THE FEASIBILITY AND ACCEPTABILITY OF A MULTIMEDIA HEPATITIS C PREVENTION PROGRAM FOR HISPANIC HIV-INFECTED PERSONS

Angel M. Mayor, MD; Diana M. Fernández, EdD; Héctor M. Colón, PhD; James C. Thomas, PhD; Robert F. Hunter-Mellado, MD

Introduction: Hepatitis C (HCV) and HIV co-infection has emerged as a major health problem in Puerto Rico, particularly among injection drug users (IDUs). We developed and implemented a multimedia educational intervention for HIV-infected IDUs, based on the Health Belief Model and social cognitive theory.

Methods: To evaluate the program's acceptability, a group of 42 participants completed a written questionnaire immediately after each intervention component.

Results: Participants were 85% male, the mean age was 41.6 years (standard deviation 9.2 years), and mean educational level was ninth grade. More than 73% of respondents reported that the computer-based program was very easy to operate. More than 83% agreed that the audio and video tools highly facilitated their learning process, and >71% agreed that the sessions were long enough. Additionally, they reported a high incremental increase in perceived knowledge regarding HIV/HCV co-infection, HCV infection risk behaviors, HCV complications, HCV preventive measures, and HCV diagnosis and therapy. Most of the participants favored the dissemination of this intervention.

Conclusions: The study found a very good acceptability and feasibility of the computerized intervention in the study group. This new technology that includes audiovisual tools in its design kept the participants' attention and interest, while increasing HIV/HCV co-infection knowledge. Subsequent studies will evaluate the efficacy of this intervention, investigating changes in knowledge and risk behaviors among HIV-infected persons. (*Ethn Dis*. 2008;18[Suppl 2]:S2-195–S2-199)

Key Words: HCV/HIV, Prevention, Multimedia, Intervention, Feasibility

From the Retrovirus Research Center, Internal Medicine Department (AMM, DMF, RFH), Center for Addiction Study (HMC), Universidad Central del Caribe, School of Medicine, Bayamón, Puerto Rico; Department of Epidemiology, School of Public Health, University of North Carolina, Chapel Hill, North Carolina (JCT).

Address correspondence and reprint requests to: Angel M. Mayor, MD, MS; Retrovirus Research Center; Universidad Central del Caribe; School of Medicine; Call Box 60-327; Bayamón, Puerto Rico 00960-6032; 787-787-8722; 787-787-8733 (fax); amayorb@hotmail.com

INTRODUCTION

HIV infection has dramatically changed the morbidity and mortality profile throughout the world in the last two decades. After the introduction of highly active antiretroviral therapy, AIDS-related opportunistic conditions decreased, while chronic conditions such as hepatitis C virus (HCV) infection have become a major contributor to the disease prognosis among HIV-infected persons.[1–7] More than 200,000 HIV-infected persons are co-infected with HCV in the United States.[2–4] HIV and HCV are blood pathogens, and the practices and behaviors associated with injection drug use are their most common risk factors.[8–11] Most co-infected persons are injection drug users (IDUs).[1–3,8,9] Co-infected patients have a rapid progression to cirrhosis and end-stage liver disease.[5–9]

Puerto Rico ranked fifth in the incidence rate of AIDS (26.4 per 100,000) among all US states and territories.[12] Injection drug use is the most common mode of HIV transmission in Puerto Rico. HCV co-infection rates in IDUs may exceed 80% in Puerto Rico.[9] No previous prevention strategies directed to prevent HCV infection, reinfection, or superinfection in Hispanic HIV-infected IDUs has been reported in the literature.

In the absence of a vaccine or an effective prophylactic therapy for HCV infection, preventive strategies that limit the spread of these viruses needs to be considered.[12,13] The advances in new technology permit the use of multimedia to disseminate patient-education information.[14–16] Consequently, we developed a multimedia educational intervention for Hispanic IDUs with HIV. The current study evaluated the acceptability of this educational intervention among a group of HIV-infected persons.

METHODS

Study Enrollment

Individuals targeted for this intervention were HIV-infected IDUs attending the Retrovirus Research Center clinic in Bayamón, Puerto Rico, for HIV-related care from February through August 2006. Participants were escorted by a health educator to a private office where they completed two self-administered questionnaires that collected demographic, clinical, and behavioral data. After the enrollment and before each computerized intervention session, each participant received a 10-minute orientation on how to use the computer and navigate the program. Subsequently, they received the computer-based interventions under the supervision and assistance of the health educator. The first session was offered at study entry, and the others were offered two, four, and eight weeks later. Additionally, participants were tested for HCV at study entry.

Intervention

Theoretical Framework

The intervention was developed in PowerPoint software (Microsoft Corp., Redmond, Wash). All four sessions included text, cartoons, pictures and

an audio tutorial. Each session was designed to be completed within 25–35 minutes.

The theoretical frameworks guiding the intervention design were the Health Belief Model and social cognitive theory.[17–19] The Health Belief Model describes the relationships between essential factors involved in behavioral change. Of particular importance to our intervention were the personal motivations for behavior change, including perceptions of the risks and benefits of disease and behavior change. Our intervention sessions focused on increasing HCV knowledge, HCV susceptibility perception, and HCV protective measure efficacy.

Social cognitive theory addresses four components of learning: attention, retention, reproduction, and motivation. The multimedia used in our intervention attracts individual attention, thereby improving retention and the ability to reproduce or copy a modeled behavior.[18–19] Moreover, we anticipated that the four installments of the intervention would reinforce the messages, further enhancing retention, reproduction, and motivation for behavior change.

Intervention Content and Form

The first session was designed to increase the knowledge about HCV as a health problem and its adverse effects on the prognosis of HIV-infected patients. Its objective was to educate patients about hepatitis, especially that caused by HCV, its damage to the liver, and its negative effects on the HIV infection and its management. The topics covered in this session were 1) the role of the liver; 2) how hepatitis affects the liver; 3) HCV infection; and 4) HCV-HIV co-infection. The second session was designed to increase the perception of susceptibility to HCV infection. The topics covered in this session were 1) modes and routes of HCV transmission and 2) behaviors and practices that increase risk. The third session taught participants about HCV risk behaviors and prevention strategies. The session included the benefits of the prevention methods and common barriers to their implementation. The final session reinforced the importance of HCV prevention. It aimed to motivate the initiation or maintenance of these practices and reduce the barriers to their practice.

All four sessions were reviewed and evaluated before the beginning of the study by an expert panel composed of two primary physicians, one gastroenterologist and one education professor. The reviewers agreed that the intervention should be created in a simple way appropriate for people with little education. They concurred that the content and form of the intervention were adequate and covered the primary goals of the study.

Feasibility Evaluation

At the end of each of the four sessions, each participant completed a self-administered form asking about difficulties encountered in using the computer, comprehension of the audiovisual aids, question clarity, and session duration and content. They were also asked about their perception of knowledge gain regarding HCV/HIV co-infection, disease severity, diagnosis, risk behaviors, and treatment and prevention. The computer use responses ranged in a scale from 1 (difficult) to 3 (very easy). Agreement-type responses ranged from 1 (highly disagree) to 4 (highly agree). Knowledge improvement measures ranged from 1 (none) to 4 (a lot).

Statistical Analysis

The Statistical Package of Social Sciences (SPSS Inc., Chicago, Ill) program was used to conduct univariate and bivariate analyses. Univariate analysis was used to evaluate the percentage distribution of the feasibility and knowledge component in each of the four session or subgroups. Bivariate analyses with χ^2 and Fisher exact tests, using a two-tailed α level of .05, were used to evaluate and compare feasibility and knowledge differences between sessions. Differences were evaluated in the overall group and by subgroups, stratified by sex, age, educational level, and active injection drug use.

RESULTS

Study Enrollment

During the seven-month study period, 65 patients eligible for the study attended the clinic, 48 were asked to participate, and 42 completed the enrollment survey. Of the 42 HIV-infected participants, 36 (85.7%) were male, all had a history of injection drug use, and 36 (85.7%) were co-infected with HCV. The mean age was 41.6 years, with a standard deviation of 9.2 years. The mean educational level was ninth grade. Half of the participants (52.0%) reported injecting drugs in the last six months. All 42 participants completed the first intervention session, 39 completed the second, 38 completed the third, and 37 completed the fourth session.

Participant-Computer Interaction

None of the 42 participants reported computer experience before the intervention. Only one in five (21.4%) reported that it was very easy to use after the first session, but three quarters (73.0%) reported ease of use after the fourth session (Table 1). This difference was statistically significant and showed a significant linear trend. The difference remained significant when accounting for educational level and recent injection drug use (Tables 2 and 3).

Intervention Acceptability

Most participants (61.9%) initially agreed highly that this multimedia intervention facilitated their learning process, and this proportion increased significantly over the four sessions

Table 1. Percentage of respondents agreeing highly about acceptability of components of the intervention

Parameter	Session 1	Session 2	Session 3	Session 4
Computer very easy to use	21.4	43.6	44.7	73.0*§
Multimedia facilitate learning process	61.9	76.9	86.8	89.2*§
Audio aids facilitate learning process	59.5	76.9	81.6	89.2*§
Visual aids facilitate learning process	54.8	74.4	76.3	83.8*§
Adequate session duration	59.5	71.8	78.9	63.8§
Clear questions	61.9	76.9	89.5 §	NA
Confusion report	7.1	7.7	10.5	NA
Recommend intervention	61.9	74.4	73.7	93.8§
General HCV knowledge improvement	64.2	79.5	81.6	89.2§

* $P<.05$ for a difference between sessions.
§ $P<.05$ for a linear trend across the four sessions.

(Table 1). This difference and the linear trend remained significant after stratifying by educational level and recent injection drug use (Tables 2 and 3). A similar trend was observed when evaluating whether the audio aids used in each session facilitated the learning process; 59.5% highly agreed after the first session and 89.2% after the fourth session. This difference and the linear trend remained significant when stratifying by educational level and recent injection drug use. Likewise, when evaluating whether the visual aids facilitated the learning process, the percentage of high agreement increased significantly after each of the four sessions. The percentage difference and the linear trend remained significant after stratifying by educational level and recent injection drug use.

Most participants agreed highly that the duration of each session was adequate and agreed to recommend the intervention to others. Some recommended that the two last sessions be even longer.

Perception of Knowledge Improvement

Approximately 81%–95% of the participants reported that the intervention improved their knowledge of liver function, hepatitis, and hepatitis C infection (diagnosis, complications, and treatment) (Table 4). Similarly, they reported a significant improvement in their knowledge related to HCV risk behaviors after the intervention, particularly in injection drug use (94.0%). Participants also reported an increment in their knowledge regarding HIV-HCV co-infection, and its detrimental effects.

Perception of Reduction of Risky Behaviors

The areas of highest knowledge improvement were those related to injecting drugs (94.9%), inhaling drugs (89.7%), and sex (89.7%) and to their corresponding prevention risk reduction strategies (Table 4).

DISCUSSION

We have found this newly developed HCV computerized intervention to be a viable approach to health-related behavior changes in a high-risk Hispanic population. To our knowledge, no previous HCV educational multimedia interventions have been culturally adapted to the Hispanic population. As reported by others,[14–16] this type of intervention may improve health status in several major areas of care. Computer-based strategies offer an opportunity for systematically exposing high-risk individuals to individually relevant, effective health promotion messages.[14–16]

Table 2. Percentage of respondents agreeing highly about acceptability of components of the intervention, by session and educational level

	Groups of Education level by session			
	Session 1	Session 2	Session 3	Session 4
Parameter	<9/≥9	<9/≥9	<9/≥9	<9/≥9
Computer very easy to use	10.5/30.4	33.3/52.4	29.4/57.1	50.0*§/70.0¶
Multimedia facilitate learning process	52.6/69.6	55.6/95.2	76.5/95.2	76.5§/100.0¶**
Audio aids facilitate learning process	52.6/65.2	66.7/85.7	70.6/90.5	76.5§/100.0¶**
Visual aids facilitate learning process	47.4/60.9	61.1/85.7	70.6/81.0	70.6§/95.0¶
Adequate session duration	52.6/65.2	55.6/85.7	76.5/81.0	64.7/100.0¶**
Clear questions	47.4/73.9	61.1/90.5	76.5§/100.0¶**	NA/NA
Confusion report	5.3/8.7	11.1/4.8	5.9/14.3	NA/NA
Recommend intervention	52.6/69.6	66.7/81.0	70.6/76.2	64.7/100.0¶

* $P<.05$ sessions difference in persons with education level below ninth grade.
§ $P<.05$ linear trend in persons with education level below ninth grade.
¶ $P<.05$ linear trend in persons with education level ninth grade or higher.
** $P<.05$ sessions difference in persons with education level ninth grade or higher.

Table 3. Percentage of respondents agreeing highly about acceptability of components of the intervention, by session and active use of injection drugs

	Group of active injecting drug use by session			
	Session 1	Session 2	Session 3	Session 4
Parameters	Yes/No	Yes/No	Yes/No	Yes/No
Computer very easy to use	20.0/22.7	27.8/57.1	44.4/45.0	77.8*/68.4§¶
Multimedia facilitate learning process	60.0/63.6	61.1/90.5	88.9/85.0	83.3* **/94.7¶
Audio aids facilitate learning process	60.0/59.1	55.6/95.2	77.8/85.0	83.3* **/94.7¶
Visual aids facilitate learning process	50.0/59.1	55.6/95.2	72.2/80.0	77.8* **/89.5¶
Adequate session duration	55.06/63.6	55.6/85.7	72.2/85.0	72.2*/94.7
Clear questions	60.0/63.6	55.6/95.2	88.9* **/90.0¶	NA/NA
Confusion report	5.0/9.1	11.1/4.8	11.1/10.0	NA/NA
Recommend intervention	55.0/68.2	61.1/85.7	61.1/85.0	72.2*/94.7

* $P<0.5$ linear trend in active injection drug user (IDU) group.
§ $P<.05$ sessions difference in no active IDU group.
¶ $P<.05$ linear trend in age in no active IDU group.
** $P<.05$ sessions difference in active IDU group.

The present intervention may reduce HCV primary infection, as well as reinfection and superinfection, with the virus. In addition, improvement in HCV knowledge in already infected persons could reduce the spread of the virus to uninfected IDUs. Because knowledge improvement was measured through participants' perceptions, their reports could be affected by a desire to give socially desirable answers. Additionally, the small sample size could limit our findings. A pre- and post-intervention study is currently underway to objectively assess changes in HCV knowledge after the computer-based intervention.

These multimedia tools hold promise for filling a critical gap in HIV and HCV infection prevention. In Puerto Rico, most persons at risk for these conditions are Spanish speakers, medically indigent, and have a low educational level—all barriers that limit their access to adequate primary, secondary, and tertiary prevention. To address illiteracy, our intervention uses cartoons and pictures that illustrate the most common risky behaviors involved with preparing, using, and sharing drugs. To enhance understandability and acceptability, the intervention employs the most common jargon used by IDUs. The program is narrated by a Puerto Rican man in a local accent, which should decrease cultural communication barriers. These approaches could explain the high acceptance of the intervention despite participants' lack of formal education and prior computer experience.

IDUs characteristically have little patience, low concentration levels, and low self-esteem, characteristics that obstruct their ability to learn by reading. Consequently cartoons, pictures, and narration are important tools in the design and creation of effective educational intervention directed to this population. Computerized interventions more easily capture and maintain the participants' attention to the sessions. Higher attention and higher interest leads to knowledge improvement, as reported by the study participants. These findings endorse the potential benefits of multimedia programs to disseminate HCV prevention strategies in populations at high risk. Moreover, the participants' improved computer skills acquired through the sessions could increase self-esteem, which could, in turn, directly or indirectly enhance their learning capacity.

Table 4. Percentage of 42 respondents reporting knowledge improvement, by topic, after each intervention session

Topic	Improvement reported
Liver function	85.7
The meaning of hepatitis	83.3
What happens if one gets infected with HCV	83.3
How to diagnose HCV infection	88.1
How to treat HCV infection	85.7
The consequences of HCV infection	81.0
The consequences of HIV and HCV co infection	88.1
Injecting drug use risk behaviors for HCV infection	94.9
Sex risk behaviors for HCV infection	89.7
Tattoo and body piercing risk behaviors for HCV	87.2
Drug inhalation risk behaviors for HCV infection	89.7
Reduction of HCV injection drug risk behaviors	94.7
Reduction of HCV sex risk behaviors	89.5
Reduction of HCV tattoo and piercing risk behaviors	92.1
Reduction of HCV inhalant drug risk behaviors	94.7

HCV = hepatitis C virus

This multimedia intervention provides additional benefits to both healthcare providers and their patients. This electronic intervention could be disseminated inexpensively through the internet to a wide number of healthcare providers or health educators and then be used in clinics or other settings. For the patients, the intervention is private (requiring only interaction with a computer) and allows them to move at their own pace.

If this intervention decreases HCV infection among IDUs, it will lower the incidence in a hard-to-reach population and thereby decrease an intransigent health disparity.

ACKNOWLEDGMENTS

The present study was sponsored by the RCMI/NIH Grant number IU54RR0195071 and G12RR03035. We also thank Mayra Soto, the program case manager, and Christine Miranda, the program health educator, for their help and collaboration.

REFERENCES

1. Sherman KE, Rouster SD, Chung RT, et al. Hepatitis C prevalence among patients coinfected with human immunodeficiency virus: a cross-sectional analysis of the USA adult AIDS clinical trials group. *Clin Infect Dis*. 2002;34:831–837.
2. Dodig M, Tavill A. Hepatitis C and human immunodeficiency virus co-infection. *J Clin Gastroenterol*. 2001;33(5):367–374.
3. Alter MJ, Kruszon-Moran D, Nainan O, et al. The prevalence of hepatitis C virus in the United States, 1998 through 1994. *N Eng J Med*. 1999;341:556–562.
4. Armstrong GL, Wasley A, Simard EP, et al. The prevalence of hepatitis C virus infection in the United States, 1999 through 2002. *Ann Inter Med*. 2006;144:705–714.
5. Appel PW, Joseph H, Richman BL. Causes and rate of death among methadone maintenance patients before and after the onset of the HIV/AIDS epidemic. *Mt Sinai J Med*. 2000;67:4444–4451.
6. Dragoni F, Cafolla A, Gentile G, et al. HIV-HCV RNA load and liver failure in coinfected patients with coagulopathy. *Haematology*. 1999;84:525–529.
7. Soto B, Sanchez-Quijano A, Rodrigo L, et al. Human immunodeficiency virus infection modifies the natural history of chronic parenterally-acquired hepatitis C with an unusually rapid progression to cirrhosis. *J Hepatol*. 1997;26:1–5.
8. Bicca I, Mc Govern B, Dhar R, et al. Increasing mortality due to end-stage liver disease in patients with human immunodeficiency virus infection. *Clin Infect Dis*. 2001;32:492–497.
9. Perez CM, Suarez E, Torres EA, et al. Seroprevalence of hepatitis C virus and associated risk behaviours: a population-based study in San Juan, Puerto Rico. *Interna J Epidemiol*. 2005;34:593–599.
10. Centers for Disease Control and Prevention. Hepatitis C. In: *Sexually Transmitted Diseases Treatment Guidelines 2002. MMWR Recomm Rep*. 2000;51:64–66.
11. Centers for Disease Control and Prevention. Recommendation for prevention and control of hepatitis C (HCV) infection and HCV-related chronic disease. *MMWR*. 1998; 47(RR19).
12. Centers for Disease Control and Prevention. *Cases of HIV infection and AIDS in the United States and Dependent Areas*. 2005;17:28–29.
13. Centers for Disease Control and Prevention. Revised guidelines for HIV counseling, test and referral. *MMWR*. 2001;50:1–57.
14. Krishna S, Balas EA, Spencer DC, et al. Clinical trial of interactive computerized patients education: implications for family planning. *J Fam Pract*. 1997;45:25–33.
15. Bellis JM, Grimley DM, Alexander LR. Feasibility of tailored intervention targeting STD related behaviors. *Am J Health Behav*. 2002;26:378–385.
16. Revere D, Dumbar PJ. Review of computer generated outpatient health behavior intervention. *J Am Med Infrom Assoc*. 2001;8:62–79.
17. Rosenstock IM. The health belief model and preventive health behavior. *Health Educ Monogra*. 1974;2:354–386.
18. Bandura A. Human agency in social cognitive theory. *Am Psychol*. 1989;44:1175–1184.
19. Bandura A. *Social foundations of thought and action: a social cognitive theory*. 1st ed. Englewood Cliffs (NJ): Prentice-Hall; 1986.