

Review of Social and Organizational Issues in Health Information Technology

Craig E. Kuziemsky, PhD

Telfer School of Management, University of Ottawa, Canada

Objectives: This paper reviews organizational and social issues (OSIs) in health information technology (HIT). **Methods:** A review and synthesis of the literature on OSIs in HIT was conducted. **Results:** Five overarching themes with respect to OSIs in HIT were identified and discussed: scope and frameworks for defining OSIs in HIT, context matters, process immaturity and complexity, trade-offs will happen and need to be discussed openly, and means of studying OSIs in HIT. **Conclusions:** There is a wide body of literature that provides insight into OSIs in HIT, even if many of the studies are not explicitly labelled as such. The two biggest research needs are more explicit and theoretical studies of OSI in HITs and more research on integrating micro and macro perspectives of HIT use in organizations.

Keywords: Organizations, Social Norms, Health Information Technology, Process Assessment (Health Care), Collaboration

I. Introduction

Over the past two decades, there have been numerous calls worldwide to reform and innovate healthcare delivery to meet objectives, such as the provision of collaborative, safe, patient centered care [1,2]. Health information technology (HIT) will play a key role in facilitating healthcare delivery to meet these objectives [3-6]. Studies have described positive outcomes from HIT, including support for the management of chronic diseases, facilitation of communication as

part of care transitions, and improvements in patient safety by providing necessary information to all providers [7,8]. There is also a wide body of research that describes numerous challenges to implementing HIT in organizations, including workflow, communication and cognitive issues, and medical errors that are mitigated by the use of HIT [9-12]. Further, studies have reported that HIT adoption has had minimal impact on the quality of care, measured by patient mortality, adverse drug events, and readmission rates [13].

Yet, despite the implementation issues, governments continue to spend large amounts of money on the adoption of HIT [14]. Organizational and social issues (OSIs) contribute to HIT implementation issues [10,11,15,16]. While some studies have explicitly studied or discussed OSIs in HIT [15-19], much of the research on OSIs has been imbedded in studies of post-implementation issues, such as unintended consequences and adverse events [9-12]. One essential point that needs to be made is that even if the HIT in question adequately automates the task it was designed for (e.g., order entry), unintended consequences may still occur due to conflicts between the HIT and the context of how and where the system is used [9,10].

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Corresponding Author

Craig E. Kuziemsky, PhD

Telfer School of Management, University of Ottawa, 55 Laurier Avenue East, Ottawa, ON K1N 6N5, Canada. Tel: +613-562-5800 (ext. 4792), Fax: +613-562-5164, E-mail: Kuziemsky@telfer.uottawa.ca

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Overall, there is a need for better understanding of the organizational issues surrounding HIT implementation [16]. One of the biggest challenges in studying OSIs is what can be referred to as ‘bounding’. Such a wide range of studies have reported on OSIs that it becomes challenging to identify what elements should be studied and how studies should be conducted. Healthcare systems continue to focus on goals such as patient safety, collaborative care delivery, and patient centered care, yet an often overlooked fact is that these goals are bound within the organizational and social web that exists in healthcare settings. There is a need for a paper that reviews the wide body of literature on OSIs in HIT to provide some bounding for how to think about and study these issues. This paper addresses that need by reviewing the literature on OSIs in HIT to identify themes that can be used to provide bounding for future research.

II. Methodology

This paper presents a non-systematic literature review of OSIs in HIT. The papers reviewed included explicit studies about OSIs in HIT (e.g., review articles) as well as papers that referred to OSIs in HIT in the context of other studies (e.g., unintended consequences, medical errors, collaborative care delivery). In reviewing the papers, five overarching themes around OSIs in HIT were identified: scope and frameworks for defining OSIs in HIT, context matters, process immaturity and complexity, trade-offs will happen and need to be openly discussed, and means of studying OSIs in HIT. To provide some framing for the discussion, each theme is discussed from the perspective of micro and macro aspects of OSIs. Macro aspects include organizational structure, leadership, incentives, training, and organizational structure (e.g., facility size, IT spending). Micro aspects include front-line care delivery issues, such as communication, collaboration or training for HIT usage. Each theme is discussed in the next section.

III. Results

1. Theme One – Scope and Frameworks for Defining OSIs in HIT

As stated in the introduction, a significant challenge in studying OSIs in HIT is defining them, given the range of studies that have reported on OSIs. On one hand, OSIs have been studied using broad approaches or frameworks, such as those from classic studies of information technology in organizations [20]. An interpretive review by Cresswell and Sheikh [16] points out the range of models used to study OSIs in

HIT, such as the technology adoption model (TAM) [21], the diffusion of innovation model [22], and organizational psychology models [23]. Other models from the information systems literature that have been used to evaluate HIT include the DeLone and McLean information system success model [24,25]. A literature review by Lluch [15] identified and classified organizational barriers and HIT under five main headings: structure of healthcare organizations, tasks, people policies, incentives, and information and decision processes. It was proposed that the five categories be used as a starting point for policy interventions.

While the above reviews and models are good at identifying the broader structural or macro aspects of HIT in OSIs, they do not provide as much insight into the behavioral or micro aspects of OSIs, yet behavioral issues are a major cause of HIT issues and often span across individual, group, and organizational levels [26]. A significant amount of research has looked at micro-level intricacies between HIT and the organizations where they are used [10,12,27-29]. While studies may not be explicitly labeled as studies on OSIs in HIT, many of their findings refer to aspects of OSIs. A seminal work by Ash et al. [9] identified the presence and significance of unintended consequence post-HIT implementation. The plethora of studies on the unintended consequences of HIT implementation emphasizes that even a well-designed system can be influenced by organizational culture and issues, such as power struggles. Research drawing upon socio-technical theory has been used to study HIT for some time and has provided valuable insight on HIT in OSIs [30,31]. A sociotechnical framework was developed by Sittig and Singh [32] that articulates eight dimensions for studying the safety and effectiveness of HIT, including organizational policies and procedures. Others have suggested that while organizational structure and leadership are important for HIT success, it is equally important that culture, workflow, and productivity be studied [33]. Some models have made explicit attempts to provide insights into organizational aspects and HIT. For example, Ancker et al. [34] developed the ‘triangle evaluation model’, which incorporates the organizational structure, processes pertaining to organizational implementation of technology, and organizational policies affecting providers.

2. Theme Two – Context Matters

Macro-level solutions are impacted by the micro-level context where they are implemented. A systematic review of HIT implementation identified better reporting of context as the biggest need in HIT evaluation [35]. Novak et al. [36] provide a good perspective on the importance of context by

differentiating the ideal or abstract description (the ostensive dimension) of how HIT should be used and how it is actually used in real clinical settings (the performance dimension). The performance dimension is defined by context, and failure to account for the ostensive-performance gap can lead to unintended consequences, such as communication, coordination, and patient safety issues [14,37]. A key part of understanding the performance dimension is understanding the intersection of organizational routines and technology [36]. While evaluation approaches, such as usability testing, can identify individual variations or contexts, it is equally important to understand organizational contexts, such as leadership, culture, and workflow, as they can impact HIT usage [38].

There are several types of organizational contexts that need to be considered. One context is the type of organization, as HIT implementation can vary according to the size and type of organization where HIT is being implemented [39,40]. Another context is training. While training on the specific features of the HIT being used is obviously important, it is equally important that organizations invest in training on technical skill sets (e.g., information management skills, such as data entry and retrieval) that are necessary for effective interaction with HIT [41,42]. Another context is the care delivery setting where the HIT will be used. Collaborative or team settings require different HIT design considerations than designing for individual providers [43,44].

A shortcoming of many of the IT adoption frameworks described in the previous section, such as TAM, is that they focus on behavior related to the technology and not the organizational or clinical context where the technology is used [45]. To address this shortcoming, models of HIT implementation have been developed that attempt to incorporate the macro (organizational) and micro (clinical) context. One such model is the contextual implementation model (CIM), which looks at HIT usage from organizational, clinical unit, and individual contexts [45].

3. Theme Three – Process Immaturity and Complexity

HIT implementation is often compared to other industries, such as finance, aviation, or manufacturing. While IT has been able to improve supply chain efficiency in companies like Wal-Mart [46], and it has enabled courier companies to develop online customer package tracking systems, a key difference between these domains and healthcare is that supply chain management and parcel delivery are mature processes; therefore, the technology was used to automate well-defined processes.

A major challenge is that many of the healthcare organiza-

tional processes we are trying to automate lack maturity. For example, while numerous interventions have been proposed to improve team-based care delivery, including training and the use of technologies such as Electronic Health Records [44,47], these macro-level interventions have not resulted in improved outcomes. It has been stated that if a care team lacks team characteristics (e.g., shared objectives and processes) than they exist as teamwork in name only [48]. Poorly defined teams provide less than ideal team-based care delivery, leading to adverse events, such as communication issues and medical errors [49,50]. While there have been mixed reports about the ability of HIT to support teamwork [43,51], HIT on its own will not enhance team-based care delivery; rather, we need a better definition of the rules of engagement and the relationship between teamwork and individual provider work routines [52,53]. Handovers are another example of processes that can be classified as evolving [54,55]. A lack of standardized handover processes has been cited as a reason for errors and other quality issues related to handovers [56]. Essential elements for handoffs, such as common ground amongst providers, are still a work in progress [57]. Poorly defined handover processes and measures make it challenging to develop HIT to support handovers.

Another consideration is the manner in which organizational processes are connected. While HIT may be designed to automate a specific task, it will impact and be impacted by other organizational and clinical tasks [58]. A well acknowledged shortcoming in how we design HIT is a focus on “tidy use cases of predictable orderliness” which fail to describe the complex interrelated manner in which HIT is used [12]. Rather than considering HIT as isolated events or activities, we need to draw upon systems theory and consider HIT and the processes it supports as complex entities [59]. HIT is more likely to introduce unintended consequences if it designed to support specific tasks while ignoring other tasks or routines that interact with it [36,60]. Tenets of complexity theory, such as emergence, non-linearity, and self-organization can help us understand the inter-relatedness between HIT and the processes, policies, and other system components that interact with a HIT [59].

4. Theme Four – Trade-offs Will Happen and Need to Be Openly Discussed

HIT implementation often necessitates trade-offs between how people currently work and how their work routines change because of HIT [36,61,62]. However, providers may be unwilling to make trade-offs, or they may find trade-offs problematic to their work practices, and as a result develop workarounds to mitigate HIT-mediated changes [12,29].

A significant trade-off is the individual-collaborative interchange. While systems may be designed to support individual or organizational tasks, designing for groups is a different challenge [63]. Macro-level objectives, such as collaborative care delivery, necessitate trade-offs at the individual-collaborative interchange and across clinical units, change individual roles in the context of working in a team, and may require the development of awareness or rules of engagement for social or group dynamics [52,53,64].

While standardization of data and processes is required for interoperability to support inter- and intra-organizational care delivery, it can introduce several types of trade-offs. Standardized data may lead to increased charting for providers, which can require a workflow trade-off with respect to patient care delivery [65,66]. Tasks such as communication, information retrieval, or decision-making may become more challenging because of HIT [10]. At times, it may not be possible to perform tasks in the same manner with HIT, and providers may be forced to learn new variations on tasks [12].

In addition to the need to understand HIT mediated trade-offs, there is the need to effectively manage them. Some of the changes may be flexible and can be negotiated as part of HIT design, whereas others (e.g., data standards or organizational policy) are more permanent. Failure to discuss HIT-induced changes can result in adverse events and other unintended consequences because of individual variations on processes. The nature of trade-offs and/or losses to work practices from HIT need to be discussed and, if applicable, negotiated with providers [67,68].

5. Theme Five – Means of Studying OSIs in HIT

Several approaches have been used to study OSIs in HIT. Kaplan has advocated for methodological pluralism, emphasizing the need for broad approaches to HIT evaluation that study social, cultural, organizational, cognitive, and other contextual concerns [69]. Both qualitative and quantitative approaches have been used to study OSIs in HIT. Quantitative studies are helpful for providing the macro or structural perspective. Such studies have included the use of Markov models, simulation, and multi-agent models [70-72]. Quantitative studies can also be used to define structural aspects of work processes, such as communication flows or patterns, to model how things should work. For example, Grando et al. [73] developed patterns to understand collaborative practices.

While quantitative studies are helpful for providing bounding or structure regarding OSIs in HIT, a shortcoming of quantitative approaches is that they decontextualize situations and thus may not sufficiently explain why things hap-

pen [74]. As described above, a lack of rules of engagement for team-based care delivery may cause a seemingly ideal collaboration structure to work in unintended ways. Qualitative approaches, such as non-participant observations, interviews, and focus groups, have been valuable for studying and providing explanations about the organizational context of OSIs in HIT [75,76]. An advantage of qualitative studies is their ability to provide rich descriptions of situation, particularly the micro aspects regarding why things happen [10,77].

Although there has been a wide variety of approaches to studying HIT that have come directly from the medical informatics community, we need to remember that the broader discipline of information systems also offers many approaches and frameworks that can be used in studying OSIs in HIT [78]. Furthermore, fields peripheral to medical informatics, such as computer-supported cooperative work (CSCW), have also made significant contributions to our understanding of the relationship between OSIs in HIT [79,80].

Regardless of the type of approach used, an iterative approach that engages users will increase the chance of understanding OSIs as a precursor to successful HIT design and implementation. Methods such as design science and participatory design provide ways to engage users in the understanding of problems and the design of HIT solutions to these problems [81-83].

IV. Discussion

Although HIT continues to play a vital role in healthcare delivery, successful implementation of HIT remains a challenge. This paper reviewed OSIs in HIT and identified five themes to help us better understand and study OSIs in HIT. One overall finding is that, while organizations frequently have strategies for macro-level objectives, such as patient safety, systems integration, collaborative care delivery, and chronic disease management, these efforts need to be studied and integrated with the underlying micro processes that operationalize the objectives. Even a well-designed HIT may not function as intended because of OSIs. One of the key issues identified in this paper is the need to account for immature or evolving processes. While HIT introduces a sudden and often substantial change to how work is done, the processes being automated by HIT may not evolve as quickly. As a result, unintended consequences occur because of the gap between the level of automation and the people and processes using the automation. Defining rules of engagement for tasks such as collaborative care delivery, or handovers, needs to be done prior to automation of these tasks.

While we need to continue research on macro-level OSIs,

such as leadership, funding, and organizational structure, these studies need to be complemented by research on OSIs at the micro level. Organizational strategy and policy may define the framework of healthcare delivery, but it is the social and behavioral aspects at the micro level that will define the activities within the framework. We also need to move away from studies that look broadly at OSIs; rather, we need to focus our research efforts on specific contexts of OSIs. For example, Dorr et al. [43] pointed out that HIT is often not designed to explicitly support collaboration. Therefore, there is a specific research need to define the collaborative behaviors and rules of engagement that HIT needs to support. Another context is the organizational setting or type. As more healthcare delivery, and subsequently more HIT, occurs outside traditional healthcare settings (e.g., in patient homes, long-term care centers) we need better evidence on how to design and evaluate HIT to support care delivery in these contexts.

Figure 1 summarizes the findings of this paper. It shows how OSIs need to be studied from micro and macro perspectives, both upstream and downstream, as part of HIT implementation. Macro considerations include the funding, incentives, leadership, organizational structure, and process or care delivery objectives. Micro considerations include the context and complexity of HIT usage, rules of engagement, and training and trade-offs. ‘Upstream’ refers to HIT design and development prior to the actual implementation of HIT. ‘Downstream’ refers to the operations and maintenance that

take place after HIT is implemented. It is essential that both micro and macro perspectives are studied upstream (i.e., pre-implementation) as well as downstream (i.e., post-implementation) because of the dynamic and evolving nature of healthcare processes. Further, HIT users need to be involved as much as possible to enable to them to understand the nature of HIT-induced changes and how it will impact their work routines.

One of the other conclusions from this work is that OSIs cannot be studied from the perspective of linear modeling of ideal scenarios; rather, they must be studied from the perspective of the messy and complex reality in which HIT is situated. In that context the toolbox for studying OSIs may be richer than people realize. In addition to the frameworks and methods from medical informatics, insights may be gained through a wide array of approaches from the information systems discipline, such as Peter Checkland’s Soft Systems Methodology [84] and the technological frames approach of Orlikowski and Gash [85], and approaches from the social sciences, such as Activity Theory and Actor Network Theory [86,87].

V. Conclusion

As HIT is more widely implemented in healthcare settings, it is essential that we ensure HIT is a fit in the organizational setting where it will be used. This paper reviewed OSIs in HIT and identified five themes to provide guidance and

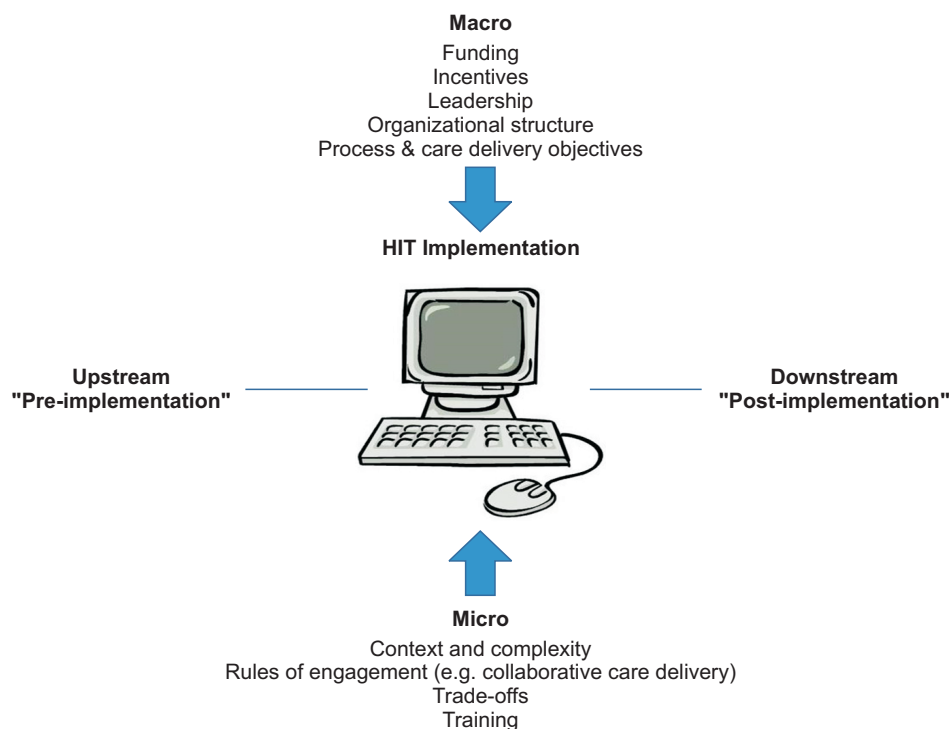


Figure 1. Model for upstream and downstream study of micro and macro aspects of OSIs as part of HIT implementation. OSI: organizational and social issue, HIT: health information technology.

bounding for future research. Echoing other studies [16], the findings from this paper suggest that there is a key need for more explicit and theoretical studies of OSIs in HIT. More research on integrating micro and macro perspectives of HIT use in organizations is also a priority need.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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