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Effect of Telehealth Counseling versus In-Person Visits on ART Adherence Among Rural HIV-Positive Adults: A Review

Bwanbale Geoffrey David

Faculty of Pharmacy Kampala International University Uganda

ABSTRACT

Antiretroviral therapy (ART) adherence remains a cornerstone of effective HIV management, yet rural HIV-positive adults face numerous barriers including geographic isolation, transportation challenges, provider shortages, and stigma that hinder consistent engagement with care. In response, telehealth counseling has emerged as a potential alternative to traditional in-person visits, aiming to improve ART adherence through remote delivery of services such as video consultations, telephone support, and mobile health (mHealth) applications. This review critically evaluated the effectiveness, feasibility, and acceptability of telehealth counseling compared to in-person care among rural HIV-positive adults. A narrative review methodology was employed, synthesizing evidence from randomized controlled trials, observational studies, and program evaluations published in peer-reviewed literature. Findings suggest that telehealth can achieve adherence outcomes comparable to, or better than, in-person care, while also enhancing convenience, confidentiality, and care continuity. Patients report high satisfaction, and programs show promising cost-effectiveness, although disparities in digital access and literacy remain significant barriers. Hybrid models that integrate telehealth with periodic in-person contact may offer the most balanced approach. The review underscored the need for longitudinal studies, digital equity interventions, and policy frameworks to support widespread implementation. Leveraging telehealth effectively can advance HIV care equity, particularly in underserved rural communities, by overcoming structural and psychosocial barriers to ART adherence.

Keywords: Antiretroviral Therapy (ART) Adherence**,** Telehealth Counseling**,** Rural HIV Care**,** In-Person Clinical Visits**,** Digital Health Interventions.

INTRODUCTION

The advent of antiretroviral therapy (ART) has dramatically transformed the prognosis of individuals living with HIV, shifting the disease from a terminal illness to a manageable chronic condition [1–3]. Central to achieving viral suppression and reducing HIV-related morbidity and transmission is consistent adherence to ART. However, adherence rates remain suboptimal, particularly among vulnerable populations, such as rural HIV-positive adults [4, 5]. These individuals often contend with multifaceted barriers including geographic isolation, limited access to specialized care, transportation difficulties, and healthcare workforce shortages. Traditional models of HIV care, heavily reliant on in-person clinical visits, may inadequately address these logistical and systemic challenges.

In response to these barriers, telehealth defined as the remote delivery of healthcare services via telecommunications technology has emerged as a viable alternative for engaging rural populations in continuous HIV care [6, 7]. Telehealth counseling, which may include video consultations, telephone-based adherence support, and digital health applications, offers the potential to bridge geographic gaps, reduce travel burden, and increase care accessibility [8, 9]. As health systems worldwide pivoted toward telemedicine during the COVID-19 pandemic, the viability and scalability of telehealth in chronic disease management, including HIV, have garnered increasing attention. This review critically examines the comparative effectiveness of telehealth counseling versus traditional in-person visits in promoting ART adherence among rural HIV-positive adults. It synthesizes evidence from randomized controlled trials, cohort studies, and program evaluations, exploring both clinical and psychosocial outcomes. The review also

assesses the operational feasibility, acceptability, and cost-effectiveness of telehealth interventions, providing insight into their role in long-term HIV care strategies. Finally, it discusses gaps in the current literature and proposes directions for future research, particularly within the context of digital equity and rural health disparities. Understanding how telehealth can augment or potentially replace conventional care models is crucial for optimizing ART adherence and advancing health equity among rural populations.

Barriers to ART Adherence in Rural Settings

Rural communities face unique challenges in accessing HIV care, many of which directly affect ART adherence [10]. Geographic isolation often translates into limited access to HIV specialists and supportive services. Rural residents may have to travel significant distances to attend clinic appointments, which imposes time, financial, and logistical burdens that can deter regular healthcare engagement. This situation is further compounded by transportation shortages, seasonal travel hazards, and poor road infrastructure.

Stigma remains a pervasive issue in rural areas, where close-knit social networks and a lack of anonymity may dissuade individuals from seeking HIV services [11]. Fear of inadvertent disclosure can result in missed appointments, medication interruptions, or complete disengagement from care. Additionally, healthcare provider shortages in rural regions often lead to overburdened systems with limited appointment availability and inconsistent follow-up, compromising the continuity of ART management.

Socioeconomic disadvantages prevalent in many rural areas, including lower income levels, unstable housing, and limited digital literacy, further exacerbate non-adherence [12, 13]. Mental health comorbidities and substance use disorders both common among HIV-positive populations may be underdiagnosed and undertreated due to lack of integrated services, contributing to irregular medication use.

Addressing these multifactorial barriers requires innovative, context-sensitive interventions that prioritize accessibility, confidentiality, and continuous support. Telehealth counseling offers a promising solution to mitigate some of these obstacles, especially when designed with user-centered approaches that consider the rural context.

Telehealth Counseling: Models and Implementation in HIV Care

Telehealth in HIV care encompasses a broad array of services, including synchronous video consultations, asynchronous messaging, mobile health (mHealth) platforms, telephone-based support, and digital adherence monitoring tools [14, 15]. These models can be integrated into routine care as stand-alone interventions or as hybrid models complementing occasional in-person visits.

Synchronous video consultations allow real-time interaction between patients and healthcare providers, enabling clinical assessments, ART regimen reviews, and psychosocial support. They can replicate many elements of face-to-face care while eliminating the need for travel. Telephone-based interventions, while lacking visual cues, offer widespread reach and are particularly beneficial in areas with limited internet bandwidth or among individuals without access to smartphones or computers.

mHealth applications often incorporate features such as medication reminders, educational resources, mood tracking, and secure messaging with healthcare teams [16]. Some platforms employ artificial intelligence to identify adherence risks and tailor support accordingly. Digital adherence technologies such as electronic pillboxes and ingestible sensors offer objective adherence data, enhancing monitoring precision.

The successful implementation of telehealth counseling in rural HIV care hinges on several factors: infrastructure availability (internet, devices), provider training, patient digital literacy, privacy safeguards, and regulatory support. Culturally tailored interventions and community stakeholder engagement are essential to ensure that telehealth solutions are accessible, acceptable, and effective within rural populations.

Evidence of Telehealth Effectiveness in Improving ART Adherence

A growing body of empirical evidence supports the efficacy of telehealth counseling in enhancing ART adherence among rural HIV-positive individuals [17]. Randomized controlled trials have shown that telehealth interventions can achieve adherence outcomes comparable to, and in some cases superior to, traditional in-person care.

One landmark trial comparing video-based adherence counseling to clinic visits found no significant differences in viral suppression rates, suggesting that telehealth may serve as an effective alternative without compromising clinical outcomes. Participants in the telehealth arm reported higher satisfaction, reduced travel-related stress, and greater scheduling flexibility factors that may indirectly contribute to sustained medication adherence.

Telephone-delivered cognitive-behavioral therapy (CBT) interventions tailored for HIV patients have demonstrated improvements in both adherence and mental health outcomes [18]. These interventions are particularly relevant in rural settings, where mental health services are often scarce. In mHealth-based studies, participants receiving text-message reminders and mobile counseling showed higher ART refill rates and better self-reported adherence than control groups.

Several program evaluations have reported improved appointment attendance, reduced missed doses, and enhanced patient-provider communication in telehealth-supported cohorts. Notably, these benefits appear more pronounced among individuals with previously identified adherence challenges, highlighting the potential of telehealth to address high-risk subpopulations.

Despite these positive findings, variations in study design, sample size, and adherence measurement tools limit generalizability. Further, many studies focus on short-term outcomes; thus, data on long-term sustainability and durability of telehealth benefits remain limited.

Comparing Telehealth and In-Person Visits: Strengths and Limitations

When comparing telehealth counseling to in-person visits, both modalities present unique strengths and challenges. In-person visits facilitate comprehensive physical examinations, laboratory assessments, and immediate diagnostic interventions capabilities that telehealth cannot fully replicate [19]. Face-to-face interactions also enable the detection of subtle clinical cues and facilitate rapport building, particularly during initial encounters.

Conversely, telehealth provides unmatched convenience and accessibility for patients in remote areas. It eliminates geographic and transportation barriers, reduces time away from work or family responsibilities, and offers a discreet alternative to clinic-based visits particularly important in stigmatized conditions like HIV. Telehealth can also expedite care delivery by minimizing appointment wait times and enabling more frequent check-ins, which may enhance adherence monitoring.

From a healthcare system perspective, telehealth can optimize resource utilization, reduce overhead costs, and expand service reach [20]. However, disparities in digital access, technological literacy, and language proficiency may introduce new inequities, particularly among older adults, socioeconomically disadvantaged populations, and those with cognitive impairments.

In practice, hybrid care models that integrate telehealth with periodic in-person visits may offer the most balanced approach. Such models can ensure continuity of care while leveraging the strengths of both modalities, enhancing ART adherence without compromising care quality.

Acceptability and Feasibility of Telehealth Among Rural Populations

Patient and provider perspectives play a critical role in determining the success of telehealth initiatives [21]. Studies assessing telehealth acceptability among rural HIV-positive adults indicate high levels of satisfaction, particularly with convenience, confidentiality, and perceived autonomy. Patients often report feeling more in control of their care and appreciate the ability to communicate with providers in real-time without the stress of travel.

However, barriers to telehealth adoption persist. Limited broadband infrastructure in some rural areas, especially in low-income regions, restricts access to high-quality video services. Device affordability, technological complexity, and concerns over privacy may deter participation. Older patients or those unfamiliar with digital platforms may require additional support and training to engage effectively.

Healthcare providers also express mixed sentiments. While many acknowledge telehealth's potential to extend care reach and reduce missed appointments, concerns remain about reduced diagnostic capabilities, difficulty in building rapport, and liability issues. Provider training, institutional support, and clear telehealth protocols are essential to mitigate these concerns and facilitate smooth implementation.

Community engagement, including input from local leaders, patients, and advocacy groups, is vital for tailoring telehealth programs to meet specific needs. Pilot programs and feasibility studies can help identify logistical and cultural barriers early, allowing for adaptive design and improved uptake.

Cost-Effectiveness and Policy Considerations

Economic evaluations of telehealth interventions in HIV care suggest potential cost savings for both patients and healthcare systems [22]. Reduced travel expenses, fewer work absences, and decreased clinic operational costs contribute to the financial efficiency of telehealth models. From a systems perspective, the ability to manage larger patient panels and reallocate clinical resources enhances service capacity.

Policy frameworks must evolve to support telehealth integration. Reimbursement parity between telehealth and in-person visits, licensure flexibility for cross-state telemedicine, and inclusion of telehealth metrics in quality improvement benchmarks are essential for sustainable adoption. Privacy and data security regulations must be rigorously upheld to ensure patient trust.

Digital equity initiatives such as expanding rural broadband access, subsidizing devices, and providing digital literacy training are critical to preventing the exacerbation of health disparities. Public-private partnerships and targeted funding streams can accelerate infrastructure development and facilitate the scale-up of successful telehealth models.

Research Gaps and Future Directions

Despite promising findings, several gaps remain in the telehealth literature for rural HIV care. Longitudinal studies are needed to assess the durability of telehealth's impact on ART adherence and viral suppression over time [23, 24]. Standardized adherence metrics and robust comparative trials will enhance the validity and generalizability of findings.

Research should also explore the differential impact of telehealth across subgroups defined by age, gender, race, socioeconomic status, and comorbidities. Identifying who benefits most from telehealth can inform targeted interventions and resource allocation. Additionally, implementation science studies examining scalability, fidelity, and real-world barriers will provide practical insights for health system integration.

Finally, investigations into patient-reported outcomes, such as quality of life, stigma reduction, and care satisfaction, are essential to capture the holistic impact of telehealth on HIV care.

CONCLUSION

The integration of telehealth counseling into HIV care represents a transformative opportunity to enhance ART adherence among rural HIV-positive adults. By addressing geographic, logistical, and psychosocial barriers inherent in traditional in-person models, telehealth offers a flexible, patient-centered alternative that aligns with the unique needs of rural populations. Evidence to date suggests that telehealth interventions can achieve comparable or improved adherence outcomes, with additional benefits in convenience, confidentiality, and care continuity. While telehealth is not a panacea, its judicious implementation supported by infrastructure investment, provider training, and policy reform can substantially strengthen HIV care delivery. Hybrid care models that combine the strengths of telehealth and in-person visits appear particularly promising for optimizing adherence and health outcomes. Future research should aim to close existing evidence gaps, particularly regarding long-term effectiveness, subgroup responsiveness, and cost-efficiency. Policymakers and healthcare leaders must ensure that telehealth expansion does not exacerbate digital disparities but rather serves as a catalyst for more equitable and accessible HIV care. As the healthcare landscape continues to evolve, leveraging telehealth to support sustained ART adherence in rural settings represents not only a clinical imperative but also a public health opportunity to reduce HIV-related disparities and improve population health outcomes.

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