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Improving treatment adherence among people living with HIV through adherence counseling: a scoping review

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Abstract

HIV remains a major global public health challenge. Although antiretroviral therapy (ART) effectively reduces morbidity and mortality, its success depends on sustained adherence to treatment. Barriers such as stigma, psychosocial problems, and limited access to healthcare continue to compromise adherence among people living with HIV (PLHIV). Adherence counseling (AC) has been increasingly implemented to address these challenges and improve treatment outcomes. This study aimed to map and synthesize the types and effectiveness of AC interventions in improving ART adherence among PLHIV. A scoping review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews guidelines. Literature searches were performed in Scopus, ScienceDirect, ProQuest, and PubMed using population, intervention, comparison, and outcomes-based keywords. Eligible studies evaluated AC interventions with ART adherence as an outcome and were published in the last 5 years. Of the 689 identified articles, 13 met the inclusion criteria. Most studies were conducted in Uganda and focused on intensive AC (IAC). IAC improves ART adherence and viral load suppression, particularly when delivered through structured, patient-centered approaches. However, the effectiveness varied according to social, health system, and contextual factors. Digital-based interventions, including real-time medication monitoring and mobile health applications, have also demonstrated promising effects on adherence. IAC plays an important role in improving ART adherence among PLHIV. Its effectiveness is influenced by the quality of counseling, social support, and health system integration. Combining face-to-face counseling with digital innovations and community-based support offers the most sustainable strategy for enhancing adherence and achieving viral suppression in PLHIV.

Keywords: *HIV. Adherence counseling. Intensive adherence counseling. Antiretroviral therapy. Scoping review.*

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Introduction

HIV remains one of the most pressing global health issues. Data from 2022 indicate that approximately 39 million people live with HIV, with more than 1.3 million new infections and 630,000 AIDS-related deaths recorded within a single year.[1] The advent of antiretroviral therapy (ART) has been proven effective in reducing mortality and enabling people living with HIV (PLHIV) to live healthier and longer lives. However, the full benefits of ART can only be achieved when patients adhere strictly to daily medication without interruption.[2]

Adherence is the cornerstone of ART success. The World Health Organization (WHO) emphasizes that a minimum adherence rate of 95% is required to maintain viral suppression in patients with HIV. Nevertheless, many patients struggle to reach this level because of a range of challenges, such as medication side effects, social stigma, and limited access to healthcare services.[3] Adherence not only reduces treatment efficacy but also increases the risk of drug resistance and the potential for further HIV transmission within the community.[4]

In Indonesia, HIV remains a significant public health concern, with an estimated 564,000 PLHIV in 2025. However, only around 63% of individuals are aware of their status, 67% are receiving ART, and approximately 55% have achieved viral suppression, indicating substantial gaps in the HIV care continuum.[5] The epidemic is predominantly concentrated among key populations, including men who have sex with men, sex workers, transgender individuals, and people who inject drugs, although a more generalized pattern has been observed in regions such as Papua.[6] In response, the Indonesian government has expanded access to HIV services, including free ART through the National Health Insurance (Jaminan Kesehatan Nasional) program and the use of fixed-dose combination regimens to support treatment adherence, with services now available across most districts.[7]

One approach believed to enhance adherence is adherence counseling (AC). This type of counseling goes beyond the mere delivery of medical information; it also provides psychosocial support (PSS), helping patients cope with stigma, sustain motivation, and overcome daily life challenges.[8] The forms of intervention vary widely, ranging from face-to-face counseling and peer support to digital platforms, such as SMS and mobile applications, which are increasingly relevant in the era of modern health care.

However, the findings of international studies have been mixed. For instance, research conducted in Uganda demonstrated that intensive AC (IAC) effectively improved viral load (VL) suppression, although its success largely depended on individual and systemic healthcare factors.[9] Conversely, systematic reviews have highlighted substantial variations in counseling approaches and outcomes, making it difficult to establish a universally applicable model for the same.

In the Indonesian context, research on adherence to counseling remains scarce. Most of the available evidence originates from African settings, where sociocultural and healthcare dynamics differ significantly. Local studies have shown that stigma remains a major barrier, while social support serves as a protective factor for promoting adherence. To date, no comprehensive study has mapped the most effective counseling models, the ideal frequency of sessions, or the integration of digital technology into ART services in Indonesia.[10]

Based on this existing gap, the present study aimed to conduct a scoping review to identify and synthesize the types and effectiveness of AC interventions among PLHIV. The findings are expected to provide a comprehensive overview, serve as an evidence base for national policy formulation, and support Indonesia's progress toward achieving global HIV prevention and control targets.

Methods

This study employed a scoping review approach developed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA) guidelines. This method was chosen to systematically map the research findings relevant to the study topic. This review aimed to analyze the existing scientific evidence regarding AC interventions designed to improve treatment adherence among PLHIV. The inclusion criteria for this review were as follows: (1) articles evaluating AC interventions among HIV patients; (2) outcomes related to adherence to ART; and (3) publications published within the last 5 years.

Search strategy

In the initial stage, search terms were formulated based on the population, intervention, comparison, and outcomes (PICO) framework. Keywords derived from PICO were entered into major academic databases, including Scopus, ScienceDirect, ProQuest, and PubMed. The detailed search terms used in this review are presented in table 1.

Table 1. Synthesis of the effectiveness of adherence counseling interventions among people living with HIV

No	Authors and year	Study objective	Design and sample	Type of intervention	Main findings	Conclusion	Reference number
1	Nakaye et al. (2023)	To determine the proportion of viral load suppression after IAC and the related factors.	Retrospective cohort study of 323 PLHIV in Kampala.	IAC ≥ 3 monthly sessions.	Of these, 66.4% achieved viral load suppression; success was associated with the dolutegravir (DGT) regimen and lower baseline VL.	IAC is effective when implemented on a schedule with an optimal ART regimen.	15
2	Kikaire et al. (2021)	To evaluate the effect of IAC on HIV patients in military facilities.	This was an operational/ cross-sectional study involving 965 PLHIV.	IAC ≥ 3 sessions focusing on barrier identification.	Viral load suppression was 48%, and barriers included socioeconomic factors and incomplete sessions.	Social and economic support must complement the IAC in military populations.	17
3	Nasuuna et al. (2021)	To assess healthcare workers' knowledge and perceptions of IAC in children and adolescents.	Qualitative: five healthcare workers.	Three monthly IAC sessions for pediatric/ adolescent patients were conducted.	Barriers stemmed from both patient factors (absenteeism and caregiver engagement) and system factors (workload and drug stockouts).	Caregiver and system support are necessary for the effective implementation of IAC.	20
4	Beja et al. (2025)	To explore the facilitators and barriers to ART adherence after implementing IAC.	Qualitative descriptive study involving 15 healthcare workers in Northern Uganda.	IAC was based on the 5A model (Assess, Advise, Assist, Agree, Arrange).	Improved ART adherence through the optimization of cognitive, motivational, and social support components.	IAC is effective when combined with psychosocial and reflective motivational approaches.	19
5	Izudi et al. (2023)	To assess the relationship between the number of IAC sessions and viral load suppression.	Nested case-control study; 48 PLHIV in Kampala.	Monthly IAC sessions (3-5).	The number of IAC sessions did not always correlate positively; additional sessions increased the risk of unsuppressed viral loads (aOR 5.09).	Session quality is more important than quantity.	13
6	Msosa et al. (2023)	To compare digital RTMM with standard IAC.	Randomized Controlled trial involving 240 adolescents and young adults in Malawi.	RTMM-Digital Adherence Tools (DAT) + feedback counseling vs. standard IAC.	RTMM-DAT improved adherence by ≥ 95% and achieved higher viral load suppression rates.	Digital interventions are more effective than conventional IAC.	14
7	Beja et al. (2022)	To identify the barriers and facilitators of IAC success using the COM-B framework.	Qualitative study involving 15 PLHIV in Uganda.	IAC is guided by the COM-B model (capability, opportunity, motivation–behavior).	Barriers included stigma, lack of food, and alcohol use, while facilitators included ART education and social support.	Social support and personal motivation enhance IAC outcomes.	21
8	Lukyamuzi et al. (2024)	To examine the determinants of viral load suppression among patients on PI-based ART.	Mixed methods; 189 patients (eight interviews).	Three monthly IAC sessions were conducted in public clinics.	51% viral load suppression; longer duration in IAC correlated with success.	The duration of counseling matters more than the session count.	22

(Continues)

Table 1. Synthesis of the effectiveness of adherence counseling interventions among people living with HIV *(continued)*

No	Authors and year	Study objective	Design and sample	Type of intervention	Main findings	Conclusion	Reference number
9	Lukyamuzi et al. (2021)	To evaluate the effects of IAC on viral load suppression and healthcare workers' experiences.	Mixed methods; 500 patients.	The IAC was based on 5A and involved 3-4 sessions with peer educators.	Viral load suppression improved (44.1% vs. 26.3%) compared to routine counseling.	IAC is more effective than standard counseling, and peer support and system strengthening are needed.	23
10	Okot et al. (2024)	To identify factors associated with IAC completion among PLHIV.	Retrospective study; 420 patients.	IAC ≥ 3 sessions and ART adherence ≥ 95%.	The completion rate was 67.1%, affected by education, malnutrition, and lack of follow-up.	Monitoring and nutritional support are vital for the success of IAC.	16
11	Izudi et al. (2023) (RDD)	To assess the impact of IAC on viral load suppression and mortality.	Regression Discontinuity Design; 3,199 PLHIV.	IAC ≥ 3 sessions versus routine psychosocial support (PSS).	Viral load suppression was lower in the IAC group (81.6%) than in the PSS group (97.8%).	Therefore, the implementation of IAC must be adjusted for greater effectiveness.	12
12	Pius et al. (2021)	To explore patients' perceptions of IAC.	Qualitative: 30 HIV patients.	Intensive adherence counseling with caregiver involvement.	The IAC improved understanding of and attitudes toward ART.	Family and social support enhance IAC outcomes.	24
13	Nakalega et al. (2021)	To evaluate linkage to IAC programs in rural areas.	Retrospective study; 4,100 PLHIV (411 with high VL).	Three-session 5A IAC model at rural health facilities.	Linkage to IAC was high (81%), but 19% of patients had delayed interventions.	Strengthening linkages at lower-level facilities improves effectiveness.	18

IAC: intensive adherence counseling; PLHIV: people living with HIV; VL: viral load, ART: antiretroviral therapy; RTMM: real-time medication monitoring; aOR: adjusted odds ratio.

Study identification

The keywords listed in table 1 were entered into the predetermined databases. The search process was conducted following the flow and standards of the PRISMA guidelines.[11]

The search results (Fig. 1) using the specified keywords yielded 107 articles in Scopus, 452 articles in ProQuest, 23 articles in ScienceDirect, and 107 articles in PubMed databases. These articles were then identified and screened based on the inclusion criteria, resulting in the final selection of 13 articles, which are further analyzed in table 1.

Results

A total of 689 articles were identified in the Scopus, ProQuest, ScienceDirect, and PubMed databases. The final review included 13 articles that were deemed relevant for analysis. Most of these studies focused on IAC as the primary intervention, with variations in methods, populations, and contextual factors.

Study characteristics

Most of the analyzed studies originated from Uganda (12 articles). This is because Uganda has been recommended by the WHO as one of the main implementers of IAC to reduce the VL among patients with HIV. In terms of study design, the 13 analyzed articles employed diverse approaches; seven studies used quantitative designs (retrospective, cross-sectional, quasi-experimental, and randomized controlled trials),[12-18] whereas six studies applied qualitative or mixed-method designs.[19-24]

Table 2. Summary of adherence counseling interventions in improving treatment adherence among people living with HIV

No	Theme	Summary of research findings	Interpretation and implications
1	Effectiveness of adherence counseling interventions (IAC)	IAC improves ART adherence and reduces viral load. Nakaye et al.,[15] reported that 66% of patients achieved viral load suppression after three IAC sessions. However, Izudi et al.[13] found that a higher number of sessions did not necessarily lead to greater effectiveness.	The quality of counseling implementation is more important than the number of sessions offered. Structured counseling that focuses on addressing patient barriers yields more optimal results than unstructured counseling.
2	The role of social and health system factors	The barriers to IAC effectiveness stem from social factors such as stigma, low motivation, and weaknesses within the healthcare system.	Social and healthcare worker support is essential for this purpose. Strengthening the healthcare system and reducing stigma are necessary.
3	Digital intervention innovation	Msosa et al.[14] demonstrated that RTMM with feedback was more effective than conventional IAC.	The integration of digital technologies, such as medication reminder applications and telecounseling, can enhance treatment adherence.
4	Variation in effectiveness based on population and context	The effectiveness of IAC varies according to the population and service context. Adolescents require strong support from their families and caregivers, whereas high mobility among military populations reduces adherence.	Interventions must be tailored to patient characteristics and healthcare settings. Family- and community-based approaches are highly relevant for improving treatment adherence.

RTMM: real-time medication monitoring; ART: antiretroviral therapy.

Population characteristics

The populations examined across the 13 studies also varied, including PLHIV, adolescents and young adults, healthcare workers, and caregivers. Most studies focused on adult patients undergoing ART with unsuppressed VLs.

Intervention characteristics

The evaluated interventions primarily consisted of structured IAC programs targeted at HIV patients with unsuppressed VLs or poor adherence to ART. The results of the 13 studies are presented in table 2.

Discussion

Effectiveness of IAC

The analysis shows that IAC plays a crucial role in improving treatment adherence and VL suppression among PLHIV. According to a study in Uganda by Nakaye et al., 66.4% of patients achieved significant VL reduction after completing three IAC sessions, with consistent reports of improved VL suppression following structured IAC interventions, particularly in settings with robust follow-up systems and community-based support. These findings confirm that counseling-based interventions can effectively address psychosocial and motivational barriers, thereby improving patient adherence.[25]

International studies have also demonstrated the important role of AC in enhancing ART compliance in resource-limited settings. Whiteley et al. reported that IAC interventions significantly improve ART adherence through approaches such as motivational interviewing and cognitive behavioral therapy.[26] Structured psychosocial counseling sessions have also been found to be effective in sustaining long-term adherence by strengthening patients' motivation and coping mechanisms.

These findings are consistent with earlier evidence showing that adherence is influenced not only by clinical factors but also by sociodemographic and psychological variables. A seminal study by Gordillo et al. identified age, transmission category, CD4 count, depression, and perceived social support as key predictors of adherence. In particular, patients experiencing depression and lacking social support were more likely to have poor adherence, highlighting the importance of integrating PSS into adherence interventions.[27]

The role of social and health system factors

The findings indicate that social and health system factors are key determinants of success in improving ART adherence rates. A systematic review by Pugh et al. in Africa found that the main barriers to adherence

include social stigma, limited knowledge, excessive workload among healthcare providers, and inadequate health facilities. Similarly, Pugh et al. emphasized that social support from peers and family members has a significant positive effect on ART adherence by enhancing motivation and reducing anxiety caused by stigma.[28]

Furthermore, Okonji et al. highlighted that support from family members and healthcare workers is particularly critical for adolescents living with HIV, who often experience complex psychological challenges. In line with the WHO, the success of AC programs in developing countries largely depends on the integration of HIV services into primary healthcare systems, capacity building for health workers, and the availability of affordable monitoring tools.[29]

Digital innovation in adherence interventions

Digital innovation or mobile health (mHealth) has emerged as a promising breakthrough in improving ART adherence. In a meta-analysis' Alandia and Yona concluded that technologies such as SMS reminders, medication reminder apps, and electronic medication monitoring significantly improved adherence compared to conventional methods. The effectiveness of these interventions increases when combined with face-to-face approaches, allowing patients to receive automated reminders through applications, followed by direct follow-up by healthcare providers.[30]

However, these approaches require adequate infrastructure, particularly in resource-limited settings. According to Perger et al., digital methods hold great potential in developing countries when supported by robust and secure data management systems.[31] In addition, Keene et al. emphasized that the effectiveness of digital interventions depends on their cultural adaptability, as culturally tailored applications can enhance patient engagement and counseling outcomes.[32]

Furthermore, there is increasing recognition that HIV care should not be limited to clinical outcomes such as VL suppression. The HIV360 framework emphasizes the importance of incorporating patient-reported outcomes, including quality of life, treatment satisfaction, and long-term engagement in care, into routine HIV services. This patient-centered approach enables a more comprehensive evaluation of treatment success and supports the development of adherence interventions that better reflect patients' needs and experiences.[33]

Variation in effectiveness based on population and context

The effectiveness of AC interventions cannot be generalized but must be evaluated according to population characteristics and healthcare contexts. The findings of this review indicate that the accuracy and success of IAC outcomes vary across different populations and service settings. Kikaire et al.[17] found that IAC effectiveness was lower in military health facilities due to high mobility among personnel. In contrast, Nasuuna et al.[20] found that IAC effectiveness was lower in military health facilities because of the high mobility of personnel.

Similarly, Chapola et al. revealed that adolescents who received family support exhibited higher adherence than those without such support, as adolescents often face distinct psychosocial challenges compared to adults.[34] Thalia also demonstrated that peer-led counseling for young patients effectively enhances self-efficacy and reduces stigma, while adult populations benefit more from community-based approaches, particularly in resource-limited areas.[35]

Therefore, AC interventions must be systematic and culturally sensitive, tailored to the needs of specific groups, to achieve optimal and sustainable adherence outcomes. Although local contextual factors vary across settings, they do not substantially alter the overall interpretation of this systematic review, as the main findings remain consistent across different study environments.

In addition, different adherence strategies may be more appropriate for specific groups of patients living with HIV. Traditional face-to-face counseling tends to be more beneficial for HIV patients who require intensive PSS, such as the elderly, those with low digital literacy, those newly diagnosed with HIV, and individuals experiencing psychological distress or stigma-related challenges. This approach allows for deeper interpersonal interactions, emotional support, and tailored guidance. In contrast, digital-based interventions are more suitable for younger, tech-savvy, and highly mobile HIV patients, as well as those already clinically stable on ART. These patients often benefit from the flexibility, convenience, and ongoing engagement offered by digital platforms, which can support medication reminders, remote monitoring, and ongoing adherence without the need for frequent in-person visits.

Conclusion

This scoping review demonstrates that IAC is effective in improving ART adherence and reducing VL

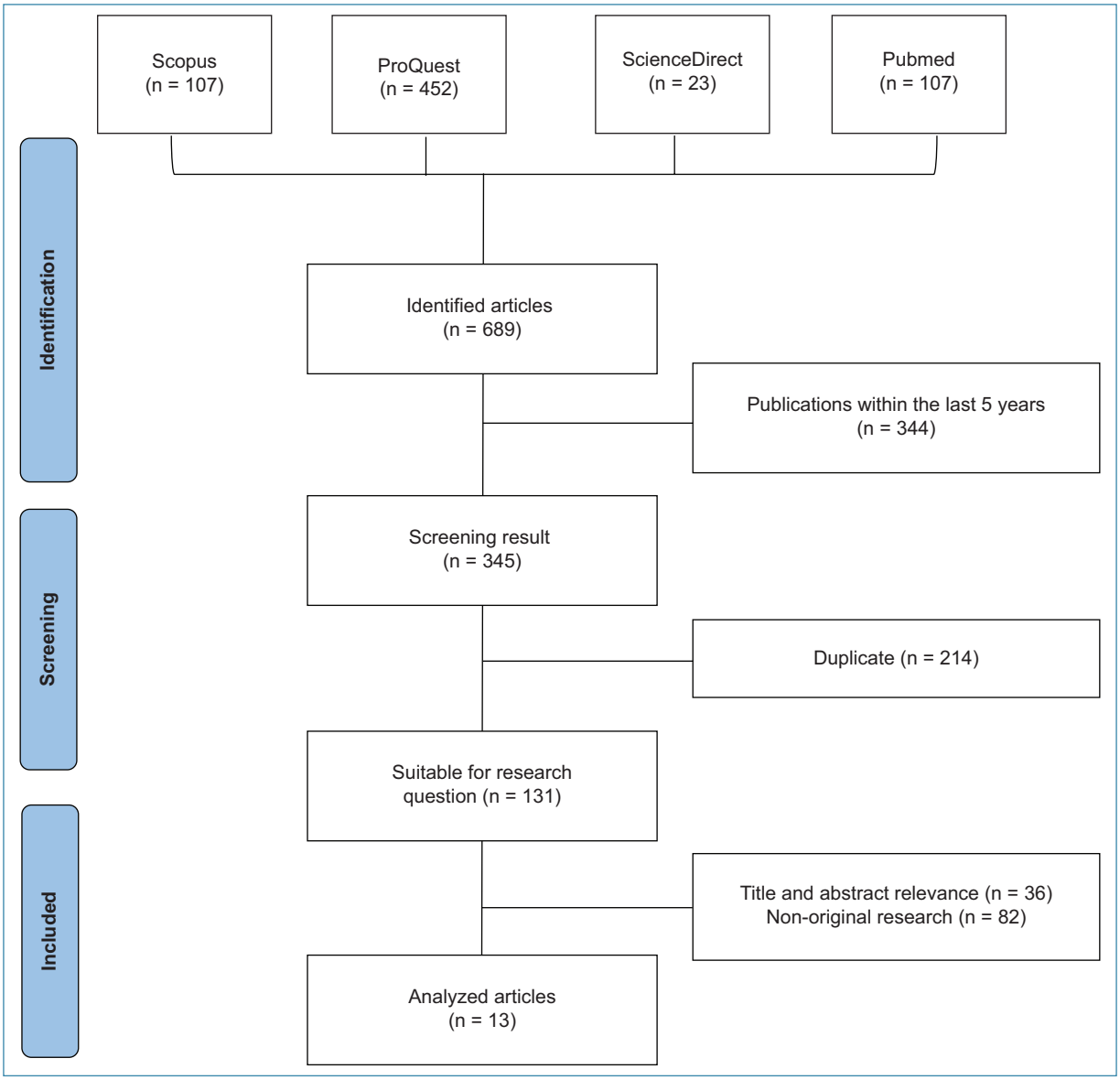

Figure 1. Article search flowchart.

among PLHIV, particularly when implemented in a structured manner that focuses on patient needs and behavioral barriers. The effectiveness of IAC is strongly influenced by social and health system factors, including counselor support, supervision, family, and community involvement. Digital innovations, such as real-time medication monitoring and mobile health applications, can further enhance counseling effectiveness by providing real-time feedback and improving patient retention. In addition, variations in IAC effectiveness across populations highlight the need to adapt interventions to specific social and cultural contexts of the target population. Overall, a combination of face-to-face counseling, social support, and digital technology represents the most promising approach for improving long-term adherence and achieving sustained viral suppression among PLHIV.

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Authors' contributions

Iismayanti led the study of conceptualization, data collection, statistical analysis, and manuscript drafting. A. Insani-Latif and M.G.R. Pandin contributed to data interpretation and critical revision of the manuscript. Nursalam and I. Krisnana provided methodological input and contributed to manuscript refinement. All authors approved the final version of the manuscript.

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Conflicts of interest

None.

Ethical considerations

Protection of human subjects and animals. The authors declare that no experiments on humans or animals were performed for this research.

Confidentiality, informed consent, and ethical approval. This study does not involve personal patient data, medical records, or biological samples, and does not require ethical approval. SAGER guidelines do not apply.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing or creation of the content of this manuscript.

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