Hospital Buddy: A Persistent Emotional Support Companion Agent for Hospital Patients

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The hospital experience can be disempowering and disorientating. Patients are deprived of sleep deprivation and exposed to constant noise, frequent interruptions, an unfamiliar environment filled with changing health professionals and ancillary staff, as well as medications often fraught with physical or psychoactive side-effects. These conditions often lead to discomfort and anxiety, and commonly induce delirium (especially in older adults), a neuropsychiatric condition in patients that results in clinically significant cognitive and perceptional problems. Simultaneously, because patients are usually alone in their rooms until a medical intervention is required they often are bored and starved for personal attention.

To address these issues, we developed a computerized hospital companion agent designed to support a patient throughout their hospital stay. The Hospital Buddy talks using synthetic speech and animation to which the patient responds using a touch screen attached to an flexible articulated arm at the bedside. The agent chats with patients about their hospital experience - providing empathic feedback and emotional support - in addition to a range of topics that have medical and entertainment functions.

Design of the Hospital Buddy

The virtual agent interface used is described in [1]. The Hospital Buddy provides patients with a brief orientation dialogue followed by options for the top-level dialogue topics described below. Following the initial conversation, the agent walks off the screen until the patient beckons it again (*Can we talk again?*).

"Let me tell you what's been going on." This dialogue enables patients to discuss an event that just occurred to them in the hospital, such as: just waking up; just finishing a meal; just completing an interaction with a provider; just finished watching TV; family or friends just visited; or just had a procedure or test done. In each case, the agent would elicit how the patient felt about the event, and provided empathic feedback when warranted. In addition, following interactions with a provider, patients were prompted for a brief evaluation of the provider and the interaction.

"I want to tell you how I've been feeling." This dialogue enables patients to self-report different subjective health-related states—including pain and stress—and record them for later time-series display for their own use or to share with their

providers. The agent also took these patient utterances as empathic opportunities to provide comfort when appropriate.

"Can we chat?" Finally, if the patient initiated this dialogue, the agent offered to tell them a story, selected from a list of 97 health-related stories, anecdotes, and jokes.

Pilot Acceptance Study

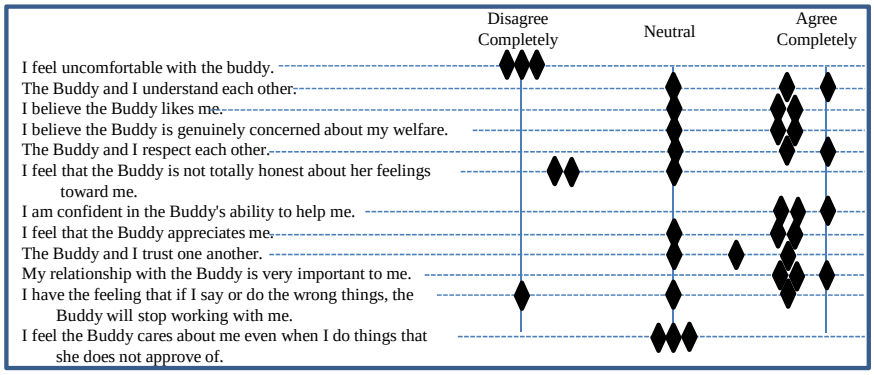
We conducted a preliminary pilot study to gage acceptance and use of the system by hospital patients when left in their room for 24 hours.

Participants. Three patients were recruited from a General Medicine floor of an urban hospital, aged 30-60, 66% female, with a range of medical conditions.

System Use. All patients used all system functions, averaging 17 interactions each with the agent during the 24 hours. All patients viewed their self-report pain levels, and one reported showing the chart to their doctor.

Quantitative Results on Relationship. Table 1 presents questionnaire responses. All patients reported feeling comfortable with the agent, were confident in its ability to help them, and felt that their relationship with the agent was important to them. Responses to other questions were generally positive, but mixed.

Table 1. Working Alliance Inventory Self-Report Scores for Each Patient



Qualitative Results. All patients reported that the system was very easy to use:

"I found it to be very easy… just by it being like a touch screen, you know it wasn't complicated at all. And with the questions, they're self-explanatory, so I didn't have a problem with it." (ID1).

When asked about how comfortable they were having the Hospital Buddy in their room, none of the patients reported any issues:

"I didn't feel like somebody was watching me or anything like that. I like the buddy." (ID2)

All 3 patients agreed that interacting with Hospital Buddy gave them something to do during their hospital stay in addition to keeping them company:

"[It] gave me something to do, other than just lay here." (ID1)

"…I mean it kept me company, nothing was on TV…" (ID2)

System Functions. All 3 patients enjoyed the storytelling feature in Hospital Buddy. Two patients quoted some of the story parts during their interview, expressing their further interest in these stories.

All patients provided positive feedback on the reporting and event discussion functions as well:

"I thought how it kept the pain scale, and the schedule and the time, I thought that was awesome." (ID2)

Companionship. All patients volunteered that the agent was effective at providing companionship during their hospital stay:

"I liked that, you know, she, you know, recognized my name and I like that she's there to, you know, interact with…you know." (ID1)

"The best thing about the system, like, you know, when you don't have anyone here with you…it was actually nice to have her. I mean it kept me company." (ID2)

"[It was] extremely comfortable, as a matter of fact, I relish it. I'm glad you came to me with this option, and have a chance to use it, to me, it helped me last night… the downtime, being lonely sometimes, this gives you something to do, something to hear." (ID3)

Patient-Initiative. One patient volunteered that she appreciated the fact that the interactions were patient-initiated:

"It was nice, you know, to have the options to talk to her and she wasn't bothersome, she wasn't like: 'talk to me! Talk to me!' … she just kind of waited around until I talked to her. … Like I said, she was very warm and welcoming!" (ID2)

Suggestions for Improvement. Patients did think the agent could be more helpful if it had more medical capabilities and the ability to discuss their self-reported medical conditions in more detail:

"…when it was asking me how I was feeling, I wish it asked me whether or not I had a headache" (ID1).

"I wish it could answer some questions…medical questions, you know." (ID3)

One patient mentioned that the Hospital Buddy could be used as a messaging system between them and their providers, so that they could get more sleep:

"I think it would have helped me to know that staff and doctors had knowledge of it, because then like…when I'm asleep, they could have easily come in and looked at whatever I had corresponded with the Buddy, so they didn't have to bother me."

Conclusions

Overall patient acceptance of and reaction to the Hospital Buddy was very positive, and it appeared to meet its primary objective of providing companionship. We are extending the Hospital Buddy with a suite of sensors—including acoustic sensors to detect medical device alarms, accelerometers to detect patient sleep/wake states, and long-range RFID sensors to detect and identify approaching providers— so that the agent is aware of events in the hospital room and can use these to initiate more intelligent and focused dialogue with patients.

References. 1. Bickmore, T., Pfeifer, L., and Paasche-Orlow, M.: Health Document Explanation by Virtual Agents. Intelligent Virtual Agents, pp. 183-196, Paris (2007)