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A socio-technical analytical framework on the EHR-organizational innovation interplay: Insights from a public hospital in Greece

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Abstract. The healthcare sector globally is confronted with increasing internal and external pressures that urge for a radical reform of health systems' status quo. The role of technological innovations such as Electronic Health Records (EHR) is recognized as instrumental in this transition process as it is expected to accelerate organizational innovations. This is why the widespread uptake of EHR systems is a top priority in the global healthcare agenda. The successful co-deployment though of EHR systems and organizational innovations within the context of secondary healthcare institutions is a complex and multifaceted issue. Existing research in the field has made little progress thus emphasizing the need for further research contribution that will incorporate a holistic perspective. This paper presents insights about the EHR-organizational innovation interplay from a public hospital in Greece into a socio-technical analytical framework providing a multilevel set of action points for the eHealth roadmap with worldwide relevance.

Keywords. Electronic Health Records, Organizational Innovation, Health Care Sector, Hospitals, Greece

Introduction

In 2004, the European Commission (EC) submitted to its Member States the eHealth Action Plan that set out a challenging list of implementation actions that focused on deploying eHealth systems, setting interoperability targets and the employment of Electronic Health Records (EHR) [1]. The advent of EHR has been accompanied by claims on its potential value to reduce medical errors [2], improve quality of care [3], decrease healthcare costs [4], and support clinical governance and performance management type analysis particularly across organizational boundaries [5].

In accordance with the European eHealth roadmap the development of EHR has been identified as a key strategic target and top priority for the National Health System in Greece [6;7]. The eHealth ERA report documents that Greece has established projects for electronic patient records or a summary thereof and is one of the four European countries, the others being Denmark, England, and Estonia, that are working concurrently on EHR and national eHealth networks. The flexibility though to maintain health records in either paper or electronic form without being obligatory to preserve health records in electronic formats [1] explains the relative low figures of EHR solutions in Greece. Although, the number of research studies in the field of EHR

within the Greek healthcare sector is limited, [8] and [9] exemplify two holistic EHR attempts across all levels of health services through the cases of integrated healthcare at a regional level 'EPIRUS-Net' and 'HYGEIAnet' respectively. Both studies discuss EHR within the context of a wider health telematics network and focus on system architecture, design, infrastructure and work in progress and future implementation plans. A subsequent study on the organizational factors that affect the adoption of the HYGEIAnet innovative services identified training and organizational support as the most influential factors for the system's successful implementation [10]. Organizational support involves the presence of a local champion who acts as a change agent by actively promoting innovation, adoption, and diffusion of information systems and has an influential role in the organization's strategy and decision-making [10].

In 2012, the EC unveiled a second eHealth Action Plan covering the period 2012-2020. The new eHealth Action Plan that operates in the context of Article 14 of Directive 2011/24 on the application of patient's rights in cross-border healthcare focuses on addressing the barriers to the deployment of eHealth systems and on four operational objectives, 1) supporting research, development and innovation; 2) promoting international cooperation; 3) achieving wider interoperability of eHealth services; and 4) ensuring wider deployment and facilitating uptake [11]. The application of EHR systems can reform the status quo of health systems around the world by mitigating existing burdens and accelerating organizational level innovations. Nevertheless, little research progress has been made in the field that can assist healthcare practitioners [12]. This paper presents empirical evidence from a public hospital in Greece on the socio-technical factors that determine the EHR-organizational innovation interplay. The study's findings provide to healthcare stakeholders fundamental issues for consideration in terms of enhancing the co-evolution of technological and organizational innovations, a key healthcare priority at a worldwide level and a topical theme with the transition towards integrated electronic healthcare.

1. Methods

Using a grounded theory methodology that is suitable for the investigation of complex multifaceted phenomena, rich data was collected providing the foundation for a detailed understanding of the underlying social processes [13] by exploring holistically the relevant socio-technical dimensions and interactions. The combination of 20 in-depth, semi-structured interviews with healthcare professionals (junior and senior doctors and administrative nurses) in four clinics (Gynecology-Midwifery, Orthopedics, Pathology, Surgery) in a public hospital in Greece and 20 hours of direct, non-participant observation, has augmented the study's credibility. Interviews were conducted in person between August and September 2011, lasted between 45 minutes and 1 hour and 15 minutes and with the permission of research participants were audio recorded and transcribed. Through iterative data review coding categories and sub-categories were created and sorted. Through data comparison across the different healthcare professional groups and clinics patterns and regularities were determined and data relationships were identified. The study's emerged themes formulate new theoretical propositions in the phenomenon of socio-technical determinants of the EHR-organizational innovation interplay. In accordance with the ethical approval procedures in the secondary healthcare sector in Greece the research study was

reviewed and approved by the two relevant hospital authorities, the hospital’s Scientific Committee and the hospital’s chairman.

2. Results

The analysis of the research data revealed a complex web of socio-technical determinants surrounding the EHR-organizational innovation interplay that have been classified into three different levels organizational, technological and contextual. Organizational level covers determinants at two sub-levels, intra-clinical and intra-hospital. The former relates to clinic-specific factors and the latter to hospital-wide factors. Technological level involves technology-related facets and contextual level incorporates external to the organization forces. A schematic representation of the three levels and the relevant socio-technical determinants is provided in Figure 1.

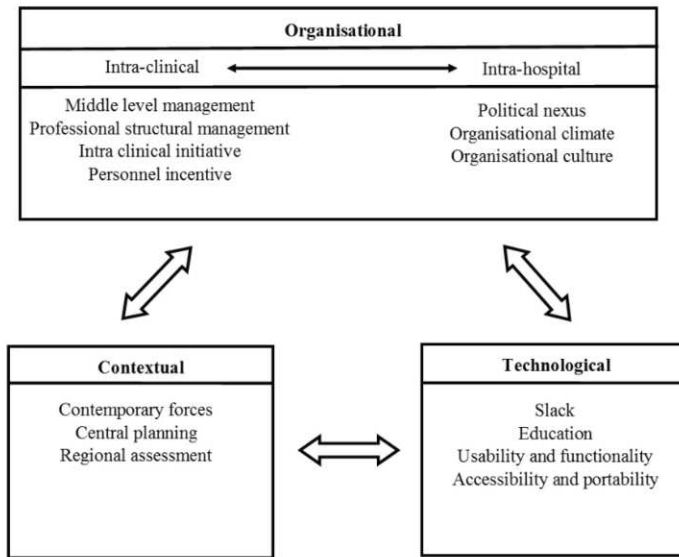


Figure 1. Socio-technical determinants of EHR-organizational innovation interplay.

3. Discussion

The study’s findings highlight the interplay of multilevel socio-technical determinants of the dual core EHR-organizational innovation correlation and offer several implications for healthcare providers and policy makers. A discussion of the relevant determinants and implications is provided in sections 3.1-3.3.

3.1. Organizational Determinants

At an intra-clinical level the role of the clinic’s directors (middle level management), the appointment of administrative nurses within the clinics as core EHR users

(professional structural management) and the motivation and engagement of the clinic's personnel (intra-clinical initiative and personnel incentive) have a significant effect on the EHR-organizational innovation interplay. Nevertheless, the study revealed considerable variations in these three aforementioned factors between the participating clinics. This can be explained by differences in the role and purpose of EHR systems within the clinics and the existence of various clinical and sub-clinical cultures. These findings render the need to determine the intra-role of EHR systems as an interactive process with the inclusion of healthcare professionals in order to cultivate an intra-culture and maximize the organizational potential of EHR systems.

At an intra-hospital level the hospital organizational context is characterized by a high politicized nexus with strategic management underpinned by the political party in power, conflicting priorities between hospital clinics and competitive collegial relations. These findings highlight that a fundamental re-design of intra-hospital initiatives and procedures is required. A 'hybrid' organizational structure, decision-making and planning and assessment mechanism where organizational strategic objectives can be aligned, a positive organizational climate can be established and liability concerns regarding intra- and inter- hospital collaboration in the provision of holistic healthcare can be addressed is expected to enhance the EHR-organizational innovation interplay.

3.2. Technological Determinants

At a technological level the availability of adequate technological resources (slack), a dynamic educational intervention as opposed to simple training (education), a user-friendly and functional EHR technology (usability and functionality) and multi-point EHR access (accessibility and portability) play a key role in realizing the EHR-organizational innovation full potential. Through participatory design a consensus among healthcare professionals on usability and functionality features can be achieved whilst at the same time accommodating intra-clinical requirements. The need for education suggests the importance of coordination and co-evolvement of EHR systems and healthcare professionals' workflows which also relates to technological accessibility and portability. Accessibility and portability are fundamental to support intra-clinical healthcare delivery from different physical locations as well as intra- and inter-hospital continuity of care.

3.3. Contextual Determinants

At a contextual level and within the financially unstable environment in Greece the study's findings indicate financial resources as the main contemporary force with government priorities translated into financial savings that may be at the expense of other qualitative healthcare objectives. For EHR-organizational innovation initiatives to fully flourish a two-way dialogue and a holistic, well-coordinated approach is required through central planning at a Ministry level and assessment at a regional level. The presence of a formal assessment process to document outcomes and share best practices at a regional and national level is essential to accelerate the EHR-organizational innovation co-evolvement and is chronologically pertinent for Greek public hospitals that plan the shift towards electronic regional healthcare networks.

4. Conclusion

The study's empirical findings discussed in this paper provide valuable insights to healthcare policy makers and other stakeholders about the planning and management of technological and organizational innovations. It has been suggested that a 'hybrid' dialogue at an organizational and contextual level is essential. At an intra-clinical and intra-hospital organizational level this implies healthcare professionals' active participation throughout the process in order to foster a mutual culture, align EHR systems with healthcare provision pathways and address liability issues regarding intra-hospital healthcare delivery. At a contextual level this relates to planning and assessing EHR interventions at a Ministry and regional level that can act as a feedback mechanism. From a technological point of view multi-point EHR access is important to support intra-hospital healthcare continuity. This three-tier level of analysis and related sub-levels provide a list of key priorities for the EHR-organizational innovation agenda at secondary healthcare institutions in Greece and other European countries.

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