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Assessing the Role of Digital Reminders in Enhancing Retention in Care Among Newly Diagnosed HIV Patients in Low-Resource Settings

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ABSTRACT

Retention in HIV care is a critical determinant of successful treatment outcomes, particularly in low-resource settings where structural, socioeconomic, and psychosocial barriers often impede sustained engagement. This review examined the role of digital reminders delivered through SMS, voice calls, or mobile applications in enhancing retention among newly diagnosed HIV patients in such contexts. Utilizing a structured narrative synthesis of findings from randomized controlled trials, cohort studies, and implementation research, the article explored the effectiveness, acceptability, and integration of digital reminders within health systems. Evidence suggests that digital reminders significantly improve appointment adherence, medication uptake, and engagement with health services by acting as cognitive prompts, enhancing motivation, and fostering patient accountability. Acceptability is generally high; however, concerns regarding confidentiality, cultural relevance, and message delivery modalities must be addressed to optimize impact. Integration with electronic health records and task shifting to community health workers have shown promise in improving sustainability and scalability. Despite technological and ethical challenges including digital literacy gaps, infrastructure limitations, and data privacy concerns digital reminders remain a low-cost, scalable intervention with transformative potential. The findings underscore the need for context-sensitive implementation and health system integration to fully realize the benefits of digital health tools in improving HIV care retention in underserved populations.

Keywords: Digital Health Interventions, HIV Care Retention, Low-Resource Settings, Mobile Health (mHealth), Newly Diagnosed HIV Patients.

INTRODUCTION

Despite remarkable progress in antiretroviral therapy (ART) and global initiatives such as the UNAIDS 95-95-95 targets, retention in HIV care remains a persistent challenge, particularly in low-resource settings [1–3]. Retention in care is crucial for achieving viral suppression, reducing transmission, and improving the quality of life among people living with HIV (PLHIV). However, numerous barriers compromise consistent care engagement, including geographic inaccessibility, stigma, inadequate health infrastructure, and socioeconomic vulnerabilities. These challenges are especially pronounced among newly diagnosed patients, who often experience a range of psychosocial stressors and informational deficits that hinder care continuity. In recent years, digital health technologies have emerged as promising tools for addressing healthcare delivery challenges in resource-limited settings [4]. Among these innovations, digital reminders delivered through mobile phones via SMS, voice calls, or mobile applications have gained prominence for their low cost, scalability, and adaptability [5–7]. These reminders serve to prompt appointment attendance, medication adherence, and routine laboratory testing, all of which are integral to sustained HIV care. The proliferation of mobile phone usage, even in impoverished regions, has further enhanced the feasibility of such interventions. This review critically examines the role of digital reminders in improving retention in care among newly diagnosed HIV patients in low-resource settings. Drawing upon empirical evidence from randomized

controlled trials, cohort studies, and implementation science research, it evaluates the effectiveness, acceptability, and contextual considerations of digital reminder systems. The review also explores the mechanisms through which reminders influence patient behavior, the integration of digital tools into existing health systems, and the ethical and infrastructural challenges inherent in deploying such interventions. By synthesizing current knowledge, this article aims to inform policy decisions, guide programmatic design, and advance the global discourse on leveraging digital health to strengthen HIV care cascades.

Understanding Retention in HIV Care

Retention in HIV care refers to the continuous engagement of patients in health services following an initial diagnosis and linkage to care [8, 9]. It encompasses regular clinic visits, consistent ART use, routine monitoring, and timely management of comorbidities. For newly diagnosed individuals, the period immediately following diagnosis is critical. During this phase, patients begin to navigate a complex landscape of emotional, medical, and social adjustments. Without sustained engagement, the risks of treatment default, disease progression, and HIV transmission increase significantly. Barriers to retention in low-resource settings are multifaceted. Structural barriers such as transportation costs, long travel distances to health facilities, and clinic congestion discourage frequent visits [10, 11]. On a systemic level, shortages of trained health workers, inconsistent drug supplies, and fragmented health information systems exacerbate the problem. Socioeconomic factors, including poverty, food insecurity, and employment instability, further limit patients' capacity to prioritize health care. Moreover, cultural beliefs and stigma associated with HIV deter individuals from disclosing their status or seeking support.

Interventions to improve retention must therefore be multifactorial, combining medical, social, and technological strategies tailored to local contexts. Digital reminders represent one such strategy with the potential to address several of these barriers in a cost-effective manner.

The Evolution of Digital Reminder Systems

Digital reminders have evolved from basic SMS messages to sophisticated mHealth platforms that provide two-way communication, automated scheduling, and integration with electronic health records [12, 13]. These systems can be tailored to individual preferences regarding language, frequency, and timing of messages. Importantly, digital reminders are designed to be unobtrusive, requiring minimal technological literacy while offering consistent support. The adoption of mobile phones has expanded dramatically across low- and middle-income countries (LMICs), including rural and underserved communities [14, 15]. The ubiquity of mobile networks and increasing smartphone penetration have created unprecedented opportunities for health communication. In HIV care, digital reminders have been employed to prompt clinic attendance, remind patients to take medication, encourage laboratory monitoring, and provide psychosocial support messages. Digital reminder systems may be implemented through unidirectional or bidirectional communication [16]. Unidirectional systems send automated messages without expecting a response, whereas bidirectional systems enable interaction between patients and healthcare providers or automated platforms. Evidence suggests that bidirectional systems may foster greater engagement by allowing patients to ask questions, reschedule appointments, or report side effects.

Effectiveness of Digital Reminders in Enhancing Retention

Numerous studies have demonstrated that digital reminders can significantly improve retention in HIV care [17]. Randomized controlled trials in sub-Saharan Africa have shown that SMS reminders increase appointment adherence and reduce missed visits among newly diagnosed patients [18, 19]. In Kenya, for example, SMS-based reminders led to a marked improvement in six-month retention rates compared to standard care. Similar results have been reported in Uganda, Nigeria, and South Africa. These improvements are attributed to several mechanisms. First, reminders serve as cognitive aids that counteract forgetfulness and competing priorities, especially in patients managing multiple life challenges. Second, they reinforce the perceived importance of care engagement and foster a sense of accountability. Third, personalized messages can offer emotional encouragement, reduce anxiety, and enhance motivation. While most studies report positive outcomes, variations exist depending on the frequency, content, and delivery mode of messages. Personalized, culturally sensitive, and contextually appropriate reminders yield better results than generic or overly frequent messages, which may be ignored or even cause irritation. Timing is also crucial; reminders sent 24 to 48 hours before an appointment are most effective.

Patient Acceptability and Preferences

The acceptability of digital reminders is generally high among patients, though preferences vary across demographic and cultural contexts. Qualitative studies indicate that patients appreciate the convenience, privacy, and reliability of mobile reminders [20]. Many reports feel cared for and supported, which enhances their trust in the healthcare system. However, concerns about confidentiality and unintended disclosure remain significant. In contexts where phone sharing is common or stigma is prevalent, patients may fear that messages could reveal their HIV status. To address this, programs often use neutral language or allow patients to customize message content.

Preferences regarding communication mode also differ. Some patients favor SMS due to its discreteness, while others prefer voice calls for their personal touch and ability to clarify information. Literacy levels, phone ownership, and network reliability influence these preferences and must be considered during program design.

Integration with Health Systems and Service Delivery

The successful implementation of digital reminder systems depends on their integration into existing health systems [21]. Standalone interventions may have limited sustainability and scalability. Integration allows for centralized monitoring, efficient data management, and consistent follow-up. Digital reminders can be linked with electronic medical records to automate scheduling, generate alerts for missed visits, and track patient outcomes. This integration enhances continuity of care and reduces administrative burdens on health workers. Furthermore, digital tools can support task shifting by enabling community health workers to manage reminders and follow up with patients using standardized protocols. Capacity building is essential to ensure healthcare providers understand and effectively use digital systems. Training should encompass technical skills, data security practices, and communication strategies. Additionally, ongoing technical support and infrastructure investments including mobile devices, software platforms, and connectivity are critical for sustained functionality.

Challenges and Limitations

Despite their promise, digital reminder systems face several challenges in low-resource settings. Technological barriers such as inconsistent network coverage, electricity shortages, and limited access to smartphones can impede effectiveness [22, 23]. Moreover, disparities in digital literacy may exclude vulnerable populations, including the elderly, those with low educational attainment, and rural residents.

Privacy and data protection are paramount. Health systems must implement stringent safeguards to prevent unauthorized access, data breaches, or misuse of sensitive information. Ethical considerations also arise regarding informed consent, autonomy, and the potential for digital surveillance. Sustainability is another concern. Many digital interventions rely on donor funding or pilot project frameworks, which may not be maintained long-term. For sustained impact, digital reminder systems must be embedded within national health strategies, with dedicated funding and policy support.

Innovations and Future Directions

Emerging innovations in digital health hold promises for enhancing retention in HIV care. Artificial intelligence and machine learning can be used to personalize reminders based on patient behavior and risk profiles. Mobile applications can offer interactive features such as educational content, peer support networks, and self-monitoring tools. The use of chatbots and automated voice assistants enables real-time interaction and information dissemination, even in low-literacy settings. Integration with social media platforms and community-based digital interventions can further extend reach and engagement. Public-private partnerships with telecommunications providers can facilitate cost-sharing, expand network coverage, and improve service quality. Governments and NGOs should also invest in digital health literacy programs to empower patients and communities. Ultimately, digital reminders should be viewed as part of a comprehensive, patient-centered strategy for HIV care [24]. When combined with other interventions such as peer counseling, community-based support, and differentiated service delivery, they can significantly improve retention outcomes.

CONCLUSION

Retention in HIV care remains a critical component of effective disease management and epidemic control, especially among newly diagnosed individuals in low-resource settings. Digital reminders offer a viable and impactful solution to bridge gaps in care by addressing logistical, behavioral, and psychosocial barriers to continued engagement. The evidence demonstrates that well-designed digital interventions can enhance appointment adherence, reinforce health-seeking behavior, and foster patient-provider communication. To maximize their effectiveness, digital reminders must be contextually tailored, ethically sound, and integrated within broader health system frameworks. Challenges related to infrastructure, privacy, and sustainability must be proactively addressed through coordinated efforts among stakeholders. As digital health continues to evolve, leveraging these tools with innovation and inclusiveness will be essential in advancing global HIV care and achieving equitable health outcomes for all.

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