CO-ED: A Development Platform for Interactive Patient Education

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ABSTRACT
The aim of this project was construction of a universal platform for rapid development of interactive computer-based health education programs. Pocket PC was used to pilot test the platform and to implement two educational curriculums: for asthma and anticoagulant therapy. Qualitative analysis of the system acceptance in 46 patients showed that computer-assisted education can be successfully implemented on the basis of a handheld computer.

INTRODUCTION
Patient education plays an important role in the management of chronic health conditions. Recent studies in patients with different chronic diseases showed that successful patient education resulted in improved clinical outcomes and decreased utilization of urgent medical care services. Computer-assisted education programs have been shown to enhance patient disease-specific knowledge and facilitate patient self-management. Growing consumer interest in handheld computing coupled with ongoing improvement of technical capabilities of Personal Digital Assistants (PDA) make these devices a potentially attractive tool for patient education. Recent introduction of Rapid Development Environment (RDE) tools and multimedia enhancements for new PDA models significantly simplified development of full-scale multimedia software for these platforms. Despite significant improvement in PDA functionality current literature does not provide systematic assessment of potential use of handheld computing for interactive patient education. The goal of this project was development of interactive patient education software utilizing modern features of handheld computing and pilot testing of the computer-assisted education using qualitative analysis.

SYSTEM DEVELOPMENT
Microsoft “eMbedded Visual Tools” and ADOCE objects have been used for software development. The software has been implemented for Windows CE-based pocket PC and tested using HP Jornada 520. As a result of this project we developed a computer-assisted education (CO-ED) system which can be used as a universal platform for rapid development and implementation of interactive computer-based education programs for a variety of chronic conditions and other health-related topics. The implementation of self-paced interactive multimedia education is based on an algorithm presented in Figure 1. The educational curriculum is divided into consecutive sections. Each section is broken into a sequence of simple educational messages. After each educational message the patients receive a multiple-choice question aimed to assess patient understanding of the educational message. If the patient answers correctly the question next educational message is presented by the CO-ED. If the patient answer is incorrect the current educational message is presented again. At the end of each section patients receive a short quiz. Patients who pass the quiz are forwarded to the next section otherwise they are asked to repeat the current section. After educational curriculum for a particular condition is approved it is entered in Access database on a desktop using a simple data entry form. The Access database is then transferred to the pocket PC and is used by a universal CO-ED presentation module installed on the PDA. Interactive education provided by CO-ED is tailored to patient specific features and utilizes main concepts of Social Cognitive Theory.

METHODS AND RESULTS
Using CO-ED we implemented and tested two educational curriculums: for adult asthma patients and for patients on anticoagulant therapy. Semi-structured, in-depth interviews were used for the evaluation of CO-ED acceptance. Patients were asked to use CO-ED while they were waiting in Asthma Center or Anticoagulation Clinic or while they were recovering in emergency room after asthma exacerbation. Out of 46 patients invited to use CO-ED 44 patients agreed to use it and to give their feedback. Patient age was in the range of 20 to 82 years. Only two patients used PDA before, about half of the patients did not have any computer experience. The overall patient response was similar regardless of patient condition and location of enrollment. All patients were very enthusiastic in using CO-ED and most of them (91%) stated that they prefer using PDA as an education tool rather than a brochure. All patients demonstrated high level of acceptance of user interface including multimedia content and easy to use. Majority of patients (86%) daimed that they would use such a tool at home and would advice other patients to use CO-ED for disease-specific education. Most of the patient (80%) stated that they learned new information about their disease using CO-ED.

DISCUSSION
Our results showed that computer-assisted education can be successfully implemented on the basis of a handheld computer. Both patients and clinicians showed a high level of acceptance of PDA as an interactive education tool. Such features of PDA as small size and mobility may be very useful for delivery of computer-assisted education in a general practitioner office, specialty clinics, emergency rooms and other health care setting as well as in patient...
homes. We conclude that PDA may serve a feasible alternative for development of an effective computer-assisted education program. CO-ED system can be used as a development platform for interactive patient education programs.

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REFERENCES