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Tensions associated with the use of electronic knowledge resources within clinical decision-making processes: A multiple case study

N. Mysore[a], P. Pluye[a,b,*,1], R.M. Grad[a,c,2], J. Johnson-Lafleur[a,1]

[a] Information Technology Primary Care Research Group, McGill University, 517 Pine Avenue West, Montreal, QC, Canada H2W 1S4
[b] Department of Family Medicine, McGill University, 517 Pine Avenue West, Montreal, QC, Canada H2W 1S4
[c] Department of Family Medicine, McGill University, Herzl Family Practice Centre, 3755 Cote Ste Catherine Road, Montreal, QC, Canada H3T 1E2

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ABSTRACT

Content and objective: Health professionals now routinely use electronic knowledge resources (EKRs). Few studies have considered EKR-related tensions which may arise in a clinical decision-making context. The present study aims to explore three types of tension: (1) user–computer tension, (2) social tensions, and (3) organizational tensions (constraints associated with organizational routines and health policies).

Design, participants, intervention, setting: We conducted a multiple case study, examining Family Medicine residents' searches for information in everyday life. Cases were defined as critical searches for information among 17 first year family medicine residents using InfoRetriever® 2003/2004 on a PDA over 1.5 months at McGill University. InfoRetriever®-derived information was used within a resident-patient decision-making context in 84 of 156 cases. For each case, residents were interviewed, and extracts of interview transcripts were assigned to themes using specialized software (presence of tension; type of tension). Further computer-assisted lexical-semantic analysis was performed on transcripts. Authors reached consensus on assignments.

Results: Twenty-five cases with tension were identified (one case had two types of tension), and illustrate the above mentioned types of tensions: (T1) tension between the resident and InfoRetriever® ($N = 16$); (T2) InfoRetriever®-related tension between the resident and other social actors, specifically supervisors, other health care professionals and patients ($N = 7$); (T3) InfoRetriever®-related tension between the resident and the health organization/system ($N = 3$).

Conclusions: Results suggest EKR usage in a clinical decision-making context may have negative consequences when three types of tension arise in a clinical decision-making context. Illustrated types of tension are interrelated and not mutually exclusive. Awareness of EKR-related tensions may help clinicians to integrate EKRs in practice.

* *Corresponding author*. McGill University, Department of Family Medicine, 517 Pine Avenue West, Montreal, Qc, Canada, H2W 1S4. Tel: +514 398 8483; fax: +514 398 4202.
E-mail addresses: pierre.pluye@mcgill.ca (P. Pluye), roland.grad@mcgill.ca (R.M. Grad), janiquejl@yahoo.ca (J. Johnson-Lafleur).
[1] Tel.: +1 514 398 7375; fax: +1 514 398 4202.
[2] Tel.: +1 514 340 8222x5851; fax: +1 514 340 8300.

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1. Introduction

Electronic knowledge resources (EKRs), in particular on a personal digital assistant (PDA), provide health professionals with rapid access to information. EKRs constitute a new means to support clinical decision making when they provide relevant and valid information. Benefits of using EKRs include improved effectiveness and efficiency of health care delivery, and a potential to reduce medical errors at the point of care [1,2]. Physicians also perceived that quality of patient care and services were enhanced when PDAs were used [3].

Most of the literature focuses on the benefits of EKRs on a PDA [4,5]. However, the use of electronic knowledge resources can also lead to tensions, especially in residency training. Tensions may arise between the resident (with the use of a PDA) and the supervisor, or between doctor and patient, with respect to the use of a PDA in the examination room [3,6–8]. Other types of tension could be (for instance) frustration with irrelevant information, or disagreement between the EKR and hospital guidelines. These can be classified into three types: (T1) user–computer tension, (T2) social tension, and (T3) organizational tension. An example of a scenario illustrating T1 tension is as follows: a resident is looking for a topic, the EKR provides information on the topic, but the information is not complete to address the clinical situation. An instance of a T2 tension is as follows: the resident has found relevant information on a topic and discusses with the staff; however, the staff physician disagrees on the basis of his or her intuition, or past clinical experience. A scenario illustrating T3 tension is as follows: while the EKR-based recommendation is valid, it disagrees with hospital protocol, e.g., the number and type of diagnostic tests to confirm the presence of a disease. We examined 26 papers on impacts of information retrieval technology that were retained in our previous literature review [9], and we found that no study systematically assessed T1, T2 and T3 tensions. Of the 26 papers, 7 papers mentioned T1 tensions, 1 paper mentioned a T2 tension, but none mentioned T3 tensions.

While tensions may also occur in non-electronic resources, their frequency of occurrence and how the conflicts may manifest differ. As mentioned previously, EKRs differ from non-electronic resources mainly with respect to ease of access and ability to update with new evidence from clinical research. This increases opportunity for conflict between supervisors and residents. Also, the dynamic of the conflict can vary, especially as some supervisors rely more heavily on their clinical experience in decision making, while evidence-based medicine places more emphasis on examination of evidence from clinical research [10].

To the best of our knowledge, there has not been a specific investigation into the types of EKR-related tension and their influence on the clinical decision-making process. The usage of information resources is usually associated with (T0) individual pre-search tensions (e.g., perceived lack of knowledge), which are conceptualized as information needs. In present paper, our focus is to highlight the tensions associated with searches for information and the usage of electronic knowledge resources. We did not aim to assess the level of individual tension that led residents to search for information. Based on the type of tension, we will categorize residents' searches for information within EKRs, and interpret consequences of these tensions from clinical scenarios. These consequences will then be used to make recommendations for improving the integration of EKRs on a PDA in health care delivery.

2. Background

The pressing need for effective information management drives clinicians to adopt new EKRs to optimize their clinical decision-making. Cognitive processes such as planning, learning and decision making can be thought of as a joint effort between many users and machines [11]. Computer systems do not just improve performance on a particular task, they can also help in the mastery of related tasks. For instance, EKR use may result in an enduring change in the diagnostic or treatment process even in the absence of such a system. Dee and Toelis studied the use of the PDA in five aspects of clinical care, specifically: decision making, diagnosis, treatment, medical test requests, and length of patient stay [5]. Over 50% of respondents in this study remarked that PDA use had changed patient treatment. In addition, even occasional PDA use "can leave physicians with the perception that PDAs influence their clinical decision making and help alter treatment choices in a positive manner" [5]. However, it is also suggested that extensive use of EKRs may induce complacency and dependency, in addition to positive consequences [11].

The negative consequences of EKRs have been considered in previous studies, such as [12–14]. For instance, a qualitative study of the use of EKRs in general practice showed that some challenges included: limited skills in the use of IT products and services, time pressures in primary care and patient reactions [12]. Since EKRs provide up-to-date information, treatment recommendations can change based on results from conflicting clinical trials, which may result in frustration on behalf of the patient, physician or both [13]. Lorenzi and Riley describe a resistance to change, which occurs at the individual and organizational level. The two are interrelated, i.e., individual resistance can give rise to organizational resistance resulting in a positive feedback loop. Thus, the successful integration of "major information systems into complex health organizations require an effective blend of good technical and good organizational skills" [14] and approaches need to include cognitive, social and organizational issues [15].

This critical review of the literature leads us to propose three types of tensions associated with EKR usage. The T1 tension (user–computer tension) is based on previous work where the inability of residents to find any information or relevant information on certain topics was described [9]. Also, T1 tension could be due to the inability of a resident to accurately process information based on a patient's symptoms [16]. The T2 tension (social tension) was alluded in [6] as well as in [17], p. 156: "Deciding to use new knowledge is a social and political process, which nearly always involves debate and reference to others' views." Thus, the introduction of an EKR can create tension (through debate and disagreement) between the resident and other social actors in the hospital. The T3 tension (organizational tension: constraints associated with organizational routines and health policies) could be between the