CareMessage Text Usage Increases Appointment Adherence in a Student-Run Free Clinic

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Abstract

Introduction: Keeping Neighbors in Good Health Through Service Clinic is a student-run, multidisciplinary free clinic dedicated to providing healthcare to uninsured, low-income patients in Central Florida. A quality improvement project was performed to decrease the rate of patient no-shows via altering the patient appointment communication method.
Methods: A needs assessment was performed from June 2017 to March 2018 (n=104 patients). The intervention was implemented over an 18-month period, from April 2018 to September 2019 (n=243 patients). The intervention changed the communication method with patients such that they received appointment reminder texts two days before their appointments and responded to confirm or cancel their appointments. Phone calls were used for rescheduling, confirming cancellations, or contacting patients who had not responded to the CareMessage text. The Mann-Whitney U test was utilized for comparison of appointment no-shows, number of phone calls made, and number of patients scheduled per clinic between pre- and post-intervention groups.
Results: The needs assessment showed that the average number of no-shows was 0.80 per clinic, while the average number of no-shows post-intervention was 0.26 per clinic (p=0.040). The average number of patients scheduled per clinic pre- and post-intervention was 6.90 and 7.84 (p=0.370), respectively. The average number of patients seen per clinic pre- and post-intervention was 5.93 and 6.74 (p=0.640), respectively. The average number of phone calls made weekly was 9.13 per clinic pre-intervention and 3.23 post-intervention (p<0.001).
Conclusion: CareMessage is effective in reducing appointment no-shows and the number of follow-up phone calls made for appointment reminders. This intervention is important for increasing patient continuity of care, access to care, and clinic efficiency.

Introduction

High numbers of patient appointment no-shows adversely impact clinic efficiency, productivity, and patient care. The increasing use of mobile technology, especially smartphones, has offered physicians a rapid and automated approach to patient communication. Multiple studies have demonstrated that text messaging reminder services in healthcare can significantly decrease the number of clinic appointment no-shows.[1-6] For instance, a meta-analysis reviewed a series of 18 randomized controlled trials and observational studies to assess patient attendance rates. They concluded that the use of text message reminders increased the likelihood of patient attendance by 50% when compared to control (no reminders).[2] When specifically examining underserved communities, a 2016 study explored the impact of text message reminders on appointment adherence in a community health center. They concluded that patients who received text message reminders had a lower proportion of appointment no-shows compared to those who did not.[7] However, there are only few studies that assessed the use and impact of mobile technology and text message reminder systems in free clinics serving low-income

populations.[7-9]

We sought to improve patient appointment adherence in order to improve clinic efficiency at the Keeping Neighbors in Good Health Through Service (KNIGHTS) Clinic, a student-run multidisciplinary free clinic that provides healthcare to uninsured patients living 200% below the federal poverty level in Central Florida. In the past, medical student care coordinators at KNIGHTS clinic confirmed patient appointments through direct phone calls. This mode of communication proved to be ineffective due to discrepancies between care coordinator and patient schedules, which often resulted in numerous patient no-shows and last-minute cancellations. CareMessage (CM) (2012, San Francisco, California) is a non-profit organization that developed a messaging platform in 2012 aimed at improving patient-provider communication in underserved healthcare settings. The CM platform allowed student care coordinators to reach patients with the Health Insurance Portability and Accountability Act protection on any mobile device in English or Spanish languages. This manuscript aims to evaluate the efficacy of the CM platform in improving patient scheduling and appointment confirmation for underserved populations in Central Florida.

Methods

KNIGHTS Clinic operates at Grace Medical Home (GMH), an establishment that provides comprehensive care for underserved patients in Central Florida. GMH provides the facility as well as necessary medical and laboratory supplies for the student-run free clinic. A total of 347 low-income, uninsured patients with scheduled primary care or specialty care appointments at KNIGHTS Clinic were involved in this quality improvement study. Clinic sessions were held on a bimonthly basis. During each clinic, up to 10 appointments could be scheduled. The study intervention involved full implementation of the CM text message system for confirmation of patient appointments. Of the total study population, 104 patients were studied prior to intervention over a 10-month needs assessment period (June 2017-March 2018), and 243 were studied post-intervention over an 18-month period (April 2018-September 2019). The inclusion criteria of the study consisted of established patients at KNIGHTS Clinic who signed up for receiving CM texts on their phones. No other opt-in process was required for signing up for receiving CM texts. Exclusion criteria consisted of patients who turned down or opted out of receiving CM texts as well as patients

Figure 1. Sample view of the CareMessage system

whose appointments were confirmed by staff of GMH instead of KNIGHTS Clinic.

A KNIGHTS Clinic CM account was made on the CM website. Patients were enrolled into the system by GMH when they signed up to receive CM texts. Appointment reminders were set up by inputting a patient's phone number as well as appointment date, time, and location. Automated appointment reminder texts were subsequently sent to patients two days prior to their appointments as follows: "Your appointment is on [day and date] at [time]. Text YES to confirm, NO to decline, or STOP." Patients whose primary or preferred language was Spanish received the reminders in the Spanish format. A status of "Going" seen next to the patient's name on the CM website indicated that the patient had confirmed their appointment A status of "Not Going" indicated that they had declined their appointment. If a patient did not respond to the message, a status of "No Response" was shown. A sample view of the CM system is shown in Figure 1. Phone calls were made via the Google Voice app (2019-2021, Google, Mountain View, California), and were only used for rescheduling, confirming cancellations, or contacting patients who had not responded to the CM text.

Patients' appointment statuses were collected directly from the KNIGHTS Clinic CM platform. Appointment attendance was then verified via the patient electronic medical records (EMR). The outcome variables of the study for both the needs assessment (pre-intervention) and post-intervention included the following: 1) average number of patients scheduled per clinic, 2) average number of patients seen during each clinic, 3) average number of appointment no-shows per clinic, 4) average number of confirmed and canceled appointments via CM, and 5) average number of phone calls made to patients weekly. Data

for each variable were collected via reviewing of the CM website and patient phone logs within the EMR. They were subsequently entered into Excel (Version 2203 Build 16.0.15028.20152, Microsoft, Redmond Washington) spreadsheets where access was limited to only those who needed it. No identifying patient information (e.g. name, demographics) was collected.

The study data did not meet the assumptions of normality based on the Shapiro-Wilk test; therefore, a non-parametric test was used for analysis. The Mann-Whitney U test was used for comparison of appointment no-shows, number of phone calls made, and number of patients scheduled per clinic between the pre- and post-intervention groups. All data were analyzed at the conclusion of the data collection using Excel. An of 0.05 was the threshold used to determine data significance. A statistician from the University of Central Florida College of Medicine was consulted for data analysis. The University of Central Florida Institutional Review Board office approved this study as not a human study research.

Results

During the needs assessment (pre-intervention), a total number of 104 patients (n=104) were scheduled for primary or specialty care appointments, with 89 patients seen at the clinic and 12 no-shows. After the intervention, a total of 243 patients (n=243) were scheduled, with 209 patients seen and 8 no-shows. A total number of 137 and 100 phone calls were made to patients pre- and post-intervention, respectively. The average number of phone calls made per patient was 1.32 pre-intervention and 0.41 post-intervention, with a 69% reduction in the number of phone calls made per patient. The average number of phone calls made weekly to patients was 9.13 pre-inter

Table 1. Data collected pre- or post-intervention

Variable	Number pre-intervention	Number post-intervention	P-value
Patients scheduled per day	6.93	7.84	0.370
Patients seen per day	5.93	6.74	0.640
No shows per day	0.80	0.26	<0.001
Phone calls made per week	9.130	3.230	0.040

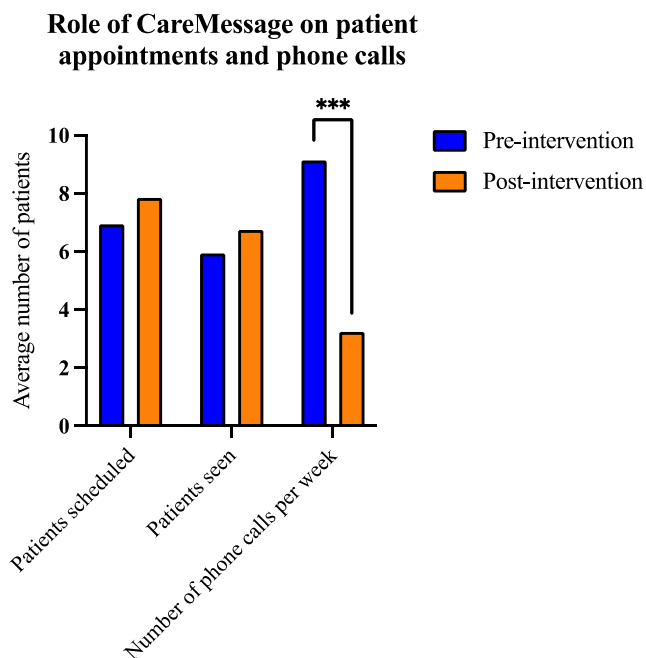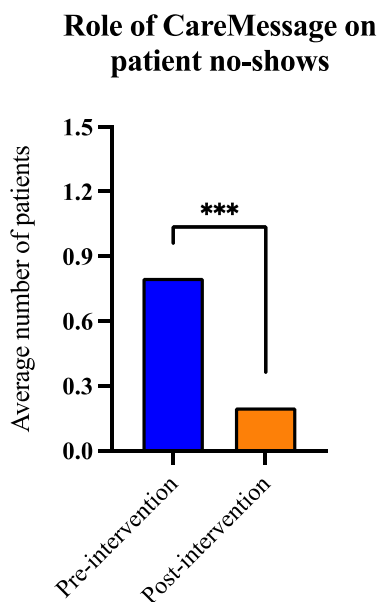**Figure 2.** The impact of CareMessage on the number of patients scheduled and seen and phone calls made per week

Role of CareMessage on patient appointments and phone calls

*** = p<0.050

Figure 3. The impact of CareMessage on patient no-shows per day

Role of CareMessage on patient no-shows

*** = p<0.050

vention and 3.23 post-intervention (p<0.001) (Table 1, Figure 2). The average number of patients scheduled per clinic pre- and post-intervention was 6.93 and 7.84 (p=0.370), respectively (Table 1, Figure 2). The average number of patients seen per clinic pre- and post-intervention was 5.93 and 6.74 (p=0.640), respectively (Table 1, Figure 2). The average number of appointment no-shows pre-intervention was 0.80 per clinic, while the average number post-intervention was 0.26 per clinic (p=0.040) (Table 1, Figure 3). The data suggest a 67.5% decrease in the number of appointment no-shows after the implementation of the CM text confirmation system.

Over the 18-month intervention period, a total of 223 CM text messages was sent to patients, with 150 confirmations and 25 cancellations via text. An average of 7.20 text messages were sent prior to each clinic. The average number of confirmed texts was 4.84 per clinic, and the average number of cancellation texts was 0.81 per clinic.

Discussion

Many studies have assessed the effect of text message reminder systems on clinic operations and patient continuity of care in various clinical settings. Text message reminders compared to telephone reminders are more cost-effective and have been shown to improve appointment attendance rates thereby allowing optimal routine care.[3,6,10] However, few studies have specifically assessed its application in underserved populations seen in student-run clinics. To the best of our knowledge, there have been minimal studies conducted by free or student-run clinics.[8] Previous research conducted with underserved adult patients in a community health center and low-income, minority pediatric patients in community-based clinics demonstrated significantly increased attendance to their appointments with text message appointment reminders.[7,9] Our project explored the role of the CM text confirmation system in reducing appointment no-shows among underserved patients. The study findings agree with those from other studies evaluating text message-based reminders in other primary and specialty care clinics.[1-8] In our student-run free clinic, the implementation of a text-based reminder system effectively reduced the number of appointment no-shows. In addition, the CM system resulted in fewer phone calls to patients

and more patients seen at the clinic each week. These findings suggest the increased efficacy of a text-based reminder system in comparison to other methods of communication such as direct phone calls and voicemails.

The observed increase in appointment compliance is likely related to increased patient convenience in responding to appointment reminders and text messaging being a preferred method of communication. Possible challenges with direct phone calls included conflicts with patient work schedules and subsequent inability to answer the phone, as well as discrepancies in the call-back numbers they received; some patients only had the direct line to GMH instead of KNIGHTS Clinic's own Google Voice number. Although there are multiple likely explanations, further study is required to explore reasons why patients prefer text-based reminders to conventional phone calls and voicemails. Additionally, a survey on patient satisfaction with the CM system could provide valuable information to optimize the platform at KNIGHTS Clinic. Other variables that may influence the reduction in appointment no-shows may involve scheduled care types or seasons. For instance, patients participating in follow-up or specialty care may be more likely to show up to their appointments due to the relationship they have established with the healthcare provider and the acuity of their medical condition, respectively. Patients may also be more likely to show up to appointments during the flu season. However, these variables are less likely confounders as the study data were collected year-round.

The CM system substantially decreased the average number of phone calls made weekly to patients which allowed for additional clinic preparation time and more scheduled patient appointments per clinic. The number of patients seen at each clinic did not change significantly; this could be attributed to attending physician no-shows. Additional research should be conducted to identify other contributing factors. The reduction in appointment no-shows enhanced patient continuity of care and access to care due to increased patient attendance at our clinic. Increased patient continuity of care may also improve patient care satisfaction; however, additional studies should be performed to examine the relationship

between continuity of care and patient satisfaction. The significant reduction in no-shows also provided more learning opportunities for students involved in patient care. Although not quantitatively measured, the CM system may also contribute to improved clinic workflow, as student care coordinators were able to assist the clinic staff with patient check-ins and registrations. Further research on the impact of the CM system on clinic workflow is necessary to support this conclusion and to explore the relationship between text reminders, enhanced patient outcomes, and student education.

An important limitation of this study is that no patient demographic data was collected since this study was originally a quality improvement project. An additional study incorporating patient demographics would allow for the assessment of the reproducibility of the results of this study and external validity. The CM platform does not indicate whether a patient has read the text message or not. Therefore, it could be difficult to determine whether a patient had a recent change in phone number, leading to loss to follow-up. The CM platform also does not show the percentage of patients who had opted out of receiving text messages, and no data was collected to indicate the percentage of patients who had opted in to receive text messages. Therefore, further evidence for the utility of this technology for most patients cannot be confirmed, but this can be addressed in future studies. Another important limitation of this study is the difference in sample size between the pre- and post-intervention groups. To address this limitation, a future study should enroll more patients and run for a longer duration to obtain more data. Further data collection and analysis would also increase the effect size of the study. Finally, although the study data demonstrated statistical significance in the reduction of appointment no-shows, the clinical significance of this result may be questionable as both pre- and post-intervention groups averaged <1 patient no-show per clinic day. However, the study data demonstrated both a statistical and clinical significance in the reduction of phone calls made weekly to patients.

The CM text message system is a simple application interface that sends scheduled and automated appointment reminder messages to

patients and allows for monitoring of patient responses. Clinics hoping to implement such a platform should keep in mind the following: 1) they must register patients for receiving CM texts on their phones; 2) they must verify that the patient's number is a mobile number and not a landline; 3) patients may opt out of receiving CM texts at any time by replying "STOP" to the text message system; 4) the clinic staff may communicate with patients directly in real-time to help address any concerns; 5) the system only provides automated messages in the English or Spanish language, thus messages sent to patients who are non-English or non-Spanish speaking must be individualized to their respective languages; and most importantly, 6) the elderly population may not have sufficient technological literacy, and proper education, such as via handouts, on operating text messaging applications on their phones must be provided to them if needed. Although beyond the scope of this study, the CM system also provides other forms of patient communication, including the ability to do the following: 1) deliver pre-appointment instructions such as fasting for laboratory blood draws; 2) collect patient satisfaction surveys regarding the use of the CM platform; 3) provide educational information to patients such as dietary restrictions appropriate for managing their blood pressure or smoking cessation; and 4) update patients on the status of their specialty referrals. The CM system could be used in the future at KNIGHTS Clinic to serve in other forms of patient communication, such as prescription pick-up and specialty referral reminders; additional studies should explore these potential uses.

Our quality improvement study demonstrates that implementing text-based clinic appointment reminders reduces the amount of time spent attempting to contact patients directly via phone calls, thereby creating additional clinic preparation time. More importantly, text message reminders decrease no-shows, thereby enhancing overall appointment adherence and patient access to care. While this finding has been studied in several clinical scenarios, our project is the first to explore the use of the CM system in the context of a low-resource patient demographic seen at a student-run clinic. Overall, the CM system may positively impact patient care

satisfaction, student learning, and clinic workflow; and further studies examining the relationships between the CM system and these factors are encouraged. We recommend this communication platform to other student-run free clinics that are looking to increase clinic efficiency and improve patient continuity of care.

Disclosures

The authors have no conflicts of interest to disclose.

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