A Usability Engineering Approach to Development of a Computer-Based System For Continence Health Promotion

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Background: Urinary incontinence is a common health problem for Americans, particularly older women. The efficacy of behavioral treatment has been established, but information about urinary incontinence has not been effectively disseminated to the lay public. Women need factual information about continence problems in order to interpret symptoms and make informed decisions about treatment options. Computer technology offers an additional channel of communication to deliver information on behavioral treatment and advice tailored to individual women’s needs. The challenge lies in designing a system for older women that is easy and satisfying to use, and provides the information they want.

System: The computer-based system for continence health promotion employs a browser-based user interface communicating with an Apache web server that executes the cgi (common gateway interface) script written in PERL programming language. It contains general information about the urinary/bladder system and offers messages generated by tailoring algorithms that are based on clinical practice guidelines.

Methods: Formative evaluation included a cycle of prototype design, testing, analysis, and redesign to determine whether the prototype was converging toward an appropriate user-interaction design; summative evaluation of the final prototype was performed during a pilot study. Participants in the usability sessions and pilot study were representative of women for whom the system was designed. Early testing focused on global design decisions and subsequent sessions tested the effectiveness of specific aspects of the system design. The pilot study tested procedures, hardware, software, instructions and overall user reaction. The think aloud method, interviewing, and questionnaire administration (including a paper and pencil version of the Overall User Reaction section of QUIS, version 7.0 with substitution of an “informative” item for the “power” item) were used during formative and summative evaluation. Testing performed in every cycle of iteration produced quantitative and qualitative data about the prototypes.

Evaluation results:
Formative: Twelve women completed four rounds of usability testing; the number of women in each round was 2, 3, 5, and 2 respectively. Five novices had never used a computer and the other seven were frequent users. Findings that guided design decisions included: large fonts were difficult to read; there was more interest in text than in pictures or graphics; implicit navigational cues were overlooked; recursive loops caused user confusion; a “clinic” metaphor helped users understand the system; and a tutorial was useful to novices.
Summative: Eleven women (4 novices and 7 computer users) completed the pilot study. Quantitative measures (a) revealed a trend toward symptom improvement; (b) supported a preference for the privacy of the computer for obtaining information on this sensitive topic; and (c) showed that after using the system, women perceived greater readiness to discuss their problem with their health care provider. Overall reactions to the system were very favorable. A mean score of 8.18 or greater was found on the QUIS for each of 6 items rated on a scale from 1 to 9 with 9 being most positive: terrible/wonderful; frustrating/satisfying; dull/stimulating; difficult/easy; not informative/informative; rigid/ flexible.

Conclusion: These findings suggest that an evaluation-centered approach to development of an interactive computer-based system can lead to a system acceptable to women desiring information about continence health promotion. Further study is underway to test the effectiveness of the system. Funded by the National Institute for Nursing Research, 1 K01 NR00125-01.