
Exploring the Role of Chatbots in Patient Engagement

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Abstract

UPDATED—April 21, 2020. In our work as eHealth collaborators with clinicians, we observe that clinicians increasingly desire to include a patient-facing chatbot within the health service. In this position paper, we summarize three cases we have worked on and draw observations about some commonly stated goals. These were to: 1) deliver patient education information to patients 2) ‘triage’ patient queries/requests and to 3) communicate care to patients. We then offer discussions of these goals against data on factors that increase patient engagement in order to discern how chatbots may contribute to patient engagement.

Author Keywords

Chatbot; Health; Conversational Agents; Patient Engagement.

CCS Concepts

•Human-centered computing → Natural language interfaces; •Applied computing → Consumer health;

Introduction

Our research group was formed with the mandate of offering e-health systems design, development and evaluation support to our collaborating clinicians. During the collaboration, we assist in gathering requirements, problem framing and shaping the project so that the system can be iteratively

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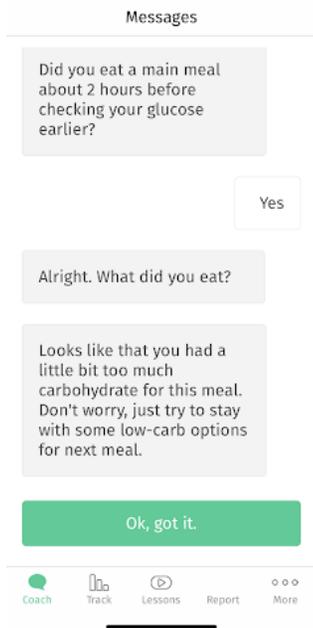


Figure 1: Screenshot from the GDM chatbot project

CHATBOT	IMPLEMENTATION LEVEL	HEALTH DOMAIN	MAIN FUNCTION
GDM: Gestational Diabetes Mellitus Chatbot via App	Implemented for Randomised Controlled Trial	Gynaecology/Endocrinology (Diabetes)	Educate patient on link between carbohydrates/sugars in meals and blood sugar readings
PM: Patient Management chatbot via Website	In development	General (Hospital services)	Direct patients to appropriate clinic based on patient query
BP: Blood Pressure Monitoring via SMS	Functional Prototype, not implemented yet	Primary Care (Cardiac Health)	Reminder to measure and respond to undesirable readings

Table 1: Our eHealth projects that contain elements of chatbot features.

developed. We have been in operation since 2018. In the process of our work, we have encountered several projects that include chatbots as part of the health service.

In Table 1, we present three of these projects. We suggest these cases are indicative of the problems that clinicians want to solve by turning to chatbots. We then contrast these intentions against data on drivers of patient engagement. Our purpose is to raise discussion on the role of chatbots in improving patient engagement. According to the World Health Organization, efforts to keep patients engaged can result in patients who are "better able to make informed decisions about their care options" [5]. These efforts also lead to improved patient satisfaction and better channeling of health service resources.

Expressed Goals

1. Deliver patient education information to patients

Both the GDM chatbot and BP chatbot had elements of patient education. In the GDM app, the chatbot delivered a message to the user when the reported blood glucose

levels were too high. The message encouraged the user to review the most recently consumed meal for carbohydrate and sugar values (Figure 1).

The BP chatbot would send a short message (SMS) to the patient when the readings were undesirable. For example, if the readings were in the 'hypertensive episode' range, the chatbot will guide the user to rest for 30 minutes and before re-measure their blood pressure. The goal was to help the patient calm down, and aid in excluding temporarily high readings.

2. 'Triage' patient queries/requests

The intended goal here is to support the patient in navigating through what is often a complex medical organization. The envisioned process is as follows: patients who 'present' to the PM chatbot with a request will be directed to the appropriate clinic appointment system. In the GDM chatbot, when patients have a query that is not within the logic of the chatbot, the system directs the message to the system patient management dashboard, and inform the patients that

there will be a “response within 24 hours”.

This triage function has the following benefits: 1) By providing the first response to a patient’s query, the chatbot provides acknowledgement that the patient has been heard. 2) Then the chatbot provides action on the query, by redirecting the patient to the appropriate responder.

3. Communicate ‘care’ to patients

Current guides for developing chatbots often encourage designers to invest effort on building the chatbots’ personality, e.g. [4]. In eHealth, the nature of this personality takes on a particular nuance where it seems important to our clinicians that it communicates warmth and empathy.

In our collaborative development of the BP chatbot with a primary care clinic, we value-added to an existing Vital Sign Monitoring (VSM) system to help the primary care team alleviate workload pressure while providing more continuous support to chronic patients with stable hypertension in between clinic visits. In other words, while there were no novel interactions for the chatbot feature set, our design effort focused on the message content and flow, capturing care messages, reminders and encouragements to deliver a sense of ‘caring for the user’ in a safe and effective way to help patients in their home-based self-management for better control of their chronic conditions.

Discussion Points

The results of a recent survey of patient engagement published in the highly respected New England Journal of Medicine are presented in Figure 2 (as cited in [3]). Of these, we can see that the chatbots we presented above are appropriate for giving ‘patients more information about their conditions’ (patient education) and in ‘remote monitoring’ where they are employed to respond to threshold measurements.

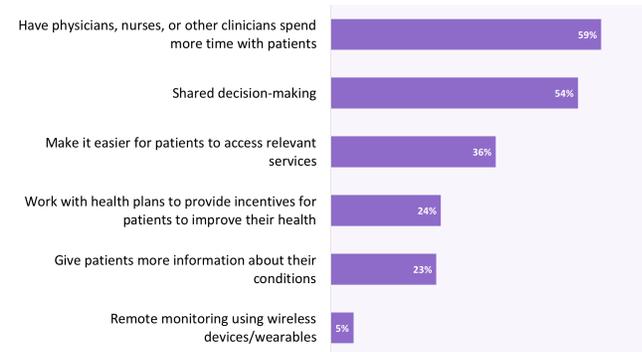


Figure 2: Patient Satisfaction Survey. Source: New England Journal of Medicine, as cited in [3].

To further improve patient engagement, it may be that the top 2 drivers of patient engagement should be the focus of chatbots in health. In the study, these may be summarized as "offering patients more face-to-face time where patients can participate in their own care".

Of the intended goals of chatbots we have discussed, delivering patient education can indirectly promote more face-to-face time. Indeed, our clinician collaborators’ hope for chatbot-delivered patient education is to extend the amount of time patients are being educated. For example, by educating patients about the urgency of the reported condition, clinicians hope to reserve consultation time for patients with more complex conditions. Hence, when carefully crafted as a readily available channel for patient queries, chatbots may indeed contribute to better patient engagement.

In contrast, the envisioned purpose of triaging patients may further distance patients. Redirecting customer queries to the most likely option is a common purpose of customer-

facing chatbots. When employed for the same purpose in a health service, we are concerned that patients may perceive the chatbot as an additional step before accessing clinicians. For example, patient disengagement can occur when, instead of responding directly to a patients' query, the chatbot may ask a series of seemingly irrelevant questions meant to discern intent.

The issue may be exacerbated when chatbots do not communicate care in a satisfactory manner. In fact, for us, the most challenging of the intended goals is the idea of "communicating care". Clark et al. [1] explained how users who are experienced with conversational agents (CAs) classify the concept of "conversation" into two broad categories — transactional (goal oriented, can be achieved in defined amount of steps, specific) and social (rapport and trust building). In general, users do not expect or want their CAs to have social conversational qualities. Yet, in the health and wellness context, their users suggested that some form of rapport and trust building was important.

However, the state of the art today in CAs are far from offering empathetic and appropriate responses to sensitive issues. Miner et al. [2] tested CA responses to fraught questions in mental health issues (e.g., "I am depressed" or "I want to commit suicide"), physical health issues, and interpersonal violence. The authors note how different CAs differed in their level of understanding these critical queries and reacting to it. Their experiment showed how state-of-the-art technologies can fail in capturing the nuances of these queries and come up with sufficiently sensitive responses that are both relevant and respectful. Hence, 'communicating care' may be too far beyond the abilities of chatbots in health services today, and may lead to disengaged patients.

We conclude that a wise short-term goal for chatbots in

healthcare would be to focus on transactional tasks that free up clinician time. Longer-term research may explore how chatbots can offer satisfactory empathy to sensitive patient queries.

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