

Use Smart Phones to Promote Diabetes Self-Management: Robust Elderly in Urban and Rural China

Phase 1 – Analysis of Context, User, & Smart Phone Requirements

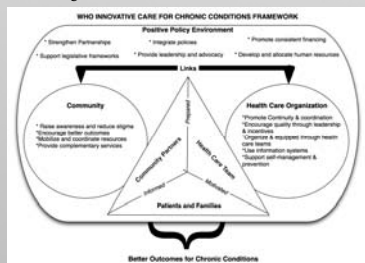
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PURPOSE: “Diabetes is increasing significantly throughout the world, but nowhere is the problem more acute than in China. The world’s most populous country will soon become the nation with the largest number of individuals affected with diabetes” (Ginsberg, MLO, 2003). This situation is particularly acute for the growing aged Chinese population for whom diabetes is a costly, chronic condition and a major cause of disability. Recent studies attribute the burden of diabetes complications to poor patient practices of self-management and limited knowledge of the clinical complexities of diabetes. The purpose of this research is to first explore the propriety and design of smart phone applications for robust (independent in activities of daily living) elderly population with diabetes in urban and rural (county) China. Second, the study includes a pilot of a resulting prototype to assess impact on care and patient knowledge acceptance. The study is guided by a socio-technical paradigm and thus, reflects an appreciation of user, context, and technology.

METHOD: A User-Centered Design (UCD) approach is being used to design and prototype the Smart Phone Diabetes Self-Management support prototype – *Chinese Aged Diabetic Assistant (CADA)*. This approach will (1) focus on users, tasks, and social context through a field study using patient focus groups, clinician interviews, direct observation and document analysis as forms of data collection ; (2) measure usability empirically; and (3) allow iterative design, whereby a product is designed, evaluated, and modified with real users repeatedly in quick iterations. UCD is well recognized as an effective human factors engineering strategy to design ease of use into the total customer experience with products and information technology (IT) that has been applied specifically to health care IT systems (Vredenburg, Isensee, & Righi, 2002; Johnson, Johnson, & Zhang, 2005; Gagnier, 2006). Following are highlights from analyzing context, users, an technology needs from phase one of the IT.

CONTEXT HIGHLIGHTS: The World Health Organization (WHO) has developed the Innovative Care for Chronic Conditions (ICCC) Framework (see Figure 1) to reflect the desired context of international health care. It highlights the need for comprehensive system design that should be tailored to unique needs and resources. Figure 2 profiles the China context in relation to this to the ICCC framework. Significant deviations from the model are indicated in red.



USER (CLINICIAN) HIGHLIGHTS:

- 20-70 yr old clinicians
- No patient-prepared self-care report or trend sheet included in patient record
- No formal patient follow-up (reminders, etc) system. Visits are up to the patient



- See need for dedicated staff for conducting diabetes education
- Training on basic diabetes guidelines is part of formal medical education for doctors. It is up to the doctor on how they integrate it into their care process and to train the nurses.
- Those who treat diabetes patients, attend training seminars on diabetes care from time to time
- Overwhelmed by number of patients treated during clinic (~50 patients per day per doc.)
- Limited time dedicated to patients’ diabetes education (docs., nurses, rarely dedicated person)
- See need for education resources specifically designed for elderly (none currently)
- Distribute & display industry produced education materials, after screening them closely
- Disconnected from community level health care services, but desire more integrated system
- Only receive hand-written patient-prepared logs of self-management (provided by pharmaceutical companies or informal personal notes) from ~ 5-10% of patients. Most have sporadically recorded information.
- Do not monitor diabetes patient affective state, except through simple question or observation of signs of distortion.

USER (PATIENT) HIGHLIGHTS:

- 60-80 yr old robust diabetics
- Empty nesters
- Most trust and listen to doctors completely
- Good at self-initiating follow-up doctor visits; must go to clinic if have questions
- Rural patients generally only see doctors when there are serious complications
- County and rural patients had more misconceptions about diabetes than urban patients
- Most take long walks each day; some participate in outdoor group exercises
- Most urban patients were diagnosed during hospital visit/stay for other illnesses like cardiovascular diseases or at annual physical exam
- Good family support (e.g., spouses especially wives help monitor diet and exercise); most come to clinics with spouses, children, or maids
- Understand need to adjust lifestyle (i.e., diet, exercise) to manage diabetes
- Urban population seems more likely to test blood glucose level using a glucose meter; rural population seems more likely to assess blood glucose level using personal feelings and symptoms
- Urban own mobile phones (1/3 use short messages & PCs; 2/3 carry mobile phone for family to reach them and to make emergency calls); ownership of the cell phone is somewhat lower in county
- Wish for better health care quality of community hospitals; hope there are more health specific community resources to utilize
- Overall, urban elderly are excited about CADA, if simple and straight forward to use and actually effective in helping their self management; willing to invest even if it’s a little bit more expensive
- Overall, county elderly consider themselves old and “should not and don’t” want to learn new technology. More accepting to CADA if connects to a television.



PATIENT CADA SMART PHONE REQUIREMENTS

- Basic requirements:**
- Comprehensive with common conditions
- Handwritten input
- Voice input and output
- Minimal text



CLINICIAN CADA SMART PHONE REQUIREMENTS

- Detailed patient self-recorded data log (e.g., glucose level, blood pressure) that provider can print out and be displayed on the computer to become part of the patient record.
- Smart Phone can be extended to address management of common co-morbidities.
- Television output, if used for patient education.

Self-management functions:

- Alert/warning when outside normal range and steps to take, such as contact doctor
- Remind patients about their appointments and for taking meds/shots
- Test, record, store, analyze data such as blood glucose level, blood pressure, heart rate
- Store patient info to alert bystanders and inform ambulance dispatcher in emergency situations (with GPS to notify ambulance of their location)

Education functions:

- Recommend total daily calories for a given weight/height
- Convert easily identified food quantities (e.g., one apple) to total calories
- Frequently updated information and knowledge about diabetes treatment without upgrade costs
- Prevention, identification, and emergency self care information (e.g., hypoglycemia issues)
- Information diabetes drug side effects
- Listing and links to trustworthy websites (assuming phone has Internet capabilities)
- Information on diabetes co-morbidities



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