

CONNECTING PATIENTS AND DIABETES EDUCATORS VIA A MOBILE PHONE AND WEB-BASED TECHNOLOGY SYSTEM: Content Analysis of Portal Messages

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BACKGROUND

Diabetes Education and Technology

Diabetes education has been proven to improve clinical outcomes; however the number of people receiving diabetes education falls below the Healthy People 2010 objective of 60% (1, 2). This is not surprising, given that there are only 15,000 Certified Diabetes Educators in the United States but there are 23.6 million people living with diabetes in the United States and 1.6 million people newly diagnosed each year (1, 2). In order to improve this disparity, there is a need for the exploration of new models of diabetes education (3-7).

The current average for the number of patient visits per day for diabetes educators is between 2 and 10 (1, 3). Incorporation of technology into the existing model of diabetes education delivery has the potential to improve work flow efficiency, and enhance patient self-efficacy and disease management (5-9). However, healthcare professionals are often hesitant to adopt these technologies, citing the following barriers: loss of patient-provider rapport; increased workload and loss of productivity; and low patient utilization of technology (10-12).

Technology interventions should therefore attempt to incorporate into the existing healthcare professional workflow, allow patients and healthcare professionals to communicate easily, and avoid the need for patients to adapt to unfamiliar technology (6, 8,10). Due to the ubiquity of the mobile phone and the ability to reach various populations, technological interventions using mobile phones show promise for improving health outcomes (13-17). However, further research is needed in this area to understand the efficacy and effectiveness of such interventions on diabetes education.

OBJECTIVE

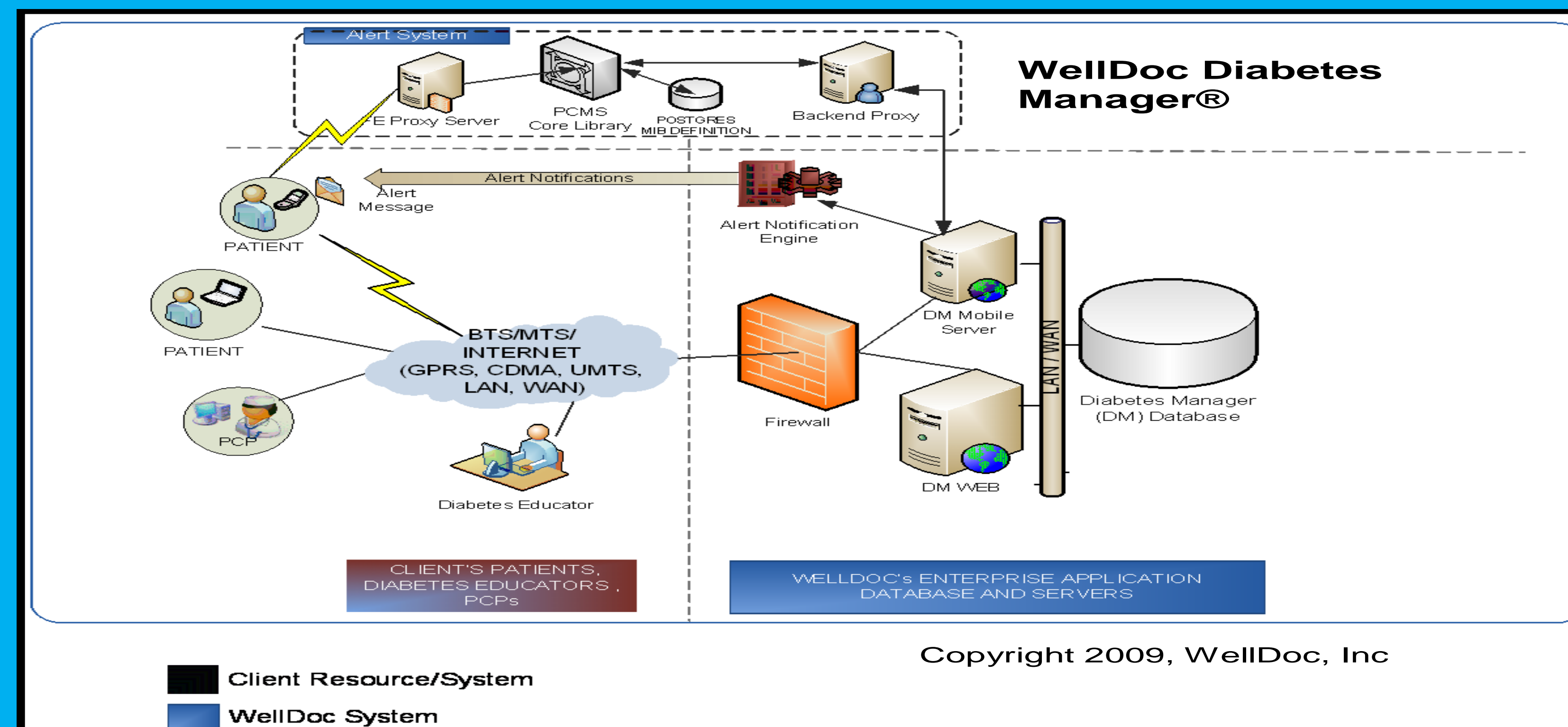
The objective of this study is to examine diabetes educator communication with patients who used DiabetesManager®, a mobile phone and web-based technology intervention designed to support diabetes self-management and enhance clinical efficiency. Detailed methods will be provided for conducting a content analysis to assess the frequency and completeness of communication between diabetes educators and patients and to identify message themes. Additionally, preliminary results are presented.

METHODS

Data are drawn from a larger randomized clinical trial to assess the impact of a diabetes communication system (DiabetesManager®) that uses mobile phones and patient/physician portals to allow patient-specific treatment and communication (18). Some participants were excluded secondary to issues of consent.

Participants used in this analysis were intervention patients with poor Type 2 diabetes control (A1c $\geq 7.5\%$) at baseline who received blood glucose meters with a one year supply of testing material, a mobile phone with a one-year unlimited data and service plan, study treatment phone software, and access to the web-based individual patient portal. For one year, patients were given system-driven automated guidance on blood glucose values based on disease status and medication regimen, in order to help them make sense of their blood glucose numbers.

METHODS (continued)



DiabetesManager® Platform

DiabetesManager® is a diabetes coaching system that uses mobile-phone and web-based technology to support patients with their total diabetes care by providing real-time, automated feedback and longitudinal data analysis and by facilitating secure electronic communication between healthcare professionals and patients. In addition to acting as a diabetes self-management coach, the mobile and web components also serve as an electronic logbook and personal health record system. There is also a web-based messaging center which serves two primary functions: 1) an inbox for the automated messages that are driven by the system analytics and 2) a secure messaging system that allows patients to communicate with healthcare professionals, including diabetes educators.

Role of Diabetes Educators

Diabetes educators periodically viewed patients' electronic logbook data and system-generated summary analysis reports. When appropriate, they communicated with patients via a web-based messaging center that delivered messages directly to the patient portal. Educators were discouraged from making outbound calls to patients as the primary form of communication. However, patients could reach out to diabetes educators as often as desired.

Content Analysis

Messages between patients and diabetes educators are analyzed to assess the frequency of communication between diabetes educators and patients, completeness of message responses, and identify most frequently occurring themes of message content.

All messages sent between patients and clinicians using the patient portal were compiled into a database. No unique identifiers were included in the database, as each patient was assigned a unique patient identification number and all messages were de-identified. Messages are being coded independently by two researchers and coding will be assessed for interrater reliability. Each message is coded as either a new message or a response message, and subsequently coded for up to 4 main content themes. Message themes were identified by the primary coder and agreed upon by the second coder. Responses to messages from patient to educator and educator to patient are assessed for completeness of the reply. Completeness is determined by whether or not the response addressed 50% or more of the content requested in the preceding message.

RESULTS

Results for this study are still being analyzed, however some preliminary findings are available. Almost all of the patients enrolled on the system responded to messaging from diabetes educators. There were several thousand messages sent using the portal, and several themes arose from these messages (Table 1). Some themes were mentioned more often than others, such as self-monitoring of blood glucose, use of medication, and nutrition related to carbohydrates.

RESULTS (continued)

Table 1. Themes Identified in Messages and Correspondence with AADE 7 Self-Care Behaviors Framework

Themes Identified in Content Analysis of Messages	AADE 7 Self-Care Behaviors Framework
Nutrition- Carbohydrates	Healthy Eating
Nutrition- Weight Management	Being Active
Physical Activity	Monitoring
Self-Monitored Blood Glucose	Monitoring
Blood Pressure	Monitoring
Use of Medication	Taking Medication
Dietary Supplements/Herbal Remedies	Taking Medication
Problem Solving	Problem Solving
Medical/Surgery Issues	Problem Solving
Labs	Reducing Risks
Visits with Healthcare Specialist	Reducing Risks
Feelings/Coping	Healthy Coping

CONCLUSIONS

Qualitative data collected from a technology platform such as DiabetesManager® can be useful in understanding the way diabetes educators and patients communicate using technology. Therefore, when analyzing this data it is important to use rigorous methods that can be replicated.

Preliminary analysis indicate that patients did utilize the mobile phone and web-based system to communicate with diabetes educators and some topics and themes are discussed more often than others. Furthermore, all the themes that arise in the content analysis fall into the AADE 7 Self-Care Behaviors framework. This demonstrates the ability for diabetes educators to cover multiple content areas when communicating with patients via an electronic messaging center.

Information from this analysis has the potential to inform on how systems such as this may be utilized to enhance the current model of diabetes education. These preliminary findings agree with previous research that found that diabetes education delivered via technology can fall into the guidelines for the AADE 7 Self-Care Behaviors framework (19). This is important, given the challenge healthcare professionals will soon face in attempting to reach the rapidly growing population of diabetes patients.

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