

Text Messaging for Managing Chronic Disease: A Model for Tailored Health Communication



Managing a chronic disease can be difficult for anyone, including people living with HIV who need to adopt and maintain healthy behaviors and a medication regimen throughout their lifetimes. Mobile phone use shows promise in its application to support the management of chronic diseases.¹ Leveraging the availability, popularity, and functionality of mobile phones, a 2-year pilot project demonstrated that tailored text messaging can improve self-management of HIV/AIDS, reduce risky behaviors, and increase overall well-being.

Text messaging is a quick and convenient way to deliver targeted information via mobile phone to the right people, at the right time, using a simple yet highly effective technology. This project involved 52 HIV-positive men who have sex with men from the Chicago, Illinois, area and used tailored bidirectional text messaging to:

- promote medication adherence and appointment attendance;
- reduce risk-taking behaviors; and
- enhance social support, patient involvement, and general health and well-being.

A set of messages was developed for each of nine message topic areas (Figure 1). Prior to initiating the intervention, each patient completed a survey and a message tailoring form to provide demographic,

Figure 1. The Intervention's Nine Health Message Topic Categories with Message Examples

General Health & Well-Being	Moderate exercise may help you stay healthier longer. Go outside and play!
Social Support	Friends can be good medicine. If you need to talk, give a friend a call.
Patient Involvement	Ask for copies of your labs to take home.
Appointment Reminders	Remember your appt at [time] on [day]. Bring your questions. Call us at [number] if you can't make it.
Medication Adherence	Missing doses = missing out on better health.
Cigarette Smoking	Smoking doesn't make living any easier. Call 773-388-8865 for resources to help you quit smoking.
Sexual Risk Reduction	Undetectable is respectable, but your partners are still infectable. Play safe.
Substance Use Risk Reduction	Going out tonight? Be safe. Party smart.

technology use, medication adherence, HIV knowledge, and behavioral risk information. This information was used to develop a patient profile. Based on this patient profile, an automated message-tailoring algorithm was used to determine which messages to send to the patient and when. Additional information on medication adherence and risk behaviors was collected throughout the intervention using bidirectional or two-way interactive messaging, and was used to update patient profiles on a weekly basis.



A video highlighting the project is available at <http://healthit.ahrq.gov/AHRQHealthITSuccessStoriesUhrigVideo>

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Project Title: Using Short Message System to Improve Health Care Quality and Outcomes Among HIV-Positive Men

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Tailored, Interactive, and Dynamic Text Messaging Shows Promise

Dr. Jennifer Uhrig and her research team developed this intervention based on the idea that health care quality and outcomes are impacted by multiple interacting psychosocial factors. Psychosocial factors such as patient involvement, social support, medication adherence, and risk behaviors may in turn be influenced by the design and delivery of text messages. For example, the interactivity, frequency, timing, and tailoring of text messages may promote adherence to a medication regimen. These text messaging variables, or communication variables, play a role in how patients receive and respond to health messaging, and have the potential to positively influence psychosocial factors that promote health care quality and outcomes.

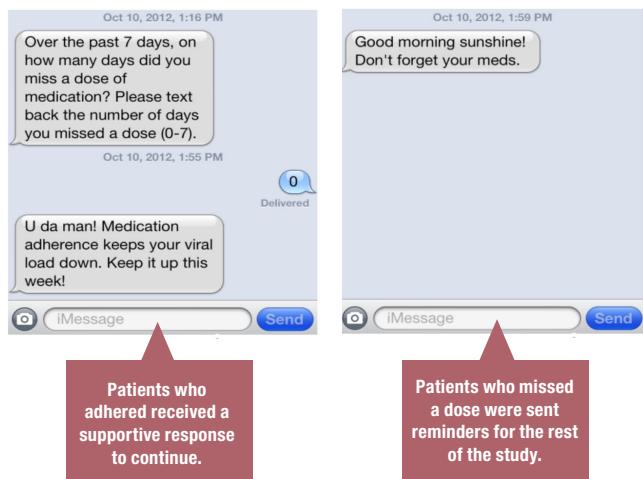
Designing the Intervention and Developing Message Content

The research team recognized that text message volume would not be enough on its own to effectively engage and motivate patients. The message content would also need to be adapted and customized to ‘speak’ to study patients, and the methodology had to be responsive to patients’ needs and preferences. To start, a set of HIV prevention-related messages were developed for nine intervention topic areas, such as medication adherence, appointment reminders, social support, and risk reduction (see Figure 1). Message topics and delivery were then customized according to individual patient profiles to ensure that patients received only messages relevant to them. For example, patients who reported smoking cigarettes on their baseline survey received a text message related to the negative effects of smoking or encouragement to quit every Thursday during the intervention—“Smoking weakens the immune system. Quit today for better health. Talk to your provider about treatment options.” Patients who reported that they do not smoke cigarettes on their baseline survey did not receive smoking-related messages during the intervention.

To further engage patients, secure bidirectional messaging was incorporated into the messaging regimen. Participants were prompted to respond to questions using predefined answers. This enabled interaction between the research team and patients for ongoing tailoring of messages and to facilitate data collection across a variety of topic areas such as medication adherence, sexual and substance use risk reduction, and satisfaction with the messages.

Patient profiles were used to determine the types of messages and the timing of their delivery to each patient. The customized messages were tailored by adapting the content to be responsive to individual patients’ needs and preferences. For example, every Sunday during the study patients were sent a text message asking how many days they missed a medication dose in the past week. Patients received a supportive automated reply on Monday, based on their response to the question; patients reporting perfect adherence received a supportive response to keep up the good work, while patients that missed one or more doses received a response encouraging them to comply with their medication schedule in the week ahead (Figure 2). If at any time a patient reported missing a dose of medicine, they were sent medication reminders up to three times a day, according to their individual dosing schedule, for the remaining duration of the study.

Figure 2. Example of Bidirectional Medication Adherence Messaging.



Tailored Text Messaging Motivates Change in Health Behaviors

HIV can be an isolating illness and complicated to manage. By developing a customized profile for each patient enrolled in the study and tailoring messaging based on that profile, the intervention was successful in engaging patients and gaining their buy-in. Patients in this study were highly receptive to both the messages and the intervention, and were motivated to adopt and maintain better health behaviors. Nearly all participants, 98 percent, indicated that the messages were easy to understand, describing them as accurate, believable, effective, clear, informative, interesting, and realistic.

Intervention text messages offered motivation, support, and health information—all tailored to individual patient profiles and behaviors during the study. The messages also provided a form of frequent and regular client-provider communication with day-to-day feedback and encouragement. As a result, clients demonstrated significant change in the following five key outcomes.

- **Medication Adherence Improved.** The patients who received medication reminder text messages reported a significant decrease in how often they missed a dose of medication.
- **Viral Load Decreased.** Overall, the average viral load of the study patients decreased significantly when comparing viral load levels at the start of the intervention to those at the end.
- **HIV Knowledge Improved.** Overall, average knowledge on HIV among study patients increased.
- **Social Support Increased.** While many patients entered the study reporting good social support

"I did like all of the positive encouragement, self-esteem booster messages."

Study Patient

systems in place, overall there was a significant increase in social support.

- **Number of Sex Partners was Reduced.** Patients reported a significant decrease in the number of sex partners in the past 3 months comparing self-reports from the beginning and end of the study.

Future Implications

Customized messaging shows promise for motivating patients to better manage their health. The project findings provide further support for the use of text messaging as an effective health information and communication tool, especially because it uses a widely available, relatively low-cost technology with potential for wide dissemination and reach. Building on this project, Dr. Uhrig and her team received funding from the Health Resources and Services Administration to develop a text message library and to implement and evaluate a text message intervention designed to improve medication adherence and retention in care among HIV positive racially and ethnically diverse youth as part of the UCARE4LIFE program. Text messaging interventions could also be applied to a range of health behaviors and chronic conditions; however, additional research is warranted to better understand how text messaging interventions can be modified to support patients and their health care providers across a variety of chronic conditions.

1 Boulos MN, Wheeler S, Tavares C, et al. How smartphones are changing the face of mobile and participatory healthcare: an overview, with example from eCAALYX. *Biomed Eng Online* 2011 Apr 5;10:24.

