



Background & Introduction

Non-adherence to medications is one of the largest drug-related issues in the world.ⁱ Adherence to medication is defined as the extent to which patients are able to follow the recommendations for prescribed treatments.ⁱⁱ Medication adherence is the act of taking medication on schedule or taking medication as prescribed. The reasons for non-adherence are complex and multi-dimensional, and may be related to the characteristics of the disease, medication side effects, duration of treatment, frequency of expected intake, complexity of treatment, or severity of the disease, among others.ⁱⁱⁱ Medication adherence refers to whether patients take their medications as prescribed, and whether they continue to take a prescribed medication over time. Consequences of non-adherence to medication include worsening condition, increased comorbid diseases, increased health care costs, and even death. Depending on the characteristics of the condition, the treatment, the patient and the setting, estimates of medication non-adherence rates typically range from 30% to 60%, with the non-adherence percentage being greatest when the patients are symptom-free. Further, when medication was to be taken over a long period, compliance rates drop dramatically to approximately 50% for either prevention or cure.^{iv}

Cellphones have emerged as a powerful tool to improve health care providers' ability to reach and engage vulnerable patient populations. Ninety percent of American adults own a cell phone and 81 percent use their cell phone to send or receive text messages.^v Given the widespread use of cellphones and the general public's comfort with text message, these devices are being used to remind patients to fill prescriptions or take prescribed doses, encourage them to adhere to their prescribed treatment and to promote healthy lifestyles. Research shows that many patients in low-income communities are interested in receiving health information and medication reminders via text message.^{vi} Driven by this research and data, AmeriCares and CareMessage teamed up in 2016 to implement a medication adherence texting pilot program in a cohort of free and charitable clinics ("FCCs") to address chronic disease management.

AmeriCares is a health-focused relief and development organization that responds to people affected by poverty or disaster with life-changing medicine, medical supplies and health programs. In the United States, AmeriCares partners with over 1,000 clinics, health centers and nonprofit behavioral health organizations in all 50 states and Puerto Rico who collectively serve nearly 6 million patients. AmeriCares is the largest distributor of the highest-quality medical aid to the poor and uninsured/underinsured in the U.S. and serve as the pharmaceutical industry's preferred program partner for domestic product distribution. Last year, the U.S. Program received medical donations from 58 corporate donors and distributed 3.46 million course treatments that benefited 236,000 people, valued at over \$200 million. AmeriCares supplements their gift-in-kind model by offering their free and charitable clinic ("FCC") partner network best-in-class health programming to address chronic diseases in low-income, uninsured patient populations.

There are approximately 1,400 FCCs in this country who together serve 2 million patients annually and provide 5 million visits.^{vii} FCCs are nonprofit organizations that rely heavily on private sources of funding and volunteer clinicians to provide a range of health services to uninsured and underinsured patients at little or no cost.

CareMessage is a nonprofit organization that developed an online patient engagement platform that enables safety net providers to have meaningful touchpoints with patient populations via text and voice messaging. Today, CareMessage supports over 200 safety net providers, including FCCs and federally qualified health centers ("FQHCs"), in streamlining administrative efficiencies with automated appointment reminders, increasing preventive screening rates with targeted reminders, and driving better health outcomes with automated text-based health education programs. CareMessage's suite of health education programs provide personalized and tailored content for 18 different conditions and wellness



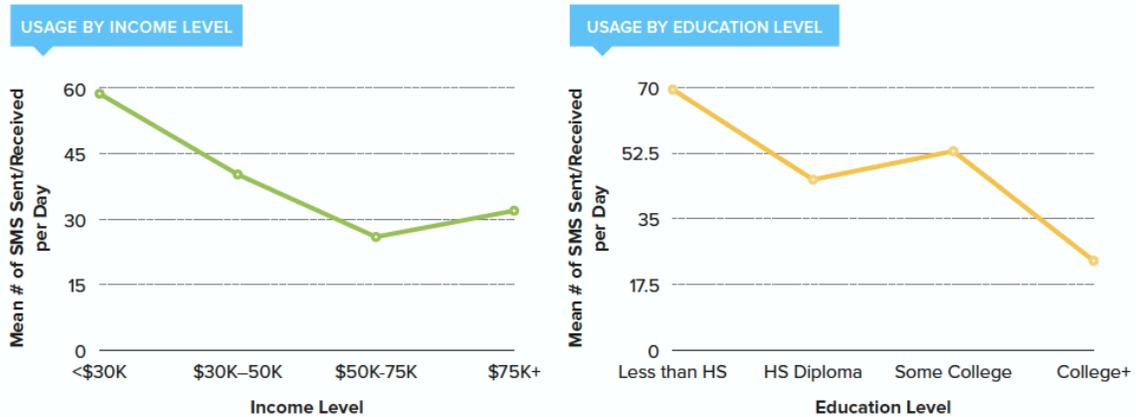
goals and are tailored to address the social determinants of health experienced by underserved populations. All CareMessage programs are developed below a 6th grade reading level and are available in English and Spanish. The organization’s main objective is to empower healthcare organizations to improve health outcomes and ultimately reduce the cost of care.

Pulling from the collective expertise of AmeriCares and CareMessage, the two organizations collaboratively developed a pilot program to address the management of chronic conditions in FCCs using text message technology: “The Medication Adherence Texting Pilot Program”. Launched in February 2016, the pilot program addressed medication adherence in a cohort of free clinic patients struggling with high cholesterol. As part of this program, each of the five participating clinics were charged with enrolling 20 patients each, or a total of 100 patients across five clinics. Each enrolled patient would receive a one-and-a-half-year supply of an expensive but highly effective cholesterol-lowering medication. *The Medication Adherence Texting Pilot Program* combined the donated medicine, medication reminders and adherence messaging with general educational and disease self-management content to promote positive behavior change for low-income patients living with high cholesterol. AmeriCares and CareMessage developed an evaluation plan to assess the impact the medication adherence texting program could have on vulnerable populations taking Crestor, the results of which are further detailed throughout this report.

Pilot Program

The pilot was driven by a mutual organizational interest in addressing both non-adherence and texting in the low-income, uninsured patients served by free clinics. Little is known about free clinics’ interest in and capacity for engaging in a texting technology initiative. Further, AmeriCares sought to study the role that a consistent supply of long-dated products might have on a patient’s medication adherence. We formed a partnership between CareMessage, AmeriCares, and long-time pharmaceutical donor to AmeriCares, to accomplish this goal.

Text messaging usage is **2-4x higher** in lower income, less educated populations, and has a **99% open rate**.



SOURCE: Smith, A., “Americans and Text Messaging” Pew Research Center. Sept 2011



High cholesterol was chosen as the specific issue to target vulnerable populations given high blood cholesterol is a major risk for heart disease.^{viii} Further, low-income individuals are 50% more likely than those who are wealthier or better educated to develop heart disease.^{ix} As a chronic condition, medication non-adherence with high cholesterol may be particularly acute given the ongoing medication regimen requirements coupled with the fact that patients with high blood cholesterol may be symptom free.

Hypothesis

In 2011, the Pew Research Center found that text message use is 2-4 times greater among less educated, lower income populations.^x This inversely proportional relationship is the foundation for CareMessage's strategy to increase communication between provider and patients seen in the safety net. Patients served by FCCs are overwhelmingly at less than 200% of the federal poverty level; thus, it was hypothesized that FCCs patients may also engage in texting at a higher rate than the general population.^{xi}

Methods

Americares disseminated a request for proposal ("RFP") to its partner network of about 500 FCCs and partnered with CareMessage to select five clinics to participate in this pilot program. Each clinic was offered a \$2000 stipend to offset a component of the costs associated with patient outreach and data collection. We believe this incentive increased the number of clinics who applied for the pilot, which in turn allowed us to be slightly more selective with which clinics were chosen to participate. We assessed applications with a weighted scoring system based on clinic's responses to several questions on:

- Clinic/ patient need
- Clinic staff's experience with implementing a technology initiative (other than electronic medical records)
- Experience and dedication of staff identified to implement and manage the pilot program
- Prescribed challenges of implementing a technology-based initiative and plans to mitigate those challenges

Based on these criteria, we selected the following clinics to participate in the pilot program:

- Community Health Care Clinic (Normal, IL)
- M-Power Ministries Health Center (Birmingham, AL)
- Metrocrest Free Clinic (Farmers Branch, TX)
- Pocatello Free Clinic (Pocatello, ID)
- Sumpter Free Health Clinic (St. Stephen, SC)

The 5 clinics range in size from 400 to 2,500 unduplicated annual patients for an average of 1,450 annual unduplicated patients, compared to the average of 1,796 unduplicated patients served by clinics across the country.^{xii} Budgets ranged in size from \$101,000 to \$900,000 for an average of \$457,716, compared to a mean budget of \$431,481 for FCC nationwide.^{xiii} These averages suggest that our clinic sample size was aligned with national averages.

Americares and CareMessage focused the medication adherence texting pilot on high cholesterol for a number of reasons. First, uninsured patients have more unmet health needs than insured patients. We saw this pilot as an opportunity to fill the gap of medication adherence for this underserved population.^{xiv} Medication non-adherence equates to an estimated \$100-\$300 billion dollars in wasted health care

Medication Adherence Pilot Texting Program



spending in the U.S.^{xv} In addition, both AmeriCares and CareMessage have extensive experience working with FCCs which primarily serve the uninsured.

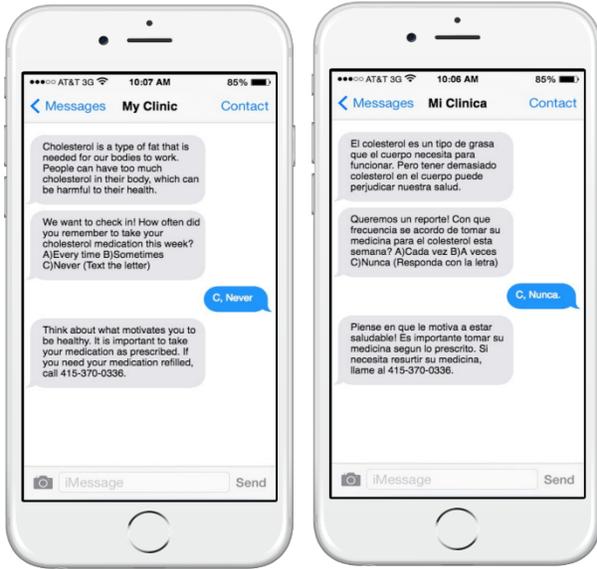
After collaboratively developing the Medication Adherence Texting Pilot Program, AmeriCares approached a long-time pharmaceutical partner to donate an initial 6 month supply of Crestor, a top-selling, high-cost and effective branded cholesterol-lowering medication. AmeriCares also provided each clinic with a \$2,000 grant to cover administrative fees and staff time associated with the pilot program. In addition, AmeriCares provided each clinic with \$500 in Walmart gift cards to use as patient incentives to encourage enrollment, and maintain high levels of engagement and responses throughout the texting

intervention. AmeriCares was not prescriptive with how each clinic should award the gift cards to patients; some used them as rewards at the end of the program, others gave them to patients throughout the project to encourage engagement and responses to the text messages.

A multidisciplinary team of physicians, psychologists, health educators and user-experience designers at CareMessage created the High Cholesterol Program used for this pilot. CareMessage offered their texting platform to the five participating clinics for free for the first year while this pilot program was under way. Patients were charged their standard messaging fees from their cell phone provider, which all prospective patients were informed of prior to joining the program. In order to meet the needs of patients at FCCs, all text messages in the pilot are written at a sixth-grade reading level or below and were available in both English and culturally-relevant Spanish. CareMessage also provided in-depth, individual trainings over the phone with each of the five clinics on using the CareMessage system on the back end. Technical assistance included adding and editing phone numbers and customizing messages. Further, CareMessage worked with each clinic in developing new processes for integrating texting technology into the patient experience. Workflow changes included presenting clinic patients with a CareMessage opt in business card at their visit or prescription pick up. Other adjustments ensured that nurses and care managers were aware of the texting platform and could explain the program to patients as part of check-ins.

To inform the design of the High Cholesterol Program, the CareMessage team leveraged portions of the Health Belief Model, which places value on condition knowledge, perceived severity, and self-efficacy. In addition, the program uses micro learning to break down complex condition information around HDL and LDL, the two types of cholesterol. Also, the program shared with patients a total of 12 low-fat cholesterol friendly recipes and provided messages on cholesterol-reducing foods, such as nuts, fish, and fruits and vegetables. Above all else, content across all CareMessage programs are written to build rapport with the patient, establish trust, and ultimately empower them to become better advocates for their care.

Medication Adherence Pilot Texting Program



Americares and CareMessage held monthly cohort calls with each of the five clinics to discuss changes to clinic processes and challenges in implementing the texting intervention. These calls also gave clinic staff an opportunity to speak with each other about their unique strategies for recruiting, engaging and retaining patients throughout the 6-month pilot and text message program.

Results

Each clinic was asked to recruit 20 patients to the program with elevated cholesterol levels in need of a cholesterol lowering medication for a total of 100 patients. Across the five clinics, a total of 86 patients were recruited, ranging from 11 patients on the low end to 22 patients per clinic. The range in recruitment was influenced by each clinic's availability to actively recruit patients coming in for appointments.

The aims of this pilot were to evaluate the following metrics: Response rate, retention rate, barriers to medication adherence, change in medication adherence, patient satisfaction with a texting program and LDL level, each further described below.

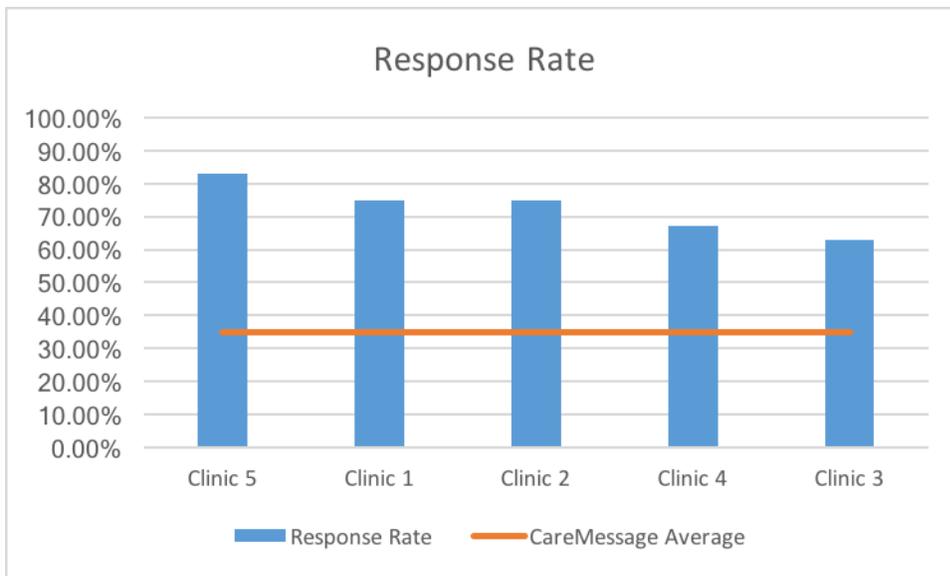
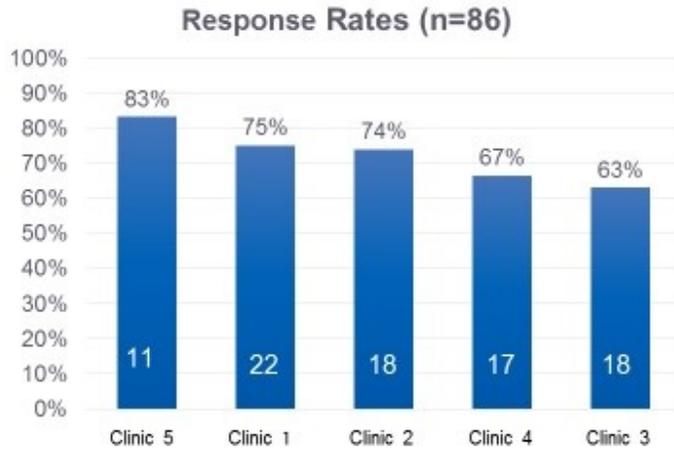
Response Rate:

Some of the text messages through the program were interactive questions in which the patient could respond with one of four options. Response rate was a valuable metric to track throughout the program because it spoke to the patients' engagement with the automated messaging content. The response rate was calculated as the percent of text messages that enrolled patients responded to. Since the High Cholesterol Program asked patient specific questions about medication adherence and behavior, a high response rate was critical to enabling providers with quick access to meaningful self-reported data. Across this program the average response rate was 76% which when compared to email communications (25% open rate^{xvi xvii}) is 51% higher.



Response Rates

Avg Response Rate: 72%



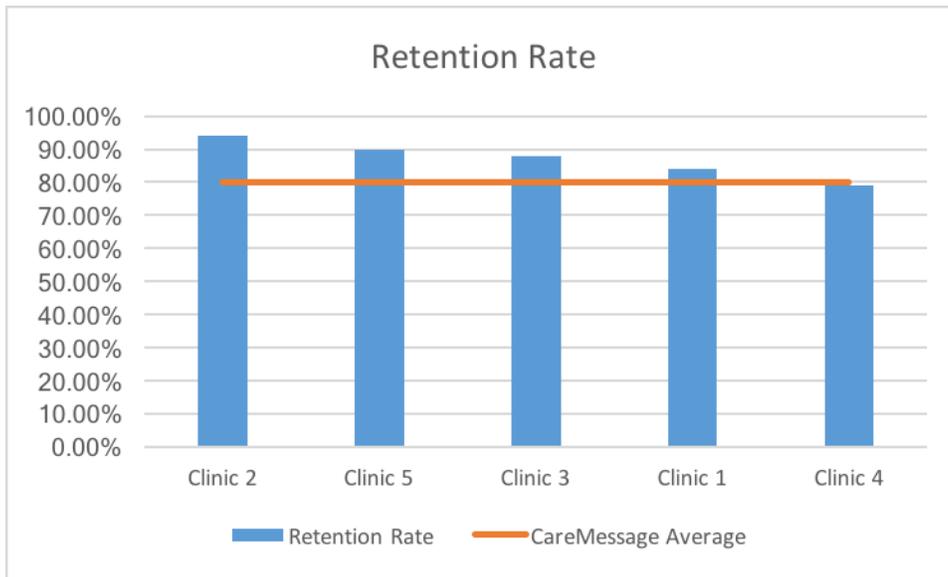
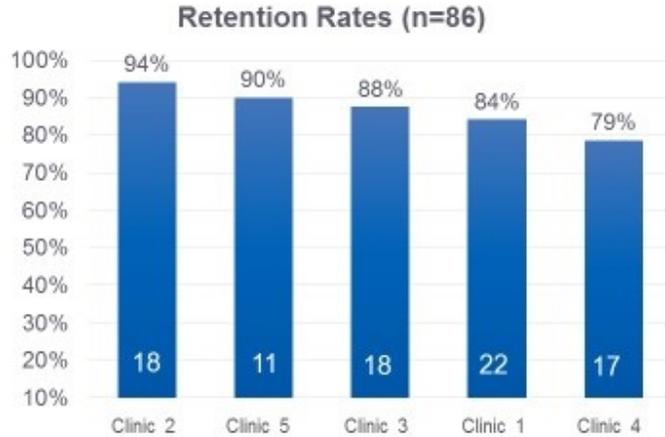
Retention Rate:

Retention rate was defined as the percent of participants who consented to the program and continued to choose to receive the text messages through the 6-month program. Patients had the opportunity to opt-out of the messaging at any time. CareMessage UX Research found that the main drivers for opting out of a program are caused when a patient: feels they don't have time for the messages, don't find the messages useful, felt they already had help on the topic, or if messages were received at an inconvenient time. Despite these drivers, the retention rate for this program was high. Average retention rate across CareMessage programs is 80% while this program had a higher than average retention rate at 87%:



Retention Rates

Avg Retention Rate: 87%



Barriers to Adherence:

The program content collected valuable insight from participating patients to better understand barriers to medication adherence. When asked what their largest contributing factor to non-adherence was, most responders indicated 'forgetfulness' (24%) as a main driver to their non-adherence, followed closely by cost (15%) and supply (9%). It is suspected that the 9% of participating patients who responded that 'supply' was their largest contributing factor to non-adherence did not interpret the question as being specific to the 25 week program. For example, it is possible that respondents had issues with supply prior to the pilot program, which included a 1.5 year supply of Crestor.



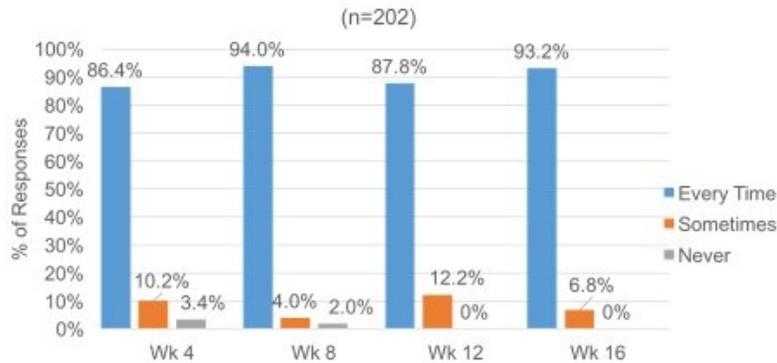
Changes in Medication Adherence:

The High Cholesterol Program also measured, over the course of 25 weeks, changes in self-reported medication adherence by repeating the following question, “Did you remember to take your medication this week?” at patients 4th, 8th, 12th, and 16th week intervals. Responses to this question were aggregated to demonstrate change across the larger pilot population.

While initial adherence was high, 86% of patients reported remembering to take their medication every time, there was a 6% increase in self-reported medication adherence over the length of the program.

Medication Adherence

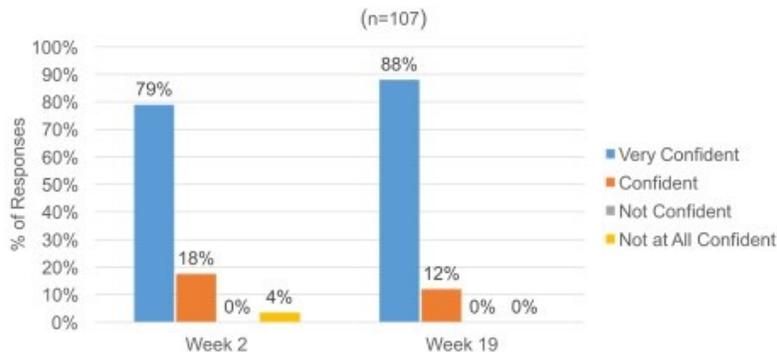
“How often did you remember to take your medication this week?”



Additionally, the percentage of patients who felt ‘very confident’ in their ability to take their medication as prescribed, increased by 9% over the duration of time they participated in the program.

Patient Confidence & Self Efficacy

“How confident are you that you can take your cholesterol medications as prescribed?”





Patient Satisfaction from Texting Program:

The User Satisfaction Survey, “USS”, was sent to participants at the end of the program. While some messages relate specifically to their condition, the five questions included in this survey (see below) help determine patient receptiveness to text message-based health education. There are five questions in the USS and participants only advance in the survey if they answer the previous question. Participants were generally satisfied with the texting program, although 17% of respondents agreed that they found the text

messages annoying. It is worth noting that question 4 is the only negative question in the USS series, suggesting that the 17% may be higher due to patients becoming accustomed to agreeing with questions.

User Satisfaction Survey (USS)

	Question	% Agreement (n)
1	I learned useful information from the text messages.	98% (46)
2	The text messages helped me better manage my high cholesterol.	95% (42)
3	I would recommend this texting program to a friend with high cholesterol.	98% (43)
4	I found the text messages annoying.	17% (7)
5	The text messages were clear and easy to understand.	93% (38)

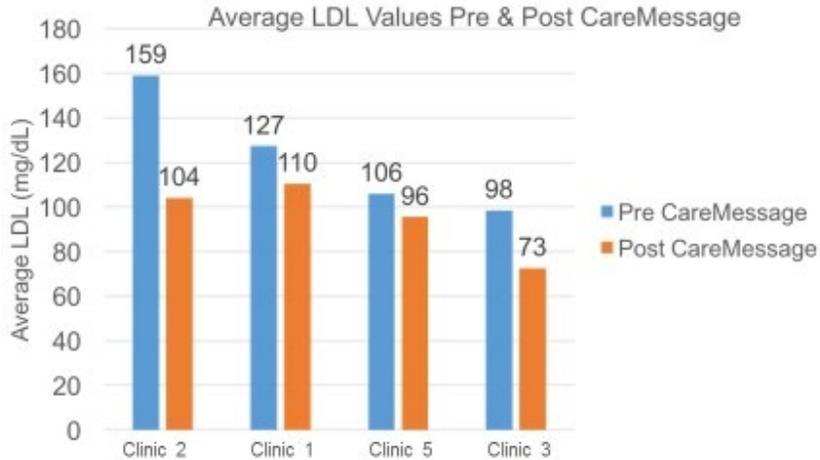
Patient testimonials: “I truly enjoyed the text of reminders and recipes.” Another Spanish speaker noted, “El programa es perfecta y muy buenos – gracias”.

LDL levels (pre/post)

In addition to metrics captured within the CareMessage platform, CareMessage ran a paired t-test to analyze LDL values measured from before and after the pilot. A statistically significant decrease in the LDL values pre-pilot was found (M=121.4 mg/dL, SD=59.38) and post-pilot (M=95.49 mg/dL, SD=36.41); t(40)=3.3816, p<0.005 suggesting that clinical outcomes can be tied to an intervention that provides both text message education and easy access to medication.



LDL Values



Pilot Limitations

Some pilot study limitations must be acknowledged. This pilot is not a research controlled study, therefore the level of rigor of both the implementation and analysis does not align with that of a study subject to peer review. Changes in LDL, for example, cannot be attributed to any single factor due to the inability to isolate effect. The pilot size was also small with 5 clinics and 86 patients. The study period was also relatively short at 6 months, mandated by budget limitations.

Conclusion

The Medication Adherence Texting Pilot Program with 86 FCC patients resulted in both response and retention rates significantly higher than industry averages, suggesting that low-income, uninsured and underinsured patients and safety net clinics are appropriate targets for medication adherence and health education texting platforms. The CareMessage platform proved to be positive from a patient experience perspective and texts were concurrent with an increase in patient’s confidence to manage their chronic condition. These intriguing findings lend themselves to further inquiry in safety net settings in which the effects of a texting platform are isolated.

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ⁱ World Health Organization report: http://www.who.int/chp/knowledge/publications/adherence_full_report.pdf

ⁱⁱ Hugtenburg, Jacqueline. Timmers, Lonke. Elders, Petra JM. Liset van Dijk, Marcia Vervloet: Patient Prefer Adherence. Definitions, variants, and causes of nonadherence with medication: a challenge for tailored interventions. 2013; 7: 675–682. Published online 2013 Jul 10. doi: 10.2147/PPA.S29549

ⁱⁱⁱ Ibid from article above by Jacqueline, G.

^{iv} Brown, Marie T., and Jennifer K. Bussell. “Medication Adherence: WHO Cares?” *Mayo Clinic Proceedings*, vol. 86, no. 4, 2011, pp. 304–314., doi:10.4065/mcp.2010.0575.

^v Duggan, Mauve. *Cell Phone Activities 2013*. Pew Research Center’s Internet & American Life Project. Washington, DC: September 16, 2013.

^{vi} Ahlers-Schmidt, CR. *Low-Income Urban Latino Parents’ Perceptions of Immunization Text Reminders*. US National Library of Medicine National Institutes of Health, www.ncbi.nlm.nih.gov/pubmed/24804372.

^{vii} Darnell, J.S. and Obrien, L. “How are free and charitable clinics faring under the Affordable Care Act? Results from a national survey.” American Public Health Association Annual Meeting, November 3, 2015, Chicago, IL, Conference Presentation. Available from <https://apha.confex.com/apha/143am/webprogram/Paper317629.html>.

^{viii} <http://www.nhlbi.nih.gov/health/resources/heart/heart-cholesterol-hbc-what.html>

^{ix} <http://www.medicalnewstoday.com/articles/233456.php>

^x <http://www.pewinternet.org/2011/09/19/americans-and-text-messaging/>

^{xi} Darnell J.S. Free Clinics in the United States: A Nationwide Survey. (2010). *Archives of Internal Medicine*, 170(11), 946-953.

^{xii} Darnell, J.S. and Obrien, L. “How are free and charitable clinics faring under the Affordable Care Act? Results from a national survey.” American Public Health Association Annual Meeting, November 3, 2015, Chicago, IL, Conference Presentation. Available from <https://apha.confex.com/apha/143am/webprogram/Paper317629.html>.

^{xiii} Ibid Darnell

^{xiv} Ayanian JZ, Weissman JS, Schneider EC, Ginsburg JA, Zaslavsky AM. *Unmet health needs of uninsured adults in the United States*. *JAMA*. 2000;284(16):2061–9.

^{xv} Mcguire, Maura, and Iuga. “Adherence and Health Care Costs.” *Risk Management and Healthcare Policy*, 2014, p. 35., doi:10.2147/rmhp.s19801.

^{xvi} Chaffey, Dave. *The Best Email Statistics Sources to Benchmark Open and Clickthrough Rates for Your Email Campaigns in the UK*. Smart Insights, 2 June 2017, www.smartinsights.com/email-marketing/email-communications-strategy/statistics-sources-for-email-marketing/.

^{xvii} Open rate in email communication is the act of opening up an email. In text message communication, open rate is ‘read receipt.’ Our pilot did not capture this metric.