Improving the Human Computer Interface Design for a Physician Order Entry System

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Introduction

The computerized physician order entry (CPOE) system has become a primary focus of time and monetary investment in the healthcare arena. This focus is partly due to the need to reduce medical errors that occur due to illegibility, drug interactions, and misplaced decimals. A CPOE system can potentially prevent many of these errors, resulting in a significantly safer healthcare system. However, only one-third of the hospitals in the United States have installed CPOE systems, and only 1 percent of these require the physicians to use them.[1] The success and failure of such a system is dependent on the acceptance by the users, in this case, the physicians. Unfortunately, many of the CPOE systems are not designed to address usability issues. They are hard to use, hard to learn, and they often generate user frustrations and abandonment. In this project, the user interface of one such software program was analyzed. As a result of this analysis, a prototype was developed as a component of the system to offer alternative solutions to the identified usability problems.

Task Analysis

A cognitive task analysis was performed on the CPOE system. The task of entering, discontinuing, and reordering a medication on the original system involved 31 steps. The task analysis also revealed a process disconnect; when the user tried to reorder a medication, the computer did not acknowledge that medication as an active order. Later, after formal training, it was discovered that the process disconnect was due to not completing some additional tasks. This problem caused concern about the reorder process and became the focus of the redesigned prototype.

Heuristic Evaluation

A heuristic evaluation was performed using a 14-point heuristic evaluation tool developed by Zhang, Johnson and Johnson.[2] Heuristic evaluation is a quick technique to identify usability problems by discovering violations of the 14 well-established heuristics that good design should follow. There were 29 heuristic violations documented in this CPOE system.

A prototype was developed to correct the heuristic violations found in the medication "D/C", and "reorder" process. This prototype reduced the number of steps from 31 to 23. Independent physician evaluators then rated the original CPOE reorder process and the prototype. The prototype was presented to different physician evaluators in a paper format. The users preferred the redesigned order entry process. The prototype was rated much higher in "task can be performed in a straight forward manner" than the original CPOE version.

Conclusion

The commercial CPOE system evaluated has numerous usability problems. Subsequent changes based on the awareness of these problems yielded an increase in the ability of the users to perform the task of order entry in a user-friendly manner. These findings are important since the success of CPOE is dependent upon the satisfaction of the physicians as users. If the Health Care System wants the physicians to utilize the CPOE, the system must be streamlined. It should be easy to use and easy to learn. The inclusion of a human factors analysis will help to not only increase the usability of the CPOE system but also decrease the number of errors that can be made. User satisfaction, acceptance, and usage will increase with only minor changes in the CPOE system.

References

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