



State of the Science: The Efficacy of a Multicomponent Intervention for ART Adherence Among People Living With HIV

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Incorrect or inconsistent adherence to antiretroviral therapy (ART) compromises the effectiveness of medications and the patient's chances of achieving viral suppression; near-perfect (>95%) compliance is required for both immediate and long-term clinical success. This report presents a systematic review of a multicomponent intervention to address adherence to ART and explores whether this intervention, when compared with standard care, resulted in improved ART adherence. Eleven randomized controlled trial studies published between 1999 and 2008 were reviewed. Seven of these demonstrated a beneficial effect from multicomponent intervention, which primarily incorporated individual education and one to three additional interventions. Interventions targeting the improvement of the patient's medication management skills were particularly successful. However, because of incongruent results across studies, it could not be determined whether improved adherence extended to improved virologic or immunologic outcomes. There is a need for standardization and increased methodological rigor in the execution of adherence trials.

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Thanks to the availability and accessibility of antiretroviral (ARV) drugs, people living with HIV infection (PLWH) who adhere to their medications have experienced longer and healthier lives (Lucas,

2005). For short- and long-term clinical success, near-perfect adherence to ARV medication is required. In an observational study assessing the effects of different levels of adherence, individuals with 95% or greater ARV adherence rates had less virologic failure, greater increases in CD4+ T cells, and lower rates of hospitalization than those having less than 95% adherence to ARV medications (Paterson et al., 2000). In addition to individual success, the importance of ARV adherence also must be emphasized from the perspective of public health; a person who has developed drug resistance due to poor practices in medication adherence may infect others with a drug-resistant virus (Wainberg & Friedland, 1998).

Failure of ARV adherence is a major predictor of drug resistance. Unlike diabetes or hypertension medication, where one may recover the full benefit of medication by correcting partial adherence as soon as possible, the short half-lives of ARV drugs mean that even a few days of missed doses could adversely affect the opportunities for viral suppression and encourage the development of drug resistance (Funesti Esch & Frank, 2001; Williams, 2001). However, medication side effects, psychological factors, and the burden of taking large quantities of pills at regular intervals all have been shown to negatively impact adherence to antiretroviral therapy (ART), leading to a very low mean adherence rate (Miller et al., 2002). In one

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study of women living with HIV, the first month posted an adherence rate of 64%, which then dropped to 45% at the time of a 6-month follow-up measurement (Howard et al., 2002); in another study, the adherence rate over 1 week ranged from 53% to 60% among current and former drug users when measured by a medication event monitoring system (Arnsten et al., 2001).

The objective of this paper was to review the state of the science of a multicomponent intervention designed to improve ART adherence and to explore whether this intervention resulted in higher success rates when compared with standard care. The multicomponent intervention is defined and evaluated, the conceptual model of the review is presented, the theoretical rationale for a multicomponent intervention addressing ART intervention is reviewed, and outcomes across studies are reviewed and synthesized. Implications for future research and implementation in clinical practice are discussed in the conclusion.

Literature Search Strategy

Determining the state of the science of multicomponent interventions was undertaken by searching the computerized databases Medline, CINAHL, Cochrane CENTRAL, PsycINFO, EMBASE, and the National Guideline Clearinghouse, using the terms *adherence*, *intervention*, *HIV* or *AIDS*, *randomized controlled trials*, and *antiretroviral** or *ART*. Manual searching for studies relevant to the intervention was also used. The inclusion of an education program as a primary component in the multicomponent intervention was emphasized as a requirement for an article to be selected. Preference was also given when this component was combined with additional interventions. Studies using only motivational interviewing or cognitive behavioral intervention without an education program and those targeting children were excluded. In order to examine the most rigorous research in this area of science, only randomized controlled trials (RCTs) were included. Although no restrictions were placed on publication dates, only articles published after 1997 appeared in the search results. Out of 224 RCT studies, 11 articles, all published between 1999 and 2008 and including

2 pilot test studies, were chosen for review. One article was published in Spanish, so only the abstract was reviewed (Knobel et al., 1999).

Definition of the Multicomponent Intervention

The multicomponent intervention was defined as a program that incorporated an individual education component with between one and three additional interventions for the purpose of enhancing ART adherence among PLWH. Additional interventions might have included training in self-management skills, counseling, phone support, home visits, and/or offering a variety of aids, such as pill-sorting boxes and medication planners. The programs were presented in a clinic or hospital setting and were facilitated by a trained health care professional.

Conceptual Model of the Review

Figure 1 illustrates the conceptual model for the multicomponent intervention promoting ART adherence that was used by this review. Certain personal characteristics and environmental and social factors may act as moderating factors that influence health behaviors and ARV medications at an individual level (Fisher, Fisher, Amico, & Harman, 2006). Psychological health parameters, such as depression and substance use (e.g., alcohol, cocaine, heroin, or current intravenous drug use), when present at high levels, have consistently been found to negatively affect ART adherence (Holzemer, Henry, Portillo, & Miramontes, 2000; Murphy, Lu, Martin, Hoffman, & Marelich, 2002). Environmental and social factors include homelessness (Duran et al., 2001), childcare demands (Mellins et al., 2002), access to medical services (Murphy et al., 2002), and social support (Koenig et al., 2008). The multicomponent intervention is guided by the Information-Motivation-Behavioral Skills (IMB) model of adherence to ART to improve outcomes of adherence measurement, which is described in the following section. The intervention aspires to enhance ART adherence, increase CD4+ T cell counts, and decrease HIV RNA viral loads.

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