.

The EMR documentation completeness component showed the highest adherence, indicating that SIMKES Khanza supported systematic and structured clinical documentation. The implementation of electronic medical records can improve accessibility, organization, and efficiency of healthcare documentation (Pratama & Purwanto, 2023; Yossiant & Hosizah, 2023). However, complete documentation does not always indicate complete adherence to clinical practice standards because the quality of clinical decision-making and the consistency of CPG implementation remain dependent on healthcare providers (Jones et al., 2022).

An important finding of this study is that high documentation completeness (80.8%) was not accompanied by equally high overall clinical adherence (59.9%). This suggests that the availability of an EMR system alone may not be sufficient to ensure compliance with evidence-based clinical guidelines. While EMRs can facilitate documentation and support audit activities, improvements in physician adherence may require complementary interventions such as continuous professional education, audit and feedback mechanisms, and integration of clinical decision support systems within EMR platforms.

Overall, this study demonstrates that EMR-based clinical audits provide valuable information for identifying gaps between documented clinical practice and recommended CPG

standards. The findings support the importance of continuous clinical audits, healthcare professional training, optimization of EMR utilization, and the integration of clinical decision support systems to improve physician adherence and enhance the quality of common cold management in primary healthcare settings. This approach aligns with previous evidence emphasizing that audit, feedback, and implementation strategies are effective approaches for strengthening adherence to clinical guidelines (Pereira et al., 2022; Liu et al., 2022).

This study has several strengths, including the use of a relatively large number of Electronic Medical Record records ($n = 753$), the utilization of real-world clinical data from routine practice, and the application of audit indicators derived from the Indonesian Clinical Practice Guidelines for primary healthcare facilities. These strengths provide an objective assessment of physician adherence in an actual primary care setting. However, several limitations should be acknowledged. The audit relied exclusively on information documented in the EMR; therefore, clinical actions that were performed but not recorded could not be assessed and were classified as non-adherent. In addition, the study was conducted in a single primary healthcare facility, which may limit the generalizability of the findings to other settings. Furthermore, the retrospective design did not allow direct observation of clinical encounters or exploration of factors influencing physician adherence to Clinical Practice Guidelines.

CONCLUSION

Physician adherence to Common Cold Clinical Practice Guidelines at Sehatu Kudus Primary Clinic was categorized as sufficient, with an overall adherence rate of 59.9%. Adherence was highest in EMR documentation completeness and diagnostic components, whereas lower adherence was observed in anamnesis, physical examination, and particularly management-related practices, including non-pharmacological interventions, patient education, and rational antibiotic use. These findings indicate that although the implementation of SIMKES Khanza supported structured clinical documentation and facilitated EMR-based clinical audits, the availability of an EMR system alone does not guarantee full compliance with guideline-recommended clinical practice.

The findings highlight the need for regular clinical audits and targeted quality improvement initiatives to address the barriers underlying non-adherence to evidence-based management of common cold in primary healthcare settings. Particular attention should be given to the low adherence to non-pharmacological management and patient education, which may be related to limited consultation time, physicians' prioritization of pharmacological

treatment, patient expectations, and incomplete documentation of clinical activities. The inappropriate use of antibiotics also indicates the need to strengthen physicians' adherence to rational prescribing recommendations through continuous professional education and audit-feedback mechanisms. In addition, optimization of the current EMR system is needed to move beyond its passive documentation function by incorporating structured CPG-based templates, mandatory fields, automated reminders, and clinical decision-support features. These interventions may help reduce overlooked guideline recommendations, improve documentation, promote rational antibiotic prescribing, and ultimately strengthen overall adherence to evidence-based common cold management.

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