

Use of Mobile Messaging System for Self-Management of Chemotherapy Symptoms in Patients with Advanced Cancer

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The use of an automated text messaging intervention provided a cost-effective option for symptom management for patients experiencing cancer-related symptoms.

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Cancer and cancer-related treatment can cause a myriad of adverse effects.^{1,2} Early identification and management of these symptoms is paramount to the success of cancer treatment completion; however, clinic and telephonic strategies for addressing symptoms often result in delays in care.¹ New strategies for patient engagement in the management of cancer and treatment-related symptoms are needed.

The use of online self-management tools can result in improvement in symptoms, reduce cancer symptom distress, improve quality-of-life, and improve medication adherence.³⁻⁹ A meta-analysis concluded that online interventions showed promise, but optimizing interventions would require additional research.¹⁰ Another meta-analysis found that online self-management was effective in managing several symptoms.¹¹ An e-health method of collecting patient self-reported symptoms has been found to be acceptable to patients and feasible for use.¹²⁻¹⁴ We postulated that a mobile text messaging strategy may be an effective modality for augmenting symptom management for cancer patients in real time.

In the US Department of Veterans Affairs (VA), “Annie,” a self-care tool utilizing a text-messaging system has been implemented. Annie was developed modeling “Flo,” a messaging system in the United Kingdom that has been used for case management of chronic obstructive pulmonary disease, heart failure, stress incontinence, asthma, as a medication reminder tool, and to provide support for weight loss or post-operatively.¹⁵⁻¹⁷ Using Annie in the US, veterans have the ability to receive and track health information. Use of the Annie program has dem-

onstrated improved continuous positive airway pressure monitor utilization in veterans with traumatic brain injury.¹⁸ Other uses within the Veterans Health Administration (VHA) include assisting patients with anger management, liver disease, anxiety, asthma, diabetes, HIV, hypertension, weight loss, and smoking cessation.

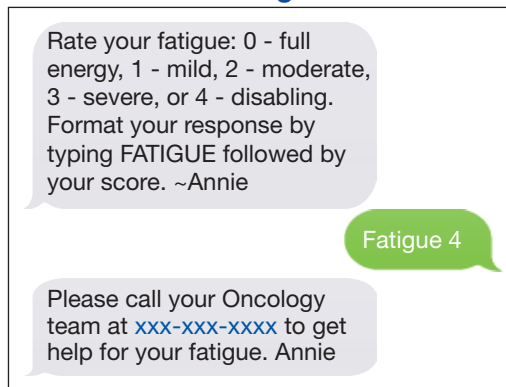
METHODS

The Hematology/Oncology division of the Minneapolis VA Healthcare System (MVAHCS) is a tertiary care facility that administers about 260 new chemotherapy regimens annually. The MVAHCS interdisciplinary hematology/oncology group initiated a quality improvement project to determine the feasibility, acceptability, and experience of tailoring the Annie tool for self-management of cancer symptoms. The group consisted of 2 physicians, 3 advanced practice registered nurses, 1 physician assistant, 2 registered nurses, and 2 Annie program team members.

We first created a symptom management pilot protocol as a result of multidisciplinary team discussions. Examples of discussion points for consideration included, but were not limited to, timing of texts, amount of information to ask for and provide, what potential symptoms to consider, and which patient population to pilot first.

The initial protocol was agreed upon and is as follows: Patients were sent text messages twice daily Monday through Friday, and asked to rate 2 symptoms per day, using a severity scale of 0 to 4 (absent, mild, moderate, severe, or disabling): nausea/vomiting, mouth sores, fatigue (Figure 1), trouble breathing, appetite, constipation, diarrhea (Figure 2), numbness/tingling, pain. In

FIGURE 1
Text Message Prompt for Assessment of Fatigue



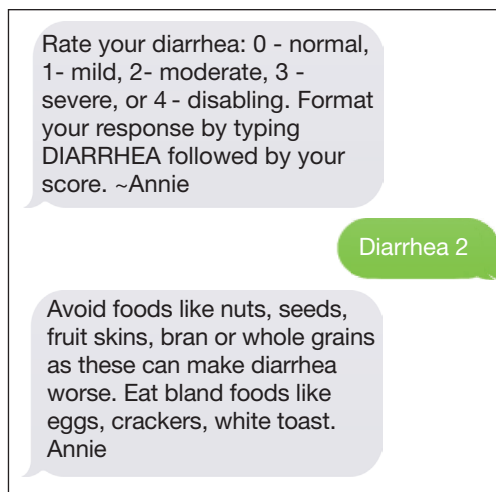
addition, patients were asked whether they had had a fever or not. Based on their response to the symptom inquiries, the patient received an automated text response. The text may have provided positive affirmation that they were doing well, given them advice for home management, referred them to an educational hyperlink, asked them to call a direct number to the clinic, or instructed them to report directly to the emergency department (ED). Patients could input a particular symptom on any day, even if they were not specifically asked about that symptom on that day. Patients also were instructed to text, only if it was not an inconvenience to them, as we wanted the intervention to be helpful and not a burden.

RESULTS

Through screening new patient consults or those referred for chemotherapy education, 15 male veterans enrolled in the symptom monitoring program over an 8 month period. There were additional patients who were not offered the program or chose not to participate; often due to not having texting capabilities on their phone or not liking the texting feature. The majority of those who participated in the program ($n = 14$) were enrolled at the start of Cycle 1; the other patient was enrolled at the start of Cycle 2. Patients were enrolled an average of 89 days (range 8-204). Average response rate was 84.2% (range 30-100%).

Although symptoms were not reviewed in real time, we reviewed responses to determine the utilization of the instructions given for the program. No veteran had 0 symptoms reported. There were numerous occurrences of a

FIGURE 2
Text Message Prompt for Assessment of Diarrhea



score of 1 or 2. Many of these patients had baseline symptoms due to their underlying cancer. A score of 3 or 4 on the system prompted the patient to call the clinic or go to the ED. Seven patients (some with multiple occurrences) were prompted to call; only 4 of these made the follow-up call to the clinic. All were offered a same day visit, but each declined. Only 1 patient reported a symptom on a day not prompted for that symptom. Symptoms that were reported are listed in order of frequency: fatigue, appetite loss, numbness, pain, mouth sore, and breathing difficulty. There were no visits to the ED.

Program Evaluation

An evaluation was conducted 30 to 60 days after program enrollment. We elicited feedback to determine who was reading and responding to the text message: the patient, a family member, or a caregiver; whether they found the prompts helpful and took action; how they felt about the number of texts; if they felt the program was helpful; and any other feedback that would improve the program. In general, the patients (8) answered the texts independently. In 4 cases, the spouse answered the texts, and 3 patients answered the texts together with their spouses. Most patients (11) found the amount of texting to be "just right." However, 3 found it to be too many texts and 1 didn't find the amount of texting to be enough.

Three veterans did not have enough symptoms to feel the program was of benefit to them, but they did feel it would have been helpful if

they had been more symptomatic. One veteran recalled taking loperamide as needed, as a result of prompting. No veterans felt as though the texting feature was difficult to use; and overall, were very positive about the program. Several appreciated receiving messages that validated when they were doing well, and they felt empowered by self-management. One of the spouses was a registered nurse and found the information too basic to be of use.

DISCUSSION

Initial evaluation of the program via survey found no technology challenges. Patients have been very positive about the program including ease of use, appreciation of messages that validated when they were doing well, empowerment of self-management, and some utilization of the texting advice for symptom management. Educational hyperlinks for constipation, fatigue, diarrhea, and nausea/vomiting were added after this evaluation, and patients felt that these additions provided a higher level of education.

Staff time for this intervention was minimal. A nurse navigator offered the texting program to the patient during chemotherapy education, along with some instructions, which generally took about 5 minutes. One of the Annie program staff enrolled the patient. From that point forward, this was a self-management tool, beyond checking to ensure that the patient was successful in starting the program and evaluating use for the purposes of this quality improvement project. This self-management tool did not replace any other mechanism that a patient would normally have in our department for seeking help for symptoms. The MVAHSC typical process for symptom management is to have patients call a 24/7 nurse line. If the triage nurse feels the symptoms are related to the patient's cancer or cancer treatment, they are referred to the physician assistant who is assigned to take those calls and has the option to see the patient the same day. Patients could continue to call the nurse line or speak with providers at the next appointment at their discretion.

CONCLUSION

Although Annie has the option of using either text messaging or a mobile application, this project only utilized text messaging. The study by Basch and colleagues was the closest randomized trial we could identify to compare

to our quality improvement intervention.⁵ The 2 main, distinct differences were that Basch and colleagues utilized online monitoring; and nurses were utilized to screen and intervene on responses, as appropriate.

The ability of our program to text patients without the use of an application or tablet, may enable more patients to participate due to ease of use. There would be no increased in expected workload for clinical staff, and may lead to decreased call burden. Since our program is automated, while still providing patients with the option to call and speak with a staff member as needed, this is a cost-effective, first-line option for symptom management for those experiencing cancer-related symptoms. We believe this text messaging tool can have system wide use and benefit throughout the VHA.

Author disclosures

The authors report no actual or potential conflicts of interest with regard to this article.

Disclaimer

The opinions expressed herein are those of the authors and do not necessarily reflect those of *Federal Practitioner*, Frontline Medical Communications Inc., the US Government, or any of its agencies. The manufacturers did not provide equipment or other forms of material support.

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