Towards Personalized & Accessible mHealth Applications

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Abstract – The overall goal of this research is to design and implement personalized and accessible mHealth. People with dexterity impairments that experience difficulties in manipulating small buttons, icons or controls on smartphones will be utilized in this study as the target population. Their accessibility needs may vary from their limitations on dexterity.

To achieve this goal, this research will be conducted in three stages: Evaluation, Implementation, and Validation. The material of this study is the iMHere system, a novel mHealth platform that has been developed to support self-care and adherence to self-care regimens. Evaluation stage is a single subject study that aimed to identify the barriers of iMHere apps to accessibility and to explore the necessary features that may improve users’ experiences. Implementation stage is aimed to design and develop personalized and accessible mHealth apps. Validation stage is aimed to conduct usability and accessibility studies on mHealth by comparing the original iMHere apps with the redesigned apps from Implementation stage. More subjects will be included in Validation stage to evaluate the feasibility of the redesigned apps.

Same study procedures are used in Evaluation and Validation stages for user’s study. Subjects are asked to use iMHere apps for approximately one week in the field trial. A lab test with in-depth interview is conducted in a “lab environment” after the field trial. Five tasks are randomly given to the subjects in the first 30 minutes. The time for a subject to complete each task, the number of possible errors that confront a subject, and the number of errors a subject is able to self-correct are recorded for statistical analysis.

Telehealth Usability Questionnaire (TUQ) that was designed to evaluate the usefulness, ease of use, effectiveness, reliability and satisfaction for Telerehabilitation is collected at the beginning of the in-depth interview. Followed by structured questions, these questions would help us understand the complexity and effectiveness use of user-interface components on mHealth apps, and their impacts on users’ satisfaction.

iMHere platform provides ability for clinicians to engage patients through monitoring their progress and devising personalized treatment plans. Reminders, prompting, and monitoring are important to empower patients for self-management. Five apps are currently available in iMHere, for medication, bowel, urine, depression, skincare management respectively. Those apps are developed to allow patients to setup reminders according to their preferences. These self-defined reminders will prompt patients to perform self-care tasks, such as to take medication. A patient’s response to issues or problem they found, such a photo of skin breakdown will be sent to the portal for the purpose of monitoring. Using this information from iMHere, clinicians will be able to monitor adherence to the treatment plan.

Two iMHere apps, including MyMeds for medication management and Skincare for skin check up, are concentrated in this research for personalization. This is due to the complexity of completing tasks when compared with others apps, such as to collect depression score and to record bowel movement issues. The activities in MyMeds app include searching and finding the correct medication, setting up a medication schedule and responding to medication reminders. Skincare app requires setting up regular skin check schedules, responding to reminders, taking picture and reporting issues.

Total of nine subjects that experience different level of dexterity impairments were included in Evaluation stage. The overall TUQ score is 5.94 (out of 7). Though overall they are satisfied with iMHere system and would like to use in the future (average score: 6.39), the sections for “ease of use & learnability”, “interface quality” and “reliability” received scores lower than 6 (average scores: 5.56, 5.67 & 5.56). The most common suggestions are made to:

1) Simplify and reduce the complicity of these apps,
2) Provide longer training time,
3) Provide feedback to users that can tell them if they are doing correctly,

In addition, more than half of the subjects commented on the button size. They will prefer to have larger buttons. Two of them indicate that they may be more comfortable to see dark text on white background. Some of them would like to try different picture background to make the app more personalized.

This research is currently under Implementation stage. The development is focused to incorporate user-interface components related to physical presentation (e.g., widgets, visual cues) and navigation (e.g., flow and layout) to achieve and adaptable user interface.

Mobile Health (mHealth) on the Smartphone has been described as a patient-centered approach to the quality of care. mHealth apps have enormous potential for supporting self-management and healthcare service delivery for patients, and for reducing the burden of care for providers. Patients supported by self-care apps can potentially improve their lives and better manage their health conditions. Dexterity limitations are commonly associated with chronic disease, accident or aging. Before these particular groups of populations can harness the potential of mHealth, the emerging trends in healthcare, the accessibility of mHealth has to be addressed to ensure the quality of such services as a whole. After this research, we are expected to conclude a set of rules for enhancing accessibility in designing personalized mHealth apps. These rules could be used for service providers to improve their usability and accessibility of apps through personalization.