

Classifying Health Information Interactions and their Motivations: A Study with Older Adults and Electronic Patient Portals

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Current research on electronic patient portals and electronic health records shows a broad range of benefits to patients, healthcare professionals and healthcare when patients are allowed to take part of their medical record information. There are, however, shortcomings in the current knowledge about patients' and other stakeholders' information interactions with electronic health record systems and what motivates them to use these. We present a tentative classification of information interactions with an electronic patient portal, the stakeholders involved in the interactions and reasons that motivate patients to interact with electronic health record information. The purpose of the classification scheme is 1) to inform the design of useful health information access systems, and simultaneously to 2) contribute to the broader information interaction research by acting as a first step in developing a more generic classification that brings together information interactions, their stakeholders and stakeholder motivations to engage with information.

Keywords

electronic health records, electronic patient portals, faceted classification, information interactions

1. Introduction

The existing literature on electronic patient portals (EPP) and electronic health records (EHR) refers to a broad range of benefits to patients and healthcare when medical record information is opened for patient consultation. Patients who access their own medical record information using an EHR are more knowledgeable and adherent to treatment [1,2], capable of informed decisions regarding their condition and healthcare [3,4] and feel empowered [5]. Similarly, healthcare and healthcare professionals have been suggested to enjoy multiple benefits when patients can access their own EHR [6,7]. Studies on older adults reveal that for patients, viewing lab results, communicating with healthcare providers [8], reviewing medical record information and checking appointments [9] are common interactions. Easy access to information, direct communication with health providers, and being able to make appointments are valued advantages [10]. Difficulties with the interaction and annoyances with, for example, lack of timely reactions to the patient's inquiries do, however exist [9]. Motivations to use these services include, for example, changes in health outcomes, and improved understanding of one's health condition and engagement with healthcare providers [2]. There are, however, shortcomings in what is currently known about patients' and other stakeholders' information interactions with EHR systems and what motivates them to use an EHR as an information resource. Firstly, the existing studies are difficult to compare as the existing EHR systems differ from each other [11]. Secondly, few studies have focused in a systematic manner on explicating patients' information interactions and what motivates them to interact with EHR information in these specific ways (cf. [12]). In this study we focus on information interactions in the sense of diverse individual (human) dealings with information (as e.g. in [13]). This differs from parallel notions of information interaction [14] (in singular) or human-computer interaction [15] as broad processes that incorporate the information behaviour in its entirety (cf. [16]). A structured scheme for explicating interactions, their stakeholders and underpinning motivations would contribute to these both ends.

On a more general level, the issue of a lack of systematic mapping of information interactions and their relation to the purposes and motivation of engaging with information is not, however, specific to EHRs and health information. So far, the efforts of classifying information interactions have been largely limited to information searching (e.g. [17-19]) whereas the work on motivations has only relatively recently began to broaden its interest beyond the classical (but to a large degree, useful) cognitive-instrumental and task-based theorising [20-23] to cover other issues like meaning-making [24] and emotions [25,26] even if the holistic nature of information behaviour has been acknowledged in principle for a long time [27]. In order to improve the current understanding of the underpinnings of information interactions to cover these relatively under-researched dimensions, it would be useful to build on the existing classificatory line of research and broaden it to pursue towards a systematic understanding of how interactions, their stakeholders and underlying motivations are related to each other. Such a classification would be helpful in understanding similarities and differences between specific interactions and different types of interactions, shedding light on chains of operations and in developing measures to facilitate them with systems and services.

As a first step towards addressing this gap, the aim of this article is to present a tentative classification of information interactions with an electronic patient portal, their related stakeholders and reasons that motivate them. The purpose with the classification scheme is 1) to inform the design of health information access systems, and simultaneously to 2) contribute to the broader information interaction research by acting as a foundational inquiry into developing a more generic classification that brings together information interactions, their stakeholders and stakeholder motivations to engage with information. The work is based on a qualitative analysis of transcripts of a focus group interview study conducted with older adults in Finland.

2. Classification of information interactions

Several earlier studies have investigated patients' attitudes and preferences towards EHRs (e.g. [28-32]), and especially more recently, how specific systems are used in practice (e.g. [33,34]). In contrast to system and system use centred studies (e.g. what user interactions EHR systems are built for as in [11]), there is less research that would specifically focus on information interactions and use [35], and systematic mapping of how users interact with the information in EHRs. The same apply to existing classifications in the medical domain such as the PICO framework for identifying components of clinical questions [36] that focus on medical interventions rather than explication of what patients do. In other contexts, both domain specific and generic classification schemes of both tasks (e.g. [37-39,17]) and information interactions have been developed (e.g. [20,17-19,40]) and used to support such efforts by serving as a structuring and communication instrument for giving complex personal and social informational processes a manageable structure and organisation [41,42] and to understand the relation between work and search tasks (e.g. [43,44]).

3. Method and material

Older adults' information interactions with EPPs were elicited in six (G1-6) focus group interviews (3-5 persons per group, reported in this article with letters A-D) with altogether 24 individuals conducted in Finland in 2018. A convenience sample of active older adults, either only recently retired or those still active in working life (i.e. not elderly), with experience of EPPs was used. None of the participants had a professional background in healthcare. The participants, 17 (71%) female and seven male, were between 55 and 73 years old (mean 60.6 years). The interviews were semi-structured and focused on EPP user experiences (uses, barriers, enablers and outcomes of use) and health information behaviour. The themes and interview guide were developed on the basis of an earlier systematic review of literature on older adults' views on eHealth services [45]. In the end of the interviews, the groups were asked to discuss their ideas, needs and wishes concerning an ideal EPP. The interviews lasted between 47 and 91 minutes in duration. Four of the group interviews were conducted in Finnish and two in Swedish. In five interviews, two researchers were present, one of them acting primarily as a notetaker and observer while the other guided the discussion. All interviews were video and audio-recorded and transcribed. The data was analysed using a grounded theory inspired approach for inductive thematic coding and identifying different types of information interactions with EHRs and their underlying reasons in the material, first by IH, and in a subsequent phase, independently by a KEB. After the second round, the differences in the two initial classifications were discussed and solved using a consensus-based approach. The data were analysed using inductive thematic coding

and identifying different types of information interactions with EHRs and their underlying reasons in the material by two of the authors.

4. Results

The analysis of the interview material produced a five-dimensional, two-level classification of interactions with EHR and their motivations (Table 1). In the classification scheme, the first facet describes purposes that motivate interviewees to interact with EHR (P) (including orientation/recall for understanding what has happened, pleasure and curiosity, use of information for direct action, knowledge making, self-understanding and meaning-making, and controlling what others have done) and the second, their information interactions (II) (e.g. communication, preservation, management, getting informed) with it. In addition, the facet of stakeholders (S) related to the interactions was identified in the analysis to explicate actors and actor roles involved in these activities. Finally, according to the final facet in the classification, the stakeholders can be either subjects (SS) i.e. doers/initiators, or objects (SO) i.e. targets of the interactions, and their participation can be either uncontested or contested (*) (i.e. considered illegitimate/unauthorised by another stakeholder group) as illustrated by the quotes in Table 1 and in the examples below. Whereas it can be expected that the interactions, motivations and stakeholder roles have certain generic relevance, the stakeholder groups are obviously specific to each individual context of analysis (e.g. EHRs and EPPs). In contrast to [19] and [46] but similarly to [47], we did not consider it helpful to split information and communication related activities to separate facets but chose to treat communication as one type of information interaction.

The functioning of the classification can be briefly exemplified using two examples from the analysed data. The interviewees discussed how information might be hidden in an EHR. Partly, in G1 the interviewees were suspicious that healthcare staff might use professional jargon for hindering patients' understanding of their medical condition i.e. to hide information for impeding independent knowledge-making, for instance, before having a discussion with a professional. Here one of the groups, the patients, see themselves as uncontested and healthcare staff as contested stakeholders in this particular interaction. This can be classified (see Table 1 for abbreviations) as (P): Knowledge making; (II): Hiding information; (S): Healthcare staff (SS*), Patients (SO). Partly, the interviewees described how they used the functions of the system to hide information they did not want everyone (including some professionals) to read i.e. (P): Getting informed; (II): Hiding information; (S): patients (SS), healthcare staff (SO). The legitimacy of this information interaction could obviously be contested by healthcare staff.

As a second example, the interviewees described how they used the EHR for managing information. In different instances, the purpose of (II) managing information could be, for instance, (P) orientation and recall of what had happened during past visits, what medicines had been prescribed, or how a condition had developed. The stakeholders include patients (in case it would be possible in an EPP to add/correct information in an EHR), guardians (a representative when the patient is a minor or an elderly relative), and healthcare staff (inputs information in the EHR) as subjects/actors (SS). Objects of the interaction (SO) varied from being the patients (e.g. when information was managed for own knowledge or meaning making, or SS was a guardian), healthcare staff (when information was managed to inform caregivers), and researchers (when information is potentially managed and used for medical research).

Our suggestion is that the next step after categorising information interactions according to the proposed classification is to consider their implications and whether they should be considered as productive (and supported by technical systems and/or social rules), problematic (that should be actively hindered), or acceptable (that should not be encouraged but do not need to be actively restricted). When studying existing systems, it would also be useful to assess the (un)successfulness of the interactions (e.g. information is not found or communication does not work). The resulting insights can be applied to inform the development of both existing and future EPPs (and in a more general sense, other information systems) to help them support information interactions the different stakeholders and relevant. The insights collected from the perspective of a single stakeholder group (here, patients) can also be complemented with data collected from other stakeholder groups, both to inform the development of new contextualised iterations of the proposed classification scheme and to gather data on other stakeholders' motivations and information interactions with information systems (e.g. EHRs and EPPs).

Table 1 Faceted classification of information interactions with electronic health records (EHR).

Interactions		Examples
Purposes of interacting (P)	Orientation/Recall (what happened)	"I just look what there has happened on different visits to [the hospital]" G3D
	Pleasure/curiosity	"I was like generally curious how [the EHR] looks like" G1A
	For direct action	"You can sort of prepare yourself [for a visit] by reading your prescriptions again" G5C
	Knowledge making	"To reflect, so to say, one-self [...] and to find evidence for one's ideas" G1D
Information interactions (II)	Self-understanding and meaning-making	"At some age you begin to [...], it becomes more common to keep track of things" G5C
	Controlling what others have done	"You can, like, compare a little if s/he has done her job, like, properly" G3C
	Communication	"Can I get in touch with a sensible person there" G4B
	Correcting information	"[Possibility to add] that I am allergic to that soap, or whatever" G2C; "[Information] is wrong and nothing has been corrected" G4A
Stakeholder (S)	Preservation	"The idea is that people don't need to remember" G1A
	Information management	"In [EHR] it is easier to get an overall idea of it" G5B
	Adding information	"There could be an own section "I think I have this [condition]" G2C
	Comparison/evaluation	"Are they within reference values [...] and then reflect [...] systems should support this" G1D
Stakeholder role (SS/SO)	Hiding information	"I have blocked [...] that not everyone gets to all information" G3B; "With that [professional] jargon it is possible to hide the real condition or the message from a lay reader" G1D
	Avoiding information	"I don't want to hear all details" G5C
	Getting informed	"You should get [cancer information] personally, they are that sensitive" G1C
	Patient	"Have I forgotten to tell the doctor that my information can be put there" G2C
Stakeholder participation in interaction	Guardian (or representative)	"There you need to have a consent of the child that [...] a parent can see them" G1A
	Peer(s)	"I have had no need to share with anyone outside of my family" G2B
	Healthcare professional(s)	"It depends a lot on the doctor, how much [documentation text] they write" G5C
	Researcher(s)	"This kind of package of information, you can say that [it can be] sometimes later really valuable for researchers" G4B
Subject (SS)	Object (SO)	"I was in [the system] and looked" G5B
	Contested by other stakeholders (*)	"[Information] should not be known [available] for parents after 18 years [of age]" G3D
Uncontested by other stakeholders (<none>)		"You can see the general situation there" G5C

4. Discussion and Conclusions

The proposed categorisation of interactions helps to explicate both current and potential interactions with an EHR from the perspective of their everyday and information related needs and wants. This differs from earlier studies focussing on the functions and usefulness of EHRs according to system functions (e.g. whether it is possible to read certain data, write comments, block access to information) and what users of such systems should be entitled to according to external criteria (e.g. freedom of information, how patients should take more responsibility and be empowered from healthcare perspective). As established in the literature, real-life situations that propel information interactions emerge out of the interaction between people and interactions themselves (cf. [48]). In addition to this, the proposed classification scheme allows describing EHRs in terms of how they facilitate or hinder specific activities relating to keeping, management, seeking and use of information on personal health, and which parts of the system and its different stakeholders are relevant to these interactions. In future studies, this first classification developed in the context of a specific population and context needs to be compared with others and refined accordingly. The major limitations of the present study relate to the limited size of the qualitative sample, its focus on Finnish older adults and their experiences of a limited number of EHR systems.

Our suggestion is that the next step after categorising information interactions according to the proposed classification is to consider their implications and whether they should be considered as productive (and supported by technical systems and/or social rules), problematic (that should be actively hindered), or acceptable (that should not be encouraged but do not need to be actively restricted). When studying existing systems, it would also be useful to assess the (un)successfulness of the interactions (e.g. information is not found or communication does not work). The resulting insights can be applied to inform the development of both existing and future EPPs (and in a more general sense, other information systems) to help them support information interactions the different stakeholders find relevant. System development might include personalising the elements of EPP and tailoring its content (see e.g., position paper by Enwald forthcoming). The insights collected from the perspective of a single stakeholder group (here, patients) can also be complemented with data collected from other stakeholder groups, both to inform the development of new contextualised iterations of the proposed classification scheme and to gather data on other stakeholders' motivations and information interactions with information systems (e.g. EHRs and EPPs).

Beyond the specific implications in the context of understanding the use of EHRs as a particular information object and source, the proposed classification scheme is a first step towards developing a more systematic and fine-grained understanding of information interactions and the purposes of engaging in them beyond and in more detail in comparison to the generic classical premise that information interactions are propelled by 'problematic situations' [49] or gaps [50]. Such a classification is helpful in articulating where the eventual gaps are and what is the problem, in addition to explicating other types of underpinnings of interacting with information. Moving beyond the specific context of EHRs and building on the literature on information interactions, the present scheme can be complemented with additional types of information interactions (e.g. dissemination and creation [19]) and motivations. It is also conceivable that the scheme discussed in the present text can be complemented, when needed, with additional facets, or combined with parallel schemes, for instance, the framework for classifying information interactions proposed by Cool and Belkin [19] to explicate, for instance, multiple information objects involved in interactions, the systematicity and degree of interactions, and the various criteria that influences them.

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