Heuristic Evaluation of a Web-based Prototype for a Personal Digital Assistant-Decision Support System for the Management of Obesity

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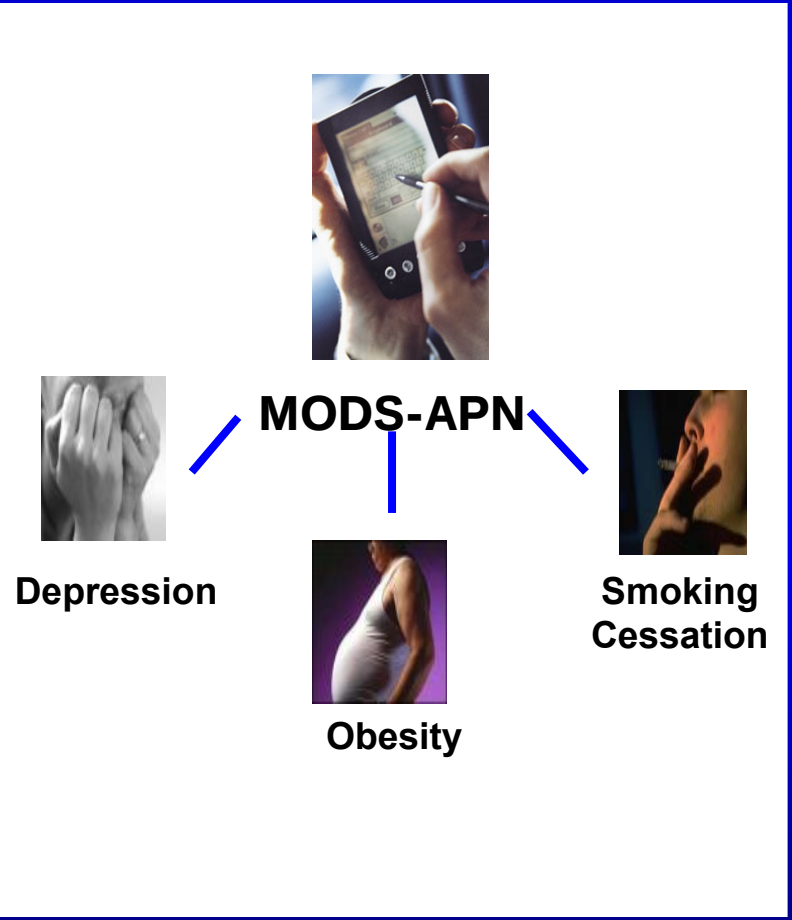
Introduction

- Handheld devices raise special interface design issues that do not occur with desktop applications
- This results in formidable challenges for design and evaluation
- Few studies have examined the special challenges of employing health care information systems on handheld devices in health care settings

Purpose of Study

The purpose of the study was to identify usability problems in the Web-based prototype user interface for the PDA-DSS for the management of obesity through heuristic evaluation

Mobile Decision Support for Advanced Practice Nursing (MODS-APN)



- Template-based approach to decision support for three guidelines on personal digital assistant (PDA)
- Randomized controlled trial is underway to compare APN students' adherence to guideline screening and treatment recommendations

Web-based Prototype of the PDA-DSS for the Management of Obesity

- The PDA-DSS for the management of obesity provides APN students with appropriate obesity diagnoses based on the results of screening and tailored plans.
- The Web-based prototype of the PDA-DSS was intended to get usability experts' quick feedback on the user interface

Materials and Methods

- Three experts in heuristic evaluation, interface design or cognitive science
- Usability laboratory at Columbia University School of Nursing
- Evaluation forms including 5 scenarios, 7 usability principles, sub-questions, a severity rating to rate the severity of usability problems, and open-ended comments
- Think aloud technique
- Audio and video recording
- Content analysis

Results: Overall Severity Score by Each Usability Factor

Usability Factors	Severity Score by Each Evaluator			Total Score	Mean Severity Score
	Expert 1	Expert 2	Expert 3		
Match Between System and the Real World	0	0	0	0	0
User Control and Freedom	0	0	2	2	0.67
Consistency and Standards	1	1	0	2	0.67
Help Users Recognize, Diagnose, and Recover From Errors	0	0	2	2	0.67
Recognition Rather Than Recall	0	0	0	0	0
Aesthetic and Minimalist Design	0	0	2	2	0.67
Error Prevention	0	0	2	2	0.67

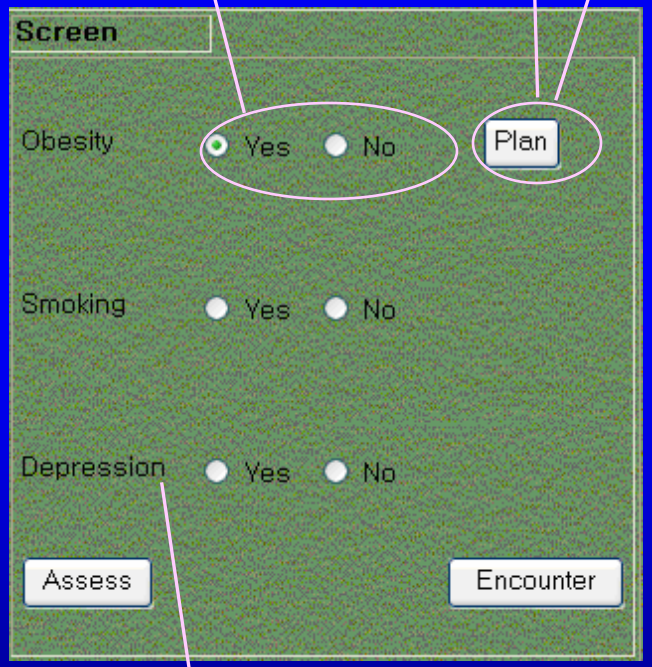
0=No usability problem, 1=Cosmetic Problem Only, 2= Minor Usability Problem, 3= Major Usability problem, 4= Usability Catastrophe

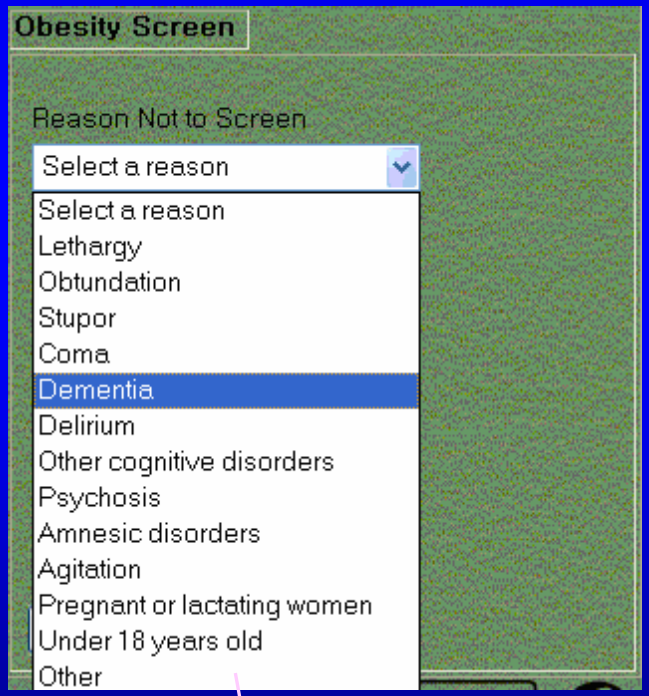
Results: Examples of Usability Problems

Radio button for navigation

Location of button

Less specified label





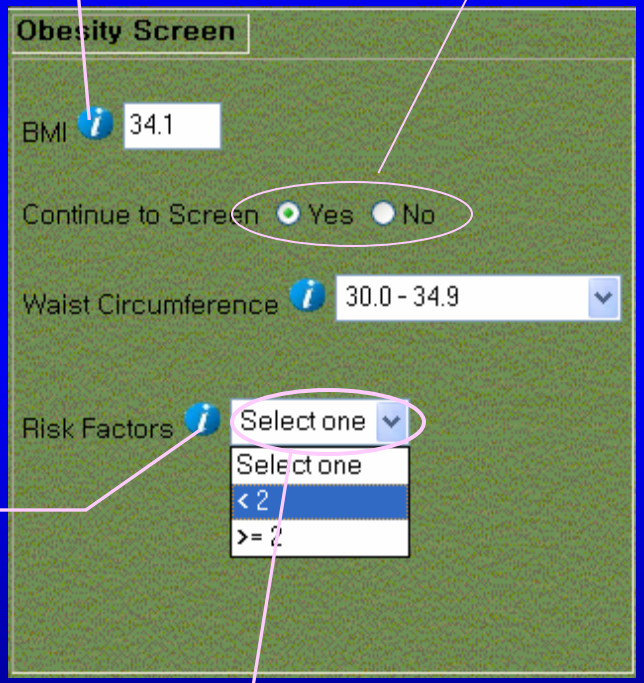
Small font

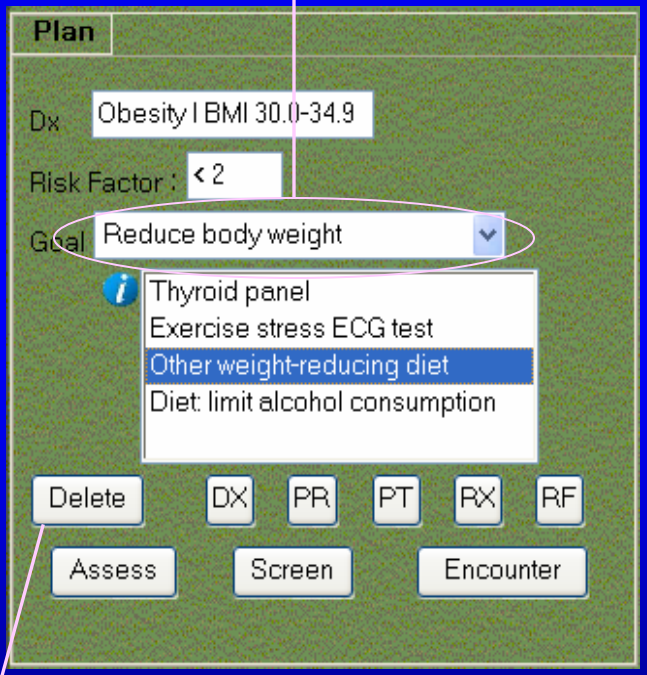
Long list

Results: Examples of Usability Problems (con't)

Too much information in Infobutton

Not to change





Less information

Ambiguous instruction

Location of button

Results: Summary of Usability Problems

Usability Factors	Usability Problems
1. Match Between System and the Real World	▪ Location of button, ▪ Ambiguous instruction, ▪ Detailed information
2. User Control and Freedom	▪ Not to cancel, ▪ Radio button
3. Consistency and Standards	▪ Less specified label/ instruction, ▪ Inconsistency in decimal points
4. Help Users Recognize, Diagnose, and Recover from Errors	▪ Implicit warning message
5. Recognition Rather Than Recall	▪ Long text in information, ▪ Necessary information display, ▪ Long lists in a pop-up list, ▪ More information
6. Aesthetic and Minimalist Design	▪ Too much text
7. Error Prevention	▪ Small font, ▪ Unpreventable user's mistake in entering, ▪ Double negative statement

Conclusion

- Heuristic evaluation using the scenarios was a useful method to find usability problems in the early phase prototyping a PDA-DSS.
- The findings provided iterative feedback regarding the design and implementation of the PDA-DSS.

References

[1] Lee NJ, Starren J, Bakken S. A systematic review of user interface issues related to PDA-based decision support systems in health care. AMIA Annu Symp Proc. 2005:1021.

[2] Nielsen J. Heuristic Evaluation. 1994 [cited 2006 October]; Available from: http://www.useit.com/papers/heuristic/

[3] Preece J, Rogers Y, Sharp H. Interaction design : beyond human-computer interaction. New York, NY: J. Wiley & Sons 2002.

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