

Abstract

Background: The objective of this systematic review was to examine whether conversational mHealth will improve medication adherence and HIV disease outcome of people living with HIV (PLWH).

Methods: We conducted an exhaustive search for randomized controlled trials (RCTs) in the following databases: Cochrane Library, MEDLINE (Ovid), PubMed, and Embase. We assessed the papers against the primary outcome of medication adherence (measured by self-reporting, pill count, or pharmacy refill count), and HIV disease status (measured by CD4 count and viral load), as well as the secondary outcomes of mental health status (measuring stigma, depression, PTSD and psychological status), quality of life (QOL), and other additional measurements of drug and alcohol use. The quality of the included papers was assessed using the Cochrane Collaboration's Risk of Bias (RoB) tool.

Results: Out of a total of 12732 papers identified, 14 papers met the inclusion criteria, and were included in this review. The included papers reported either single or multiple interventions, with intervention type of pager, SMS, and smartphone application. The mHealth functionalities were reminder messaging, motivational messaging, and others. The technology used, dialogue management was either conducted as finite-state or frame-based. None of the included papers utilized an agent-based dialogue management method, such as the use of AI. As for medication adherence, four out of eight papers reported significant improvement in self-reported adherence, three of the four papers reported significant improvement in adherence as measured using the pill count, and two out of three papers indicated a significant improvement in medication adherence measured using the pharmacy refill rates ($p < 0.05$). As for HIV disease outcome, one paper reported a significant improvement in both CD4 count ($p = 0.03$), out of two papers, and viral load ($p = 0.04$), out of four papers. No significant associations were reported for secondary outcomes. The single

intervention of reminder messaging was the most effective in improving medication adherence and HIV disease outcome. Reports on adolescents and young adults also indicated significant effects in the primary outcomes. High-risk groups, such as men who have sex with men (MSM), illicit drug users, and alcohol-dependent PLWH, all demonstrated a significant improvement in both HIV disease outcomes and medication adherence.

Discussion: On the other hand, one strength is that our review is the first to date to explore the use of conversational mHealth for medication adherence and HIV disease outcome in PLWH. As an interpretation of the results, a majority of the included papers reported significant improvement of medication adherence and HIV disease outcomes with conversational mHealth, which are promising results. Significant results were reported for single-use of medication reminders, use in adolescents and young adults, as well as use in high-risk groups such as MSM and illicit drug users / alcohol-dependent population. The most effective functionality was reminder messaging. The most effective mechanism was the use of smartphones and pagers.

Conclusion: Conversational mHealth interventions have a promising impact on medication adherence and HIV disease outcome in PLWH. Although this area of study is still in its early stages, we foresee more RCTs on new innovative approaches of conversational mHealth, with the results showing a promising direction.

Keywords: mHealth, technology, HIV, medication adherence, HIV outcome measures, conversational agents, systematic review

Trial Registration: International Prospective Register of Systematic Reviews (PROSPERO); CRD42021258992