

Improved Medication Reminding Software for Older Adults

Reducing the barriers to using a Personal Digital Assistant (PDA) will increase the number of people who can benefit from the long list of features a PDA can offer. Our efforts included creating a curriculum targeted to older adults to teach PDA usage skills¹ as well as creating software with an improved interface and operation as compared to standard applications that come with the PDA². We designed these modifications to lower the barriers required to use a PDA and to improve the likelihood of success for the participants.

The most important design principle we focused on was connecting instructions and information to the medication. The most serious drawback of traditional pillboxes is that they separate medication from the dosage and consumption instructions (for instance, take with water) and warnings (for instance, not to be taken with grapefruit juice).

To connect the medication and instructions, we began by making the applica-

tion capable of showing pictures of drugs. The shape, color, and markings of the pills can be clearly seen by the individual. When looking at the details of a particular medication the name, dosage, number of tablets or capsules, and the reason for taking the pills are clearly presented. Contact information for the doctor, pharmacy, and a running pill count are also featured. All buttons and text are oversized on the main display screens to improve legibility (*Figure 1*). On a Samsung i300 hybrid cell phone, buttons appear 4 mm tall on the sharp color screen. We use a 14-point font (3 mm tall) rather than the 9-point font (2 mm tall) in standard applications. The picture of the pills is 6 cm diagonal on our 4 X 4.5 cm display. Screens with the background information such as entering the usage note, reason for taking the drug, and the starting pill count that were entered by the researcher are in standard font size.

THE PDA PILLBOX

We felt it was important to link the re-

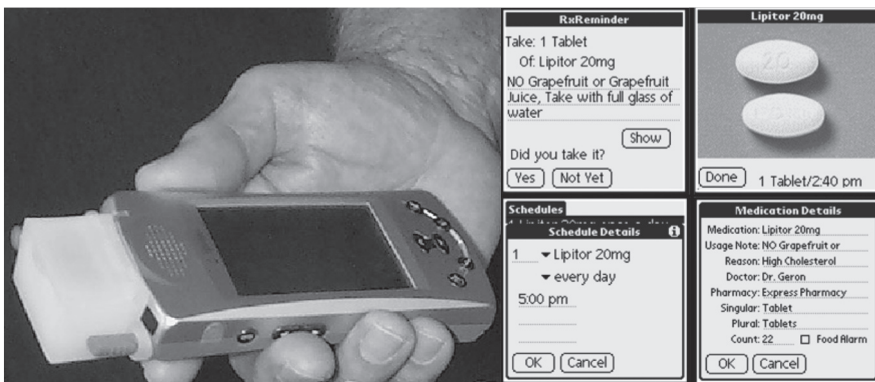


Figure 1. The PDA Pillbox Prototype (patent pending) on the Samsung i300. The PDA pillbox could hold a day's worth of pills, improved access to the stylus, and allowed wireless infrared transfer of information between devices. To the right are Key RxReminder™ application screens showing reminders with warnings and instructions, a picture with dosage and time, a schedule details page, and a medication details page. Medications were programmed in by the research team.

minder program and the medications. To accomplish this marriage we designed a patented pillbox attachment that would integrate with the PDA (*Figure 1*). Mid-day medications are the most challenging because active individuals are often away from where they keep their pills, usually bedside or in the lavatory. The idea of the PDA pillbox was to provide a way to carry mid-day medications or supplements when away from the home.

STUDY DESIGN

Participants

A total of 44 (90% of those recruited) participants ranging in age from 56 to 89 (average age of 72 years) completed training. A majority of the participants were female (65%). All were community dwelling. Most had used computers for e-mail or the Internet (76%) and about half had used cell phones (53%). Approximately 25% had no exposure to either computers or cell phones. All participants indicated an interest in learning to use a PDA.

Procedures and Measurements

Training procedures are documented fully elsewhere¹. Participants received three hours of training over three days. One day of training was focused on learning to use the hybrid cell phone PDA (a Samsung i300) and to enter data using the stylus. The second and part of the third day were devoted to learning to use the four standard applications (Date Book, Address Book, Memo Pad, and To Do List) and the e-mail client. Five minutes at the end of the first two sessions were devoted to reviewing the medication-reminding program and its one controllable feature, the sound of the alarm. A 45-minute usage test was given at the end of training requiring all the participants to run through an exercise that required entering information in the four standard applications. The participants were allowed to ask for

help and the number of requests was tracked. Overall, 89% of participants who took the application usage test (N = 39 of 44) completed all four tasks with some help in the time allotted. Over one fourth (26%) completed the four tasks without a single request for help.

A physical count of the pills using a pharmacy tray was conducted for the participants at the beginning of the study and at the end of each month for three months. Up to two prescriptions or one supplement were followed. In addition to the pill count at each monthly interview, participants were given a PDA usage questionnaire and asked about their medication adherence. No control group was installed; we compared the experiences before and after using the special pillbox. There was no independent check of taking too many or too few pills on any given day other than the count of the medications at the interview.

RESULTS

Medication Adherence Results

The average missed pills were 1.04, 2.43, and .05 pills in months 1, 2, and 3, respectively. We found that 24 individuals, 57% of those counted in the third month of the study had perfect adherence and 28 individuals, 67% of those counted in the third month had missed no more than one pill. Eleven of twelve (92%) of those who took mid-day pills used the pillbox.

Initial comments indicated participants were not rigorous in taking their medications prior to joining the study. Participants universally indicated that they had dramatically improved the regularity of taking their medications at the end of the study.

Usage and Rating the Applications User Interface

RxReminder™ was used by 93% of parti-

participants, significantly higher than other applications including all the standard applications (Date Book, Address Book, Memo Pad, To Do List) and the e-mail client. RxReminder™ received the highest usability rating (4.4/5.0) over other standard PDA applications. This demonstrated that applying design principles and guidelines does result in software that older adults perceived to be easy to use.

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