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Original Research

The impact of tailored text messages on health beliefs and medication adherence in adults with diabetes: A randomized pilot study

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Abstract

Background: Inadequate medication adherence reduces optimal health outcomes and can lead to increased costs, particularly in patients with diabetes. Efforts to improve adherence have resulted in limited effects; approaches leveraging mobile technology have emerged, but their focus has mainly been limited to simple reminder messages.
Objective: The purpose of this pilot study was to test the effectiveness of tailored text messages focusing on improving medication adherence and health beliefs in adults with diabetes.
Methods: Adults aged 21–64, with uncontrolled diabetes, and taking at least one anti-diabetic medication were recruited and randomized into 2 study arms: daily tailored text messaging for 90 days or standard care. Comparing baseline and endpoint survey responses, changes in theory-driven health beliefs and attitudes were assessed. The impact on medication adherence was evaluated using pharmacy claims by calculating the percent of days covered (PDC).
Results: A total of 75 subjects were consented, and 48 were randomized. Mean PDC at baseline were comparable between cohorts (84.4% and 87.1%, respectively). Declines in adherence were observed in both groups over time but no significant differences were observed between groups or from baseline to the end of the active study period. Unadjusted tests suggested that perceived benefits and competence might have improved in the intervention arm.
Conclusions: Tailoring mobile phone text messages is a novel way to address medication nonadherence and health beliefs; further investigation to this combined technique is needed to better understand its impact on behavior change in adults with diabetes.

Keywords: Adherence; Tailoring; Mobile health; Self-management; Behavioral theory

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Background

Nonadherence to chronic medications is a prevalent public health issue in the United States, contributing to added costs and detrimental health outcomes. The extent of this issue varies widely by condition with estimates of nonadherence to long-term medication regimens ranging from 20 to 83%.[1] The landscape of nonadherence is especially problematic among patients with diabetes and is prevalent in those taking either oral medications or insulin. In this patient population, adherence may be as high as 98%, but estimates have been observed to be as low as 31% for oral medications while insulin regimens were found to have been adhered to only two-thirds of the time, on average.[2,3] The implications of such suboptimal adherence include a worsening of health status, as indicated by higher levels of hemoglobin A1C, as well as increased hospitalizations and all-cause mortality.[4,5]

Approaches aimed at improving adherence have evolved over time. Common strategies for supporting medication adherence have included provider follow-up,[6–10] patient education and coaching,[11–17] case management,[12,18,19] and reminders.[15,20,21] Across these intervention strategies improvements in medication adherence have been realized, but consistent change has not been observed and no dominant approach has emerged. Recently, mobile phone technology has been used as a means to target improved medication adherence, most commonly leveraging text message reminders to reach patients.[22–27] While improvements in adherence have been realized by solely focusing on such cues to action, mobile technology affords the medical community an opportunity to relay messages to patients beyond simple reminders and focus on other medication-taking barriers.

Having shown positive results in health-related behaviors, tailored messaging may be an approach to influence patients with diabetes to better adhere to their regimens based on added influences.[28,29] Tailoring identifies and then focuses communication on individual barriers and behavioral factors observed to impact a particular behavior. Studies using tailoring techniques aimed at improving medication adherence have shown mostly positive outcomes, and these results have become more consistent in recent years.[30–39] However, in studies involving patients with diabetes, the results have been mixed, suggesting the need for further inquiry.[11,40]

A limited number of studies have investigated the combined effect of both text messaging and tailoring on medication adherence and have shown promising results.[41–43] Franklin and colleagues examined the use of tailored text messages among pediatric patients with type one diabetes, and results demonstrated that this level of communication was accepted and could be effective in improving self-reported adherence.[44] What remains to be seen is whether the combined approach of tailoring and mobile phone message delivery can be an effective mode of behavior change in older and more diverse populations of patients with diabetes.

The purpose of this pilot trial was to test the effectiveness of tailored text messages on influencing patients' health beliefs and attitudes toward their condition and treatment which in turn could lead to improved medication adherence in adults with uncontrolled diabetes. In this study, tailoring was based on the Health Belief Model and Self-Determination Theory, the rationale for which has been presented elsewhere.[45] We hypothesized that the sending of daily messages focusing on either theoretical concepts known to influence medication or specific medication knowledge would lead to increased subject beliefs about their condition and treatment and result in improved adherence to pharmacotherapy.

Methods

Design

This pilot study was conducted between November 2012 and September of 2013 as a randomized controlled trial using 2 parallel arms: an active intervention arm that received a daily tailored message and a control arm that received standard care only. Approval to conduct this investigation was granted by an Institutional Review Board at the University of Michigan (Ann Arbor, MI) and Mercy Health Partners (Muskegon, MI).

Study population

Using electronic health records, adults (aged 21–64) with diabetes and a hemoglobin A1C of at least 8.0% (according to their most recent reading) were recruited from a western Michigan health system. Potentially eligible subjects were drawn from the health system's electronic health record system, contacted by mail, and given the option to opt out of being further contacted. Initially identified patients who did not opt out were contacted by phone, introduced to the study,