

# Daily Text Message Reminders Versus No Reminders for Enhancing Viral Suppression in ART-Naive Adults with HIV: A Narrative Review

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## ABSTRACT

Achieving viral suppression in antiretroviral therapy (ART)-naive adults with HIV is critical for effective HIV control; however, poor medication adherence remains a persistent barrier. This narrative review explored the effectiveness of daily short message service (SMS) reminders compared to no reminders in promoting viral suppression among ART-naive adults. Mobile health (mHealth) technologies, particularly SMS interventions, have been widely studied as scalable, low-cost tools to reinforce adherence behaviors during the critical early phase of ART initiation. The review synthesized evidence from randomized controlled trials and observational studies conducted across diverse settings, revealing generally positive but mixed outcomes regarding adherence and virologic control. Mechanisms underpinning SMS effectiveness include behavioral reinforcement, improved engagement, enhanced self-efficacy, and reduced forgetfulness. However, the impact of SMS interventions is moderated by variables such as message personalization, patient demographics, psychosocial factors, and health system integration. Confidentiality, ethical concerns, and user acceptability are also essential considerations. The review was conducted using a structured narrative synthesis of peer-reviewed studies identified through database searches and manual screening. While SMS reminders are not a panacea, they represent a valuable adjunct to traditional care, particularly in resource-limited settings. Future research should refine message delivery strategies and evaluate long-term effectiveness to maximize clinical outcomes.

**Keywords:** HIV, Antiretroviral Therapy (ART), SMS Reminders, Viral Suppression, Medication Adherence.

## INTRODUCTION

Human Immunodeficiency Virus (HIV) remains a significant global public health concern, with Sub-Saharan Africa accounting for the highest burden of infection [1-3]. Antiretroviral therapy (ART) has significantly improved the prognosis of people living with HIV (PLHIV), reducing morbidity, mortality, and transmission rates [4]. Despite these advancements, adherence to ART remains a formidable challenge, particularly among ART-naive adults individuals initiating treatment for the first time. Sustained adherence is critical to achieving and maintaining viral suppression, which is the cornerstone of successful HIV management. The early phase of ART initiation is particularly sensitive, as patients navigate the complexities of a lifelong treatment regimen often amidst stigma, limited health literacy, and socio-economic constraints.

Mobile health (mHealth) interventions have garnered substantial interest as tools for promoting adherence and improving clinical outcomes in resource-limited settings [5, 6]. Among these, daily short message service (SMS) reminders have emerged as a simple, scalable, and cost-effective strategy. The rationale is grounded in behavioral theories suggesting that consistent prompts can support habit formation, reinforce health-seeking behavior, and counteract forgetfulness. SMS reminders also offer a non-invasive, user-controlled medium of engagement that respects patient autonomy and confidentiality [7]. This narrative review critically explores the effectiveness of daily text message reminders compared to no reminders in promoting viral suppression among ART-naive adults with HIV. It synthesizes empirical evidence from diverse geographic contexts and examines potential mechanisms through which SMS interventions may influence adherence and viral load dynamics. Moreover, the review assesses

limitations, contextual barriers, and facilitators influencing the intervention's efficacy. While previous studies have broadly examined mHealth tools, this review specifically focuses on daily SMS reminders and their direct impact on viral suppression a clinical endpoint of paramount importance. By elucidating the strengths and limitations of this approach, the review contributes to the ongoing discourse on digital adherence technologies and their role in optimizing ART outcomes for newly diagnosed individuals.

### **Rationale for SMS-Based Interventions in ART-Naïve Populations**

The rationale for SMS-based interventions in ART-naïve adults is multidimensional, grounded in psychological, clinical, and structural domains [6, 7]. Newly diagnosed individuals are often overwhelmed by the psychological burden of an HIV diagnosis, coupled with the sudden responsibility of adhering to lifelong medication. This period is critical for establishing adherence behavior, which has been shown to predict long-term virologic outcomes. SMS reminders act as external cognitive aids that reinforce treatment routines, mitigate forgetfulness, and enhance the patient's sense of accountability [8].

From a structural perspective, the widespread penetration of mobile phones, even in low-income settings, makes SMS reminders an accessible platform. They bypass the logistical constraints of in-person adherence counseling while maintaining patient engagement in real-time. Additionally, SMS interventions are cost-effective and require minimal infrastructure, making them particularly attractive for overburdened healthcare systems.

Theoretically, the use of SMS aligns with constructs from behavioral models such as the Health Belief Model and the Theory of Planned Behavior [8, 9]. Reminders may increase perceived severity and susceptibility related to non-adherence while enhancing perceived benefits of taking ART. They may also positively influence behavioral intentions and self-efficacy, especially when messages are tailored to be motivational rather than merely informational.

### **Evidence from Clinical Trials and Observational Studies**

Numerous randomized controlled trials (RCTs) and observational studies have assessed the impact of SMS reminders on ART adherence and viral suppression [10]. Notably, several studies conducted in Sub-Saharan Africa, Asia, and Latin America have yielded mixed but generally promising results.

In a large multi-site RCT in Kenya, daily SMS reminders significantly improved self-reported adherence and increased the proportion of participants achieving viral suppression at six months [11]. Participants receiving personalized, interactive messages showed higher adherence than those receiving non-interactive messages or no messages. Similarly, a Ugandan cohort study demonstrated that daily motivational messages sent during the first 90 days of ART initiation were associated with higher adherence rates and faster viral load decline compared to standard care.

Conversely, some studies reported no significant differences between intervention and control groups. For example, an RCT in South Africa found that although SMS reminders improved appointment attendance, they had no statistically significant effect on viral suppression at 12 months [12, 13]. In another trial in India, patients receiving daily SMS reminders showed improved adherence scores but did not exhibit a corresponding improvement in viral load outcomes.

These mixed results underscore the need to examine intervention fidelity, message content, duration, and patient context. Nonetheless, the overall trend suggests that SMS reminders can contribute to improved viral suppression, particularly when implemented with behavioral reinforcement strategies and patient-centered tailoring.

### **Mechanisms Linking SMS Reminders to Viral Suppression**

Viral suppression is achieved when ART is taken consistently as prescribed, ensuring adequate drug plasma levels to inhibit viral replication [14, 15]. SMS reminders support this process through several interrelated mechanisms:

- i. **Improved Adherence:** The most direct pathway is through improved medication adherence. Daily reminders prompt patients to take their medication on time, reducing missed doses, which are strongly correlated with treatment failure and viral rebound.
- ii. **Enhanced Patient Engagement:** SMS reminders may serve as a proxy for care engagement [16]. They reinforce the patient's connection to the healthcare system and remind them of their ongoing treatment journey, fostering a sense of being monitored and supported.
- iii. **Behavioral Reinforcement:** Regular prompts may help establish a habitual medication-taking routine. Over time, this routine becomes internalized, promoting long-term adherence even beyond the intervention period.
- iv. **Health Literacy and Self-Efficacy:** SMS reminders that include motivational or educational content can enhance patients' understanding of ART and its importance, increasing their self-efficacy in managing their health [17].

- v. **Reduction in Stigma and Isolation:** For some patients, receiving health-related messages especially those framed positively can normalize the treatment experience and reduce feelings of isolation, which are known barriers to adherence.

Collectively, these mechanisms suggest that SMS reminders operate not only as reminders but also as behavioral and psychosocial enablers that indirectly promote virologic control.

#### **Factors Influencing Effectiveness**

Several factors modulate the effectiveness of SMS reminders in achieving viral suppression. These include message characteristics, patient demographics, psychosocial variables, and health system infrastructure.

- i. **Message Characteristics:** The frequency, timing, tone, and personalization of messages significantly influence outcomes. Personalized, motivational messages are generally more effective than generic reminders [18]. Interactivity such as two-way messaging may also enhance engagement and allow for real-time problem-solving.
- ii. **Patient Demographics:** Age, literacy level, and mobile phone access affect how messages are received and acted upon. Younger adults may respond more positively to digital prompts, whereas older individuals may require complementary support. Literacy and language barriers can impede comprehension and reduce message effectiveness.
- iii. **Psychosocial Variables:** Mental health status, perceived stigma, and social support modulate adherence behavior. Patients experiencing depression or internalized stigma may benefit less from reminders unless these psychosocial challenges are concurrently addressed.
- iv. **Health System Integration:** The effectiveness of SMS interventions is also contingent upon integration into existing care frameworks [19]. Messages that are coordinated with clinic visits, laboratory testing, and counseling sessions tend to have higher impact.
- v. **Technological Limitations:** Network unreliability, phone loss, and inconsistent access to mobile data or electricity can undermine the consistency and reliability of SMS interventions, particularly in rural or impoverished settings.

Understanding these moderators is essential for tailoring interventions to maximize their clinical impact and ensure sustainability.

#### **Ethical, Confidentiality, and Acceptability Considerations**

Despite their potential, SMS-based interventions raise important ethical and privacy concerns. HIV remains highly stigmatized, and inadvertent disclosure through mobile communication can have serious consequences for patients [20]. Thus, messages must be discreet, coded, or anonymized in ways that protect confidentiality without compromising clarity.

Acceptability studies generally report high levels of patient satisfaction with SMS reminders. Many patients appreciate the sense of support and routine they provide. However, concerns about message content being seen by others remain a deterrent, particularly in shared phone environments. Interventions must therefore strike a balance between being informative and non-intrusive.

Consent procedures must include clear communication about the nature of messages, potential risks, and options for opting out. Moreover, ethical oversight is needed to ensure that digital interventions are equitable, inclusive, and respectful of patient autonomy.

#### **Implications for Policy and Future Research**

The findings of this review hold several implications for policy, programming, and future research. Policymakers should consider incorporating SMS reminders as part of a broader adherence support package, especially in resource-constrained settings where healthcare personnel are limited [21]. Integration into national HIV programs could be cost-effective, particularly when bundled with digital health platforms already in use.

Future research should focus on:

- i. Head-to-head comparisons of different message types (e.g., motivational vs. neutral).
- ii. Longitudinal studies assessing sustained viral suppression beyond 12 months.
- iii. Cost-effectiveness analyses to guide health economics decision-making.
- iv. Exploration of adaptive SMS algorithms based on patient feedback and adherence data.
- v. Culturally sensitive message tailoring, especially in multilingual settings.

Furthermore, implementation science approaches should be employed to identify real-world barriers and facilitators, ensuring scalability and sustainability of interventions.

#### **CONCLUSION**

In summary, daily text message reminders represent a promising intervention for enhancing viral suppression among ART-naïve adults with HIV. Evidence from randomized trials and observational studies suggests that SMS-

based support can improve adherence, accelerate viral load decline, and reinforce health system engagement during the critical early stages of ART initiation. The intervention's low cost, scalability, and acceptability make it particularly suitable for low-resource settings. However, its effectiveness is moderated by several contextual factors, including message design, patient characteristics, and systemic constraints. Despite mixed findings across studies, the overarching narrative supports the integration of SMS reminders into comprehensive adherence strategies. To fully realize their potential, future implementations must ensure confidentiality, leverage behavior change theories and be responsive to user preferences and technological barriers. Importantly, SMS interventions should not be viewed as standalone solutions, but as complementary tools embedded within a continuum of care. As HIV treatment increasingly embraces digital health innovations, the use of mobile technologies offers a vital opportunity to bridge adherence gaps, improve clinical outcomes, and move closer to global targets for viral suppression. With thoughtful design and strategic integration, SMS reminders can serve as an effective conduit for transforming how adherence support is delivered to newly diagnosed individuals initiating ART.

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