Primary Care Providers’ Acceptance of Health Information Exchange Utilizing IHE XDS

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Abstract. We assessed primary care providers’ perception of a health information exchange system (HIE) based on IHE XDS. The HIE will be part of a regional health network in the metropolitan area of Braunschweig, Lower Saxony, Germany. An application enabling access to medical documents in an XDS Affinity Domain was developed. We examined usability and factors related to user acceptance. User perception was probed using system usability scale (SUS) and semi-structured interviews. The evaluation was performed on 7 participants. The SUS showed an above average usability with a median score of 77.5. During interviews, participants submitted suggestions for additional features and improvement of usability. Poor integration of functionality into existing workflows was most frequently criticized. While usability was well perceived by primary care providers, challenges remain in adoption of XDS based IHE. To speed up document access in time-critical domains, we suggest use of complementary methods, enabling directed communication flows.

Keywords. health information exchange, user adoption, technology acceptance, IHE XDS

Introduction

The objective of health information exchange (HIE) is to enhance collaboration between healthcare providers. Expected benefits of HIE include improved patient safety, reduction of costs and facilitation of continuity of care. Prerequisite for a successful implementation of HIE is a broad adoption by healthcare professionals. While the need for establishing health information exchange is well anticipated, adoption of HIE remains slow [1-3].

In the field of cross-institutional data exchange, Integrating the Healthcare Enterprise (IHE) provides a widely anticipated approach for implementing electronic health records: Cross-Enterprise Document Sharing (XDS). XDS is characterized by using undirected communication workflows: a combination of federated document repositories and a document registry creates a longitudinal record of information about...
a patient, holding documents available for network participants. This architectural approach has been utilized in several projects worldwide [4]. As broad user adoption is crucial for the success of HIE [2], we wanted to learn about users’ perceptions of newly introduced workflows (e.g., query-based patient retrieval) enforced by XDS. We already had developed a web-based application granting primary care providers access to patient data in the XDS Affinity Domain of an HIE called Lower Saxony Bank of Health.

1. Methods

The study was administered to health care providers at general practices in the area of Braunschweig (Lower Saxony, Germany). We documented participants’ demographics (age, gender, specialization) and evaluated usability and perception of our application. In the presence of a researcher, participants were asked to carry out four typical use cases induced by XDS (including patient demographics querying and document download). Afterwards, a variation of the system usability scale (SUS) and semi-structured interviews were used to evaluate user satisfaction. The SUS-test is well-validated, can be done in a short period of time and is also understandable by nontechnical users [5]. Its scores range from 0 to 100.

2. Results

Of 22 feasible participants for our study, 7 responded to our request (response rate: 31%). 10 stated their disinterest in joining. 3 practices did not respond to phone calls or e-mail messages. In one case, a respondent declined participation after giving consent. One dismissed the agreed appointment. 7 SUS-tests were performed after finishing the given tasks with the system. The mean value of all tests shows an average score of about 70.7 (SD=13.6) and a median of 77.5. Sample minimum was a SUS-Score of 37.5 (equals 2.44*SD); sample maximum was at 82.5 points. In total, 7 interviews were conducted. Aside from the structured questions, there was the intention to create an opportunity of informal speech to get specific details about user perception.

Asked about the presented prototype, users said they like the simplicity of its graphical user interface (5/7) and the whole idea behind the concept of health information exchange (4/7). Users mostly criticized the workflow as too time consuming (5/7). The concept of patient search via demographic querying was mentioned as being difficult to use in daily practice (3/7). One user (1/7) did not understand the idea of patient querying at all. Two (2/7) physicians said that they want to avoid using a computer during a doctor’s consultation.

At all, 4 of 7 participants told us, that they would also like to be able to submit documents to hospitals and colleagues in ambulatory practices. Of those participants, all named the transmission of documentation on medical findings (4/7) as valuable feature. In two (2/7) cases, submission of ECGs was requested. Electronic patient referrals were mentioned once (1/7). Participants gave advice about future features and improvements. Receiving electronically sent documents via fax was mentioned most frequently (3/7). A better integration of HIE system into existing electronic medical records was stated, too (2/7).
3. Discussion

Health information exchange systems are still in an early stage of development. While several studies have been able to show benefits and challenges of HIE in different settings, there is still lack of investigations concerning the real world application of XDS. This study is one of the first studies to assess the usability and user perception of such systems in ambulatory care settings.

Our implementation of an XDS based HIE was generally well received by participants. The system usability measured with SUS showed encouraging results. With a median of 77.5 points, we have seen an above average usability. Experienced users as well as participants with less skill found the graphical user interface suitable for their purposes. We have seen one participant with an outlier value of 37.5 (equals 2.44*SD). Because of limited numbers of study participants, we don’t know if this is a singular instance or there would be more frequent similar observations in a bigger study population. Looking at distinct statements of SUS, we see a gap between scores of those describing system usability and usefulness. While the system is generally found to be easy to use and to show consistency in its design, scores have been low regarding usefulness and unnecessary complexity. Thus, in contradiction to the positive results we see in the usability of the system, its value in daily practice was skeptically evaluated by participants. The conduction of semi-structured interviews revealed fundamental challenges in the utilization of HIE based on IHE XDS integration profiles in ambulatory settings.

4. Conclusion

This study contributes initial insight into challenges associated with the use of XDS in ambulatory care settings. While most healthcare providers recognize a need for the use of HIE, there are still barriers avoiding broad adoption. When establishing an XDS Affinity Domain, we propose to consider the use of complementary methods, such as IHE cross-enterprise reliable interchange (XDR) [6], allowing direct document interchange between sites. Further studies should concentrate on the evaluation of using patterns in real-world application of HIE based on XDS and XDR. We need to learn more about conditions determining when and what kind of documents should be provided in a directed or in an undirected fashion.

References