



Research Article

Development and Evaluation of a Computerized Multimedia Approach to Educate Older Adults about Safe Medication



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SUMMARY

Purpose: Interactive multimedia education using computer technology is increasing in the area of health education. The purpose of this study was to examine the effects of interactive multimedia education on community dwelling older adults' self-efficacy and knowledge for medication and level of satisfaction with the education program.

Methods: A nonequivalent control group pretest and post-test design was used in this study. The multimedia education was designed to enhance safe medication of older adults. Education consisted of seven modules which contained the medication name, usage, side effects, interactions, and storage requirements. Computerized interactive learning activities consisted of multimedia animations and games. A total of 60 older adults from two local senior centers were recruited and assigned to the experimental and control group. Twenty-six participants in experimental group used the interactive multimedia education on laptop computers.

Results: Participants receiving interactive multimedia education had significantly higher self-efficacy ($F = 20.03, p < .001$) and knowledge ($F = 36.26, p < .001$) scores than the control group did at post intervention. The experimental group indicated a high degree of satisfaction with the interactive multimedia education.

Conclusion: The study results suggest that the interactive multimedia education is an effective teaching method that empowers older adults to facilitate individual learning using computer technology.

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Introduction

Multiple medications such as over-the-counter medicines, nutritional supplements, and prescription medicines can result in adverse drug interactions and pose major barriers to optimal health in older adults who have chronic multiple diseases (Korea Food & Drug Administration, 2009). An older adult's drug metabolism is more variable than a younger adult's (Park, 2008) and older adults often report impaired ability in terms of hearing, reading, and understanding of written and oral medication instructions (DiMatteo, 2004; Lee & Park, 2010). With a growing number of prescription medicines available and the population aging, the potential risk for medication problems is ever increasing. Safe medication means ensured safety of self-management on medication therapy (US Food and Drug Administration, 2013).

Previous studies reported that the health professionals' workload put in doubt the feasibility of individual counseling and teaching of medication use for all patients (Jang, 2012). Verbal instruction and printed drug guides have been the main methods of public medication education (Hill, 2004; Lee & Park, 2007). More efficient and effective means of providing drug information is needed. Nurses have an important role in educating older adults about drug interaction and safe medication (Neafsey, Anderson, Coleman, Lin, M'lan, & Walsh, 2009). A few studies in Korea have emphasized the role of the nurse in educating or helping older adults to develop appropriate knowledge and behaviors required for self-medication (Lee & Park, 2007; Park, 2011). However, education on the self-management of medication is typically delivered with written or verbal information and is more to be "one size fits all" rather than individualized (Fialova et al., 2005). For instance, traditional health education materials and contents are often designed and delivered at a population or group level (Sawhney & Reicherter, 2005). In addition, the traditional method fails to consider the individual interactions that uniquely influence personal learning experiences about health-related behaviors. Failure

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to consider individual learning experiences in health education likely results in a poor understanding of the contents and a low compliance by older adults, who have different health literacy levels and expectations. Older adults can benefit from traditional medication education, but traditional programs are labor-intensive and costly and they are not always successful in producing long-lasting changes in effective strategy use. Thus there is the pressing need to identify alternative modes of education for the elderly (Lee & Park, 2007; Lin & Effken, 2010).

Computer mediated instruction has been proven to be an effective educational method for older adults, resulting in increased knowledge and self-efficacy of health behavior change (King et al., 2004). Interactive multimedia instruction using computer technology is one method that can be used to supplement or replace the traditional off-line and standardized education. Interactive multimedia is the use of content forms that include a combination of text, audio, still images, animation, video, and described as electronic media devices that are used to store and experience multimedia content (Dix, Finlay, Abowd, & Beale, 2004; Lim, Lee, & Ahn, 2009). In particular, health-related training for the vulnerable population is one area that could benefit from the use of interactive multimedia based instruction to attract users including the elderly who have learning difficulties with text based information. Interactive multimedia instruction using computer technology allows the user some control over the pace of learning; it provides an interactive learning environment in which materials can be specifically targeted or tailored, and provides a variety of multimedia formats including graphics, animation, and games (Kang, Kang, Yang, Ku, & Kim, 2009). Rich multimedia education using interactive technology was generally proved to be more effective in changing health behaviors than text-based conventional education (Oenema, Brug, & Lechner, 2001).

Knowledge and self-efficacy are one of the traditional outcome variables of educational interventions. These two concepts have been shown to frequently provide an explanation of behaviors. Self-efficacy is defined as the belief that a person can effectively perform an action required to attain a desired goal (Bandura, 1986). Studies suggest that cognitive abilities such as knowledge and self-efficacy can be strong predictors of safe medication behavior, and serve as valuable outcome indicators for education (Park, 2008; Risser, Jacobson, & Kripalani, 2007). Data from previous studies reported that older adults with little knowledge are at risk of medication misuse and abuse (Lee & Park, 2010). It has been suggested that self-efficacy is a strong predictor of adherence to knowledge-based intervention, and can serve as a useful basis for analysis (van Es, Nagelkerke, Colland, Scholten, & Bouter, 2001). The feasibility of the intervention needs to be tested by providers in a realistic setting and satisfaction with the system in particular is an important aspect of usability. In addition, increased level of patient satisfaction will promote self-efficacy and knowledge resulting in improved safe medication adherence (Neafsey et al., 2009).

This study describes the development and evaluation of an interactive multimedia medication education using computer technology for older adults living in the community. The web-based multimedia education was designed to be delivered to older adults to improve self-efficacy towards safe medication and knowledge of medication instruction. In this study, the program was developed to improve adherence to medication instructions, rather than specific drugs or disease. The program may provide a model for tailored program offering specific health information.

Purpose

In this study, the specific aims related to the outcomes of the interactive multimedia medication education were to show that the

interactive multimedia education program increase self-efficacy for safe medication and knowledge of medication.

Methods

Study design

A nonequivalent control group pretest and post-test design was used to examine the effects of interactive multimedia education on community dwelling older adults' self-efficacy and knowledge for safe medication.

Setting and sample

Sixty older adults, from two senior centers in a metropolitan city in Korea, were selected. Thirty older adults were selected from each center. One senior center was assigned to the experimental group and the other to the control group. The study was conducted from March 1st to May 7th, 2012. Participants were at least 65 years of age. Study participants met the following criteria: (a) were able to perform activities of daily living, (b) were cognitively aware, (c) understood education, (d) were taking one or more prescription or over-the-counter drugs, and (e) were willing to sign the consent form. Those who met the inclusion criteria were assigned to one of two groups, with the goal of retaining 26 subjects per group, to yield sufficient statistical power (.80) to detect differences between groups (effect size = .80) at an alpha of .05 (Cohen, 1988), estimating that standardized sizes (d) ranged from 0.60 to 1.30, depending on which participant outcome measure was considered. Thirty subjects per group were recruited to allow for a 20% attrition rate for the study.

Data were either anonymous (i.e., self-report instruments and surveys) or confidential (assessment of inclusion criteria) and posed no physical or psychological risk to participants. Individual participants were not identified in the analyses or in reporting of data and results. All study participants were asked to sign an informed consent form that was read to them and explained, if needed.

A total of 51 participants completed the study: 26 participants in the experimental group and 25 participants in the control group. Four participants from the experimental group and five from control group were unable to complete the study because of illness or personal reasons.

Ethical consideration

This study was approved by the institutional review board. The purpose and procedures of the study were explained to the director for approval, at each senior center. After approval was granted to conduct the study, the participants gave their written consent during the initial contact.

Measurements

Self-efficacy for appropriate medication use

Self-efficacy is defined as the confidence in the individual's ability to perform a task and an important contributing factor to one's behavior (Bandura, 1986). In this study, self-efficacy for appropriate medication use was defined as confidence in an older adult's ability to use medication appropriately. The Self-Efficacy for Appropriate Medication Use Scale developed by Risser et al. (2007) and translated into Korean by Park (2011) was used in this study. The 13-item instrument consists of two dimensions. One dimension assesses the self-efficacy for taking medicines under challenging circumstances, such as when patients are busy, outside of

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