Facilitators and Barriers of Electronic Health Record Patient Portal Adoption by Older Adults: A Literature Study

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Abstract. Patient portal usage by older adults, patients aged 50 years old and above, is intended to improve their access and quality of care. Acceptance of patient portals by this target group is low. This paper discusses the results of a literature review to determine the facilitators and barriers that drive or inhibit older patients to adopt patient portals. Articles were included when they described an acceptance, adoption or usability evaluation study of a patient portal. From a total of 245 potentially relevant articles, 8 articles were finally included. We used the Unified Theory of Acceptance and Use of Technology (UTAUT) as a classification model to analyze factors influencing older adults' acceptance of patient portals. Main facilitators for acceptance were 'performance expectancy' and 'voluntariness of use' related to a higher level of education and experienced health. Main barriers were limited health literacy and motivation related to involuntariness to use a patient portal. Poor facilitation conditions (limited technology access and no prior knowledge on existence of a patient portal) hampered access to a portal. More thorough insight into the latter is needed to improve the reach and effectiveness of patient portals among older patients.

Keywords. Patient portal, older adults, elderly, acceptance, adoption, UTAUT

1. Introduction

Usage of patient portals is intended to improve access and quality of care and may result in improved health outcomes, especially for chronically ill patients [1]. Effective use of patient portals by older adults, patients aged 50 years old and above, is also expected to lower healthcare expenditures. Despite the associations of patient portal use with these favorable outcomes, voluntary uptake and use of patient portals by this target group have been low [2]. Older adults' *enrollment* to patient portals is expected to rise, since the elderly population is one of the fastest growing user segment of internet [2]. However, their *adoption* of patient portals is questionable. Besides a patient's age, aspects as health literacy level and socioeconomic status influence patient portal acceptance. Adoption of

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patient portals of older adults is further jeopardized by biological, psychological and social aging processes; it is thus relevant to examine which factors contribute to or impede the adoption of patient portals by this target group [3]. This is particularly relevant for chronically ill older adult patients, since it is foreseen that portals will increasingly fulfill a role in patients' self-management of their disease and care [4]. If patient portals indeed become a key tool for self-management and adoption rates of patient portals by older adults remain low, chronically ill older adult patients might be withheld from patient portal usage benefits and they might encounter difficulties due to a lack of non-patient portal services, such as a dedicated nurse practitioner to answer questions by telephone. It is thus needed to evaluate older adults' experiences and preferences for using a patient portal. The goal of this literature review is to determine the facilitators and barriers that drive older adult patients to adopt EHR patient portals by using the Unified Theory of Acceptance and Use of Technology (UTAUT), a prominent technology acceptance framework [5], as a classification model for those factors.

2. Methods

The database PUBMED was searched on the 7th of October 2016 for studies reporting on possible factors influencing the usage of patient portals. We used the following search strategy: "patients"[MeSH] OR "patients"[All Fields] OR "patient"[All Fields]) AND ("Electronic Health Records"[MeSH] OR "Telemedicine"[MeSH]) AND (factors[All Fields] OR barriers [All Fields] OR reasons [All Fields]) AND acceptance[All Fields]). We performed three additional searches including 'patient portal', 'barriers' and 'acceptance' in all fields. We limited all searches to articles in English published between January 2010 and July 2016. Studies were included if the abstract described an acceptance, adoption or usability evaluation study of a patient portal (1) with patients over 50 years old (2) in a hospital or primary care setting (3). We excluded articles reporting on a general status update of patient portals, with physicians as study population, reporting solely on one functionality of a patient portal, assisted living technologies, or a disease specific eHealth or mHealth tool.

The methodological quality of each article was evaluated by means of the Mixed Methods Appraisal Tool (MMAT), used for systematic mixed studies reviews, resulting in a standardized quality score across diverse type of study designs, study populations and sampling [6]. Per study, the first and second author independently identified facilitators and barriers and mapped these onto UTAUT concepts. If needed, a new concept in the UTAUT was introduced.

3. Results

3.1. General Characteristics of Included Studies

The searches resulted in 245 potentially relevant articles. Deduplication and abstract screening resulted in the rejection of 213 articles. Full text versions were not available for 2 articles and 22 articles were excluded after reading the full text version. This resulted in the inclusion of 8 articles for further analysis. The interrater reliability score

was κ=0,65. Five studies followed a qualitative design, with one using the UTAUT framework to formulate questions for the interviews and questionnaire [7].

3.2. Facilitators and Barriers of Older Adults' Patient Portal Usage

Table 1 and 2 respectively show the reported facilitators and barriers related to UTAUT concepts. Concerning facilitators, non-occurring UTAUT concepts were: effort expectancy, gender and age. We introduced one UTAUT sub-concept for performance expectancy and five sub-concepts for voluntariness of use. Concerning barriers, non-occurring UTAUT concepts were: performance expectancy and gender. We introduced two UTAUT sub-concepts for facilitating conditions and three sub-concepts for voluntariness of use.

Table 1. UTAUT categories related to facilitators of older adults' patient portal usage

UTAUT *Extended UTAUT*	**Reported Facilitators**	Age cluster	[Ref #] *Quality %*
Performance expectancy	Options for digital archiving and analysis of one's own medical data	55-75+	[8], *33*
	Beneficial aspects of patient portal: self-health monitoring by patient	Mean 56 Mean 51	[7], *40* [9], *40*
	Reread medical information at home	Mean 64	[1], *13*
Performance expectancy: benefits patient/provider relationship	Patient participation: patient portal facilitates influence of patient on their disease management and treatment	Mean 64	[1], *13*
	Option for sending secure messages to healthcare team via patient portal	65-79 Mean 56	[10], *13* [7], *40*
	Patient portal is neutral medium for delivering difficult news or 'difficult to hear' advice	55-75+	[8], *33*
Social influence	Availability of other person to help with usage	Mean 64	[1], *13*
	Physician or someone else thought use of patient portal would be useful for patient	Mean 64	[1], *13*
Facilitating conditions	Use via mobile device (smartphone, tablet)	65-79	[10], *13*
	Comfortable in using the internet	45-64, 65+	[11], *40*
Experience	Regular use of internet	Mean 64	[1], *13*
Voluntariness of use (VoU)	Ambition to learn how to use patient portal	50-100	[12], *40*
VoU: level of education	Higher level of education related to higher probability of using of patient portal	65-79 55-75+ Mean 55	[10], *13* [8], *33* [13], *13*
VoU: health interest & status	Better health conditions related to higher use of patient portal	65-79	[10], *13*
	Patients regularly searching health information on internet more likely to use patient portal	Mean 64	[1], *13*
VoU: dissatisfied current care communication	Dissatisfaction concerning current care communication	Mean 64	[1], *13*
VoU: Satisfied current care communication	Positive experiences healthcare clinic (careful listening, easy information explanation)	45-64, 65+	[11], 40
VoU: Cultural background	Cultural background might influence of use: Caucasians more positive attitude toward use and less connectivity problems than black patients	Mean 51	[9], *40*

Table 2. UTAUT categories related to barriers of older adults' patient portal usage

UTAUT Extended UTAUT	Reported Barriers	Age cluster	[Ref #] Quality%
Effort expectancy	Use of patient portal would be too complicated for patient according to patient	Mean 51	[9], 40
Social influence	Older adults not able to use internet by themselves, only browse internet with help of others	65-79	[10], 13
Facilitating conditions (FC)	Limited technology and/or internet access	55-75+ Mean 51 50-100	[8], 33 [9], 40 [12], 40
FC: implementation issues	Limited to no prior knowledge on existence of patient portal	Mean 64 Mean 51 50-100	[1], 13 [9], 40 [12], 40
FC: concerns	Concerns about privacy or security issues of medical data in patient portal	Mean 56 Mean 51	[7], 40 [9], 40
Age	70 years old and above limited to no to use of patient portal	mean 64 55-75+ 65-79	[1], 13 [8], 33 [10], 13
Experience	Lack of or limited technology experience and proficiency	55-75+ mean 56	[8], 33 [7], 40
VoU: Health literacy	Limited health literacy	Mean 55	[13], 13
VoU: satisfied with current care communication	Satisfied with the status quo	50-100	[12], 40
	Wish to preserve in-person aspects of existing patient-provider relationships (i.r.t. limited health literacy)	Mean 56 Mean 51	[7], 40 [9], 40
	Prefer to leave disease management to physician	Mean 64	[1], 13
VoU: motivation	Lack of motivation to use patient portal	Mean 51	[9], 40

4. Discussion

This literature review gives insight into the facilitators and barriers on patient portal acceptance by older adult patients, analyzed and clustered by means of the UTAUT. 18 facilitators predominantly concerned the UTAUT concepts 'performance expectancy: 'benefits patient/provider relationship', 'voluntariness of use: level of 'education', 'health interest & status', '(dis)satisfied with current care communication' and 'cultural background'. Twelve barriers predominantly concerned the UTAUT concepts 'facilitating conditions: implementation issues' & 'concerns' and 'voluntariness of use: 'health literacy', 'satisfied with current care communication' and 'motivation'.

We introduced 11 sub-concepts to the UTAUT, 6 related to facilitators and 5 to barriers. The UTAUT provides a theoretical framework for analyzing users' acceptance of health technology, but needs to be supplemented with concepts reflecting barriers and facilitators of older patients influencing their acceptance of patient portals. Another review suggests three additional constructs to the UTAUT for analyzing older users' home telehealth services acceptance: 'Doctor's Opinion', 'Computer Anxiety' and 'Perceived Security' [3]. These constructs correlate with the sub-concepts we introduced for 'performance expectancy' reflecting the (changing) patient/provider relationship by introduction of a patient portal and 'voluntariness to use' reflecting motivational reasons to use or not use a patient portal – such as (dis)satisfaction with current care communication, health literacy level and level of education. Yet, we found additional barriers related to access of digital health services for older adults, such as limited technology and internet access and privacy concerns on the medical data in the portal. Though most trend studies report that internet access issues of older adults will vanish over time, relying on everyday technology or generic internet use rates of seniors to

estimate digital health use may be misleading [14]. Seniors have used digital health tools at low rates with only modest increases from 2011 to 2014; these tools are not reaching most seniors and their underuse is associated with socioeconomic disparities, raising concerns about their ability to improve quality, cost, and safety of seniors' health care [14]. With the role of patient portals concerning patients' self-management growing, it is important to gain more sight on the conditions that hamper or facilitate the reach and acceptance of these portals by older patients.

5. Conclusion

Patient portal use is promoted in healthcare but acceptance rates of older patients are low. Older patients' expectancy of performance of a portal and higher education levels facilitate acceptance. Whereas a lower health literacy level and being satisfied with the status quo relate to involuntariness to use a patient portal. Poor facilitation conditions, such as limited technology and internet access, hamper older adults' access to a patient portal. Future research should focus on conditions for engaging older patient populations in patient portal usage within the broader context of patient profiles, the patient/provider relationship, decision making, provision and self-management of care.

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