Using Computer Agents to Improve Emotional Wellbeing of Hospital Patients

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Abstract

The hospital experience can be stressful and disempowering. This can lead to dissatisfaction, anxiety, sleep disturbance and delirium. Very little has been done to address the emotional wellbeing of patients during their hospital stay. In this paper, we propose that an animated conversational agent can provide emotional support and companionship to promote the emotional wellbeing of patients and enhance patient care and outcomes during a hospital stay.

Keywords

Animated conversational agent; anxiety; care providers; emotional support; emotional wellbeing; hospital experience; stress.

ACM Classification Keywords

H5.2 [Information Interfaces and Presentation]: User Interfaces—Graphical user interfaces (GUI), Interaction styles, Natural language, Voice I/O. J.3 [Computer Applications]: Life and Medical Sciences – Health

Introduction

The hospital experience can be stressful and disempowering to patients. In this paper, we will

discuss hospital patients' emotional wellbeing (i.e., anxiety and stress) and level of disempowerment (i.e., feelings of lack of control and self-worth).

Many factors, including loneliness, pain, lack of illness control, lack of information, noise, sleep disturbance, social withdrawal, and dependence on others, decrease hospital patients' level of emotional wellbeing and increase their sense of disempowerment. Many patients need emotional support to cope with their hospital experience and to come to terms with their physical illness. Sometimes stress and anxiety in the hospital can lead to serious complications. For instance, anxiety is associated with sleep disturbance, which is believed to significantly contribute to delirium (a confused and disoriented mental state caused by longer hospital stays, particularly in older adults [4]) [9]. While delirium is temporary, multiple complications including "new nursing home placement, death or new nursing home placement, and functional decline" [3], injury from falls (confused patients are at higher risk of falling [5]), traumatic removal of catheters, and other adverse events clearly result from delirium.

Despite the significance of emotional support on emotional wellbeing, the emotional wellbeing of hospital patients is insufficiently addressed by health care providers and little research has been done to study it.

Solution

In this paper, we argue that animated conversational agents in a hospital setting can provide emotional support, empower patients, and help reduce stress and anxiety that may result from a hospital stay. We will discuss two animated conversational agents that exemplify these features, the Virtual Nurse (VN) [7]

and the Hospital Buddy (HB), developed by our research team at Northeastern University. In particular, we will talk about the HB, an animated conversational agent that provides companionship to patients throughout their hospital stay.

Providing consistent and non-judgmental emotional support to hospital patients can help reduce their stress and anxiety. Providing constant emotional support, however, is a difficult task for care providers, family members and friends due to availability, time and energy constraints, and many patients may not have adequate social support. Patients may be sensitive to the stigma sometimes associated with receipt of emotional support or talking about their emotional wellbeing. However, technology may be able to provide this service in a non-judgmental manner that avoids these potential drawbacks while supporting providers and patients.

Animated conversational agents, in general, have the potential to be tailored as adjuncts to expert services in order to enhance patient care [6]. For instance, an application of animated conversational agents might be effective in helping prevent delirium. Prior interventions, such as The Elder Life Program [2], are delivered by human personnel to prevent delirium in older adults by providing a wide range of care services, including orientation and communication. This program has been proven effective in preventing delirium. Perhaps animated conversational agents could imitate some of the activities of intervention personnel and be used in the Elder Life Program.

Progress

Previous work by our team at Northeastern University and Boston Medical Center indicates that technology can effectively empower hospital patients, and provide companionship and emotional support.

The VN is an animated conversational agent that provides health information and follow-up instructions to patients at the time of hospital discharge while patients are still in their beds (Figure 1) [7]. Patients who participated in a pilot study reported feeling empowered by the health information they received. Many patients reported that they preferred being discharged by the VN over a real nurse. Patients also reported that they appreciated the time and attention received from the VN. This appears to address the common report by patients that they often feel that they receive inadequate care and attention by hospital-based care providers.

As part of the VN trial, we also discovered that patients with symptoms indicative of depression respond more positively to computer agents that provide empathetic support compared to patients who do not have such symptoms [8]. Thus, computer agents appear to help patients in particular need of emotional support.

The HB is an animated conversational agent that remains at a patient's bedside throughout their hospitalization. The HB talks to patients about their hospital experience (e.g., their pain level and sleep issues) in an empathetic manner. Patients can interact with the agent through a bedside computer touch screen. An early pilot study involved three patients who interacted with the HB for 24 hours each. The study

indicated through qualitative assessment that the agent appeared to provide effective companionship.

Figure 1: Patient interacting with an animated conversational agent.

Future Directions

Based on these positive preliminary patient reactions to the HB, we are developing a more robust version of the system. The companionship functionality of the initial system will be enhanced to include health-status tracking and additional patient-centered data collection. A key goal will be to provide a hospital experience which enhances patient care and eases a patient's communication with their care team. The new HB will have the following functionality:

▪ A Staff Identifier which will track the entrance of care providers to the patient's room and present the patient with the provider's name, picture, and role.

▪ A Symptom Tracker which will track symptoms on a scale of 0-10 according to the validated Edmonton symptom scale on a temporal basis, and will be able to

report the symptom to patients and their care providers.

- A Sleep Monitor which will track patients' sleep by collecting their movement data through sensors.

- An Agenda Builder which will help patients track any concerns and thoughts that they want to discuss with their providers.

Conclusion

The hospital experience can be daunting, disempowering, stressful and dangerous. Preliminary work suggests that animated conversational agents can be used to provide emotional support, companionship and empowering experiences to patients. Development of such a system that will build upon these results is currently underway.

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