



Original Article

The ability of older adults to use customized online medical databases to improve their health-related knowledge



Ophir Freund^a, Iris Reyhav^{b,*}, Roger McHaney^e, Ella Goland^c, Joseph Azuri^d

^a Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

^b Head of Department of Industrial Engineering & Management, Ariel University, 40700 Ariel, Israel

^c V.P. Nursing & Health professions, Bait Balev Ltd., Herzliya, Israel

^d Sackler Faculty of Medicine, Tel Aviv University and Maccabi Healthcare Services, Tel Aviv, Israel

^e Daniel D. Burke Chair for Exceptional Faculty, Management Information Systems, Kansas State University, Manhattan, KS, USA

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ABSTRACT

Introduction: Patient compliance with medical advice and recommended treatment depends on perception of health condition, medical knowledge, attitude, and self-efficacy. This study investigated how use of customized online medical databases, intended to improve knowledge in a variety of relevant medical topics, influenced senior adults' perceptions.

Method: Seventy-nine older adults in residence homes completed a computerized, tablet-based questionnaire, with medical scenarios and related questions. Following an intervention, control group participants answered questions without online help while an experimental group received internet links that directed them to customized, online medical databases.

Results: Medical knowledge and test scores among the experimental group significantly improved from pre- to post-intervention ($p < 0.0001$) and was higher in comparison with the control group ($p < 0.0001$). No significant change occurred in the control group.

Conclusion: Older adults improved their knowledge in desired medical topic areas using customized online medical databases. The study demonstrated how such databases help solve health-related questions among older adult population members, and that older patients appear willing to consider technology usage in information acquisition.

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1. Introduction

Previous research illustrates varying levels of patient compliance with suggested medical treatment following an examination. Compliance often depends on perceptions of health condition, medical knowledge, attitude, and self-efficacy [1–3]. There is little doubt that higher levels of compliance will improve medical treatment outcomes and ultimately result in better patient health. Therefore, our guiding inquiry became: *How can we influence compliance variables among patients?*

Advanced and widespread uses of the internet and online databases have led to the creation of “eHealth literacy”, a term

defined by Norman and Skinner as “the ability to seek, find, understand and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem” [4]. In other words, the internet can make it easier for patients to find medical information [5], which can lead to increased patient empowerment and greater involvement in decision-making processes [6,7]. In addition, use of online medical information may result in positive effects on patient–doctor relationships and ultimately, improve patients' health [8–10]. More unique possibilities enabled by the internet include: the ability to ask a private medical question, ways to capture medical information [11], methods to seek international expert advice, and ability to research medical conditions – mostly without making an appointment or exposing one's identity [12]. A computer based eHealth Intervention in the form of a four-week training program positively impacted both the participants' healthcare, and their ability to use knowledge gained to play a more active role in their own healthcare [13].

In many ways, eHealth literacy and online health information are especially important to older adults. For instance, the improve-

* Corresponding author at: Head of Department of Industrial Engineering & Management, Ariel University, P.O.B 40700, Ariel, Israel. Office: +972 39066325, fax: +972 39066322.

E-mail addresses: ophir068@gmail.com (O. Freund), irisre@ariel.ac.il (I. Reyhav), mchaney@ksu.edu (R. McHaney), ela.g@bbalev.co.il (E. Goland), azuri.yo@mac.org.il (J. Azuri).

ment of medical treatment and care increased life expectancies and helped make the older adult population (65+) a growing sector. In 2014, this group reached a peak in many countries such as Canada, United Kingdom, and United States [14]. It further is estimated that by 2030 more than 20% of US residents will be aged 65 and over, representing 70+ million people [15] with high needs for health resources.

In other examples of eHealth literacy's importance, health information and assistance play central roles in the lives of older adults. In 2009, senior citizens in Israel visited physicians 2.5 times more frequently than general population members did. Among these, 70% were diagnosed with chronic illnesses [16]. According to a 2013 report by the National Center for Health Statistics, 22.7% of the US population over the age of 65 reported fair or poor health and 22.2% visited an emergency room during the past 12 months [17]. Together, these findings represent high morbidity and emphasize the need for healthcare in this sector.

Despite these statistics, a positive trend shows technology use and eHealth literacy are no longer limited to younger population members [18]. Per a 2013 survey by the Pew Research Center, 59% of older adults go online, 27% own a tablet or eBook reader, and 18% have a smartphone – and these numbers rapidly are increasing [5]. Furthermore, when online, older adults are interested in topics related to health and medicine more often than younger people [19]. According to the 2015 report of the World Internet Project (WIP), in most countries, at least 70% of users go online for health information [20]. Another survey of more than 30,000 adults reported the internet was the preferred source of information about health among older population members [21].

Despite advantages and progress made, older adults still lag the younger population in terms of internet use, especially with respect to eHealth literacy [22,23]. This gap is not surprising, since individuals who have low health literacy, such as seniors, also have low computer and internet literacy [24,25]. People with low eHealth-literacy often are limited in their use of online resources [22] due to factors such as inappropriate interfaces and systems, or lack of knowledge and skills for utilizing the internet's potential [24,26]. In addition, low health literacy negatively correlates with ability to evaluate online health information [27], an important part of the eHealth literacy process. The majority of online searches for medical information start with general search engines [28], often leading to deceptive or inaccurate sites [8,29]. This increases the likelihood of incorrect content evaluation, particularly among senior citizens, and ultimately leads to poor medical decisions. In addition, many older patients lack motivation or desire to adopt new technologies [30]. Therefore, a future challenge is to direct patients to reliable, correct online medical databases, and avoid unintended health consequences.

Empirical research that relates efficacy of eHealth literacy interventions in developing skills and knowledge amongst older adults is relatively new, but recognized as important [31,32]. Interventions influence participants' knowledge of computers, or the internet, which result in improvements in areas such as self-efficacy, attitudes, behaviors, and perceptions [33,34]. While these subjects are important, it remains essential to assess abilities of older adults to select and understand relevant medical information [35] obtained from online sources.

This study investigated the impact customized online medical databases have on older adults' knowledge regarding relevant medical topics. Most previous research in this area examined effects of eHealth literacy interventions according to subjective measures, such as self-perceived change in knowledge or skills through surveys or interviews [34,36,37]. In contrast, this study evaluates actual abilities of senior citizens to use and gain benefit from an intervention via objective and quantitative means. This study relied on Norman and Skinner's eHealth definition [4] to formulate our

main research question: *Can older adults effectively use internet links to find and understand specific health information from customized online medical databases (electronic sources), and then apply knowledge gained to address questions about relevant health problems?*

2. Methods

2.1. Overview

To evaluate our research question, we conducted a parallel group, pre-post study involving residents from three older adult care homes in three different cities – two from central and one from northern regions of Israel. This study operated in cooperation with Maccabi Healthcare Services group, the second largest health maintenance organization (HMO) in Israel, and with Bayit-Balev, which owns and runs a chain of adult care homes. Maccabi Healthcare Services and Bayit-Balev Institutional Review Board reviewed and approved the study in accordance with the Israeli Ministry of Health.

2.2. Participants and recruitment

Participant recruitment and the study took place from November 2015 to May 2016. Researchers invited eligible residents in selected institutions to participate. Inclusion criterion included: (1) age > 65; (2) the ability to read and understand; and (3) no cognitive impairment. An initial invitation appeared in institution newsletters with an explanation about the research. To maximize response and cooperation of volunteers, a member from our research team presented the study at each institution, emphasizing its innovative character and the opportunity to use tablet technology. Before filling in the questionnaire, participants received directions about operating the tablet and using internet links. We also provided on-the-spot technical support during questionnaire administration but offered no medical advice.

Recruitment and data collection used three main "offline" methods:

1. *Multi-participant meetings at pre-scheduled times.* The executive social worker in each adult care home assisted with connections between the research team and the residents; and helped coordinate the meetings. We recruited approximately 75% of the participants with this method.
2. *Small meetings in the adult care homes with up to two persons.* The executive social worker scheduled residents for small meetings. Research team members visited at specific, convenient times to meet with one or two residents simultaneously. We recruited approximately 12.5% of the participants using this method. Fig. 1 illustrates.
3. *Direct approach.* A research team member, accompanied by a social worker or a nurse from the institution, approached appropriate individuals in the facility and offered a chance to participate after explaining the research. We recruited approximately 12.5% of the participants with this method.

2.3. Study instrument

We created a computerized questionnaire (shown in Appendix A) via the Qualtrics platform. Respondents answered online using a tablet device attached to the care homes' wireless networks. A portable Wi-Fi router provided a backup connection. Since physical disabilities and health issues can limit the benefits of eHealth literacy among older adults [5], we chose to use touch-sensitive, tablet computers. This technology provided options to increase text size (addressing potential visual problems), did not require a computer

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