

Research Paper ■

Emotions Associated with Computer-based Provider Order Entry: A Qualitative Study

DEA F... D, → G AE T A... →D, → , | A T AA AA = , , → ,
| A . A , → D

Abstract Objectives: Computer-based provider order entry (CPOE) systems are implemented to increase both efficiency and accuracy in health care, but these systems often cause a myriad of emotions to arise. This qualitative research investigates the emotions surrounding CPOE implementation and use.

Methods: We performed a secondary analysis of several previously collected qualitative data sets from

routine clinical workflow. Finally, we recognize that these CPOE systems are continually being modified, both to fix problems that are identified by those using the systems as well as to increase the capabilities of the applications. So, from the clinicians' perspective, it often appears as if the CPOE systems are in a state of perpetual implementation or reimplementation.

Emotions

Emotions are mental states that arise spontaneously rather than through conscious effort (see Morelos-Borja, 1998¹⁴ for an overview of emotions and their relation to technology). Changes in underlying physiology, facial expression, or even actions often accompany emotions. A specific event or series of events that either cause the person to succeed or fail in reaching his or her goal(s) triggers most emotions. One's emotions and resulting moods reflect on a person's ability to attend to complex physical and cognitive tasks.¹⁵

While emotions of all types are interesting to study, we are interested in those emotions that are associated with either or both decreases in cognitive and physical abilities. CPOE seems to elicit such emotions. For example, Ash et al.¹⁶ identified many examples of emotionally loaded words related to CPOE either uttered by housestaff or to describe housestaff, such as "The surgeons have always used it and the internists have sort of been laggards." Or "They just are pretty intolerant if anything

Liking/Attachment

While not a unique attribute of CPOE, clinicians like the fact that it is no longer necessary for them to have the patient's chart in their possession to write an order; for example, "One of the beauties of not having a paper chart is you can do it anywhere, and you can do it on the fly

Hostility/Animosity

Hostility was one of the most commonly expressed emotions throughout all these interviews and focus groups. A work stoppage, even if only threatened, represents a level of hostility rarely seen in, or even around, health care institutions, "but they...happened like a hurricane [i.e., rallies of hostile residents] within the space of two or three days, all of a sudden something would happen, stir the pot, everybody would decide okay, we've had enough and this is the time [to strike]."

Disgust/Loathing

Disgust often results from situations in which the person has little or no control over the situation at hand. These feelings of disempowerment were widespread throughout the data sets. "Everybody felt like the university had gotten the short end of the stick, they'd...got a bad product. And then to make it [worse], we couldn't dump it and it [was a] 6 million dollar investment whatever it was, I don't know how much the investment was, it was a lot of money and you couldn't just dump it into a different vendor."

Discussion

The practice of medicine is filled with enormous stressors including an incredible workload³² that is often accompanied by a lack of sleep,³³ the threat of lawsuits, feelings of loss of control over the workload and/or schedule,³⁴ task interruptions,³⁵ and patients with complex medical problems.³⁶ With all these stressors capable of causing negative emotions, CPOE system designers and implementers must be especially careful not to be the ones to cause a nonlinear negative effect on performance (e.g., failure to complete a task or an erroneous action)³⁷ by popping up yet another irrelevant alert³⁸ or implementing a new CPOE system³⁹ on an underpowered and slow computer system.⁴⁰ Likewise, clinical system designers and health care administrators should be careful to listen and respond in a positive manner to clinical users' concerns. At the same time, clinicians need to be educated about the potential long-term benefits of CPOE and remain open to the possibility of changes in their workflow.

CPOE systems with clinical decision support capabilities focus frequently on alerting or reminding clinicians when they have forgotten to do something or when they have done something wrong rather than trying to educate or help them to do a better job, by making "the right thing to do the easiest thing to do." It is little wonder that so many of the emotions exhibited by clinicians involved with CPOE implementation, or any clinical information system, are negative.^{41,42} Interestingly, many of the positive emotional responses that we observed resulted directly from

1. Positive feedback from other users (e.g., order set becomes "hallmark")
2. Evidence that either system designers or health care administrators listened to their concerns and made positive changes (e.g., "system much improved now" or "clinicians and administrators worked it out")
3. Aspects of the systems that provided some sort of positive feedback to clinicians (e.g., "lights unlit" or "little sound")

Likewise, many of the negative emotions that we recorded resulted from either negative feedback from the system or from health care or information technology administration personnel. Based on these findings and the recognition that clinical information systems users already lead stressful lives, system

designers might consider designing systems that provide more positive, rather than punitive, feedback.⁴³

An Idea for Improving Clinical Information Systems by Providing Positive Feedback

While CPOE system designers and implementers can never hope to remove the myriad of stressors routinely faced by clinicians, it might be possible for them to develop new system features that provide positive feedback to clinicians, although we must be careful not to further disrupt the clinicians while doing this. For example, the ability for each clinician to select first whether he or she would like to receive positive feedback and then, if so, to what degree, might be helpful. If a clinician chose to participate in the positive feedback program, might receive something like the following examples, according

- A system might pop up a small congratulatory reminder whenever a clinician enters 100 medication orders in a row that are on the formulary.
- We could place a small geometric figure in an unobtrusive location on the screen that had pieces added to it, or it was colored in, as the clinicians worked with the system as designed.
- A congratulatory message could be sent to clinicians by the system when they have completed all their patient encounters within three days of the event over a one-month period.
- We could generate a pleasant audio sound when clinicians performed a series of correct tasks.
- Clinicians could get a \$50 gift certificate whenever 90% of their patients meet their health maintenance targets in any given month.
- Clinicians who have overridden a particular alert more than 90% of the time and more than ten times in the past three months could be presented with an option to: Stop receiving this alert because...(enter reason here!) or Continue receiving this alert.
- We could allow physicians to adjust the level of positive feedback that they receive so that they would not receive more disruptions than they want.

If clinicians received such positive reinforcements or simply felt more in control of their workflow, they might react differently to the various alerts and reminders that are currently in place. For example, rather than feeling as if the alerts were "punishing" them, they might begin to feel that these alerts were "helping" them reach their objectives.

Study Limitations

The data sets used in this secondary analysis were chosen because feedback well feedback8.9663008.9663472.588119 information technology personnel, represented a cross section of types, geography, backgrounds, and experience with CPOE. The selection was purposive rather than random. It is possible that informants expressed negative emotions because they hoped that the researchers would take complaints to those

the purpose of each study. It is also possible that informants enjoyed the opportunity to vent, which would also increase the number and intensity of negative emotions.

Conclusion

Designing, implementing, and maintaining CPOE systems is difficult. The implementation and subsequent use of these

systems inspires intense emotions in nearly everyone involved.

- the new hospital information system. *Nagoya J Med Sci.* 1994;57:19–24.
41. Darbyshire P. 'Rage against the machine?': Nurses' and midwives' experiences of using computerized patient information systems for clinical information. *J Clin Nurs.* 2004;13:17–25.
 42. Lundberg U, Melin B, Evans GW, Holmberg L. Physiological deactivation after two contrasting tasks at a video display terminal: learning vs repetitive data entry. *Ergonomics.* 1993;36:601–11.
 43. Eisenberger R, Cameron J. Detrimental effects of reward. Reality or myth? *Am Psychol.* 1996;51:1153–66.