

Patient-Empowered Electronic Health Records

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Abstract

Electronic Health Records (EHRs) constitute evidence of online health information management. Critical healthcare information technology (HIT) infrastructure facilitates health information exchange of 'modern' health systems. The growth and implementation of EHRs are progressing in many countries while the adoption rate is lagging and lacking momentum amidst privacy and security concerns.

This paper uses an interrupted time series (ITS) analysis of OECD data related to EHRs from many countries to make predictions about EHR adoption. The ITS model can be used to explore the impact of various HIT on adoption. Assumptions about the impact of Information Accountability are entered into the model to generate projections if information accountability technologies are developed. In this way, the OECD data and ITS analysis can be used to perform simulations for improving EHR adoption.

Keywords:

Electronic Health Records, Intervention Study, Information Accountability.

Introduction

The health sector plays a significant role in any country's productivity and economic development. Health sector expenses are astronomical, and factors associated with service deliveries and healthcare products, directly impact on quality of life. The health sector is also an information intensive sector in that information is generated and consumed in enormous quantities by healthcare professionals, patients, managers, and other stakeholders. In this information, intensive sector, the research challenges include discovery of ways that health information can be integration that linked and, measuring appropriate use of health information under the given privacy and security constraints (e.g., Information Accountability) [1, 2].

Electronic health records (EHR) capture healthcare information prior to the inception of an individual's birth, through the life span until after death. These records are either captured in paper format or are electronic in nature and, should and would empower the consumer and their families care. It is indeed the comprehensive, unified, longitudinal records that aid in improving 'quality of life'. With technological maturity, EHRs constitute evidence of online records from interactions between professionals (e.g., Physicians and GPs), the public (Consumers and Patients) and healthcare service providers (healthcare policy makers and funding agencies). Furthermore "EHRs consist of patient information such as demographics, medications, laboratory test results, diagnosis codes, and procedures" [3].

Realization of the health information flow and contextual awareness of EHR sharing capabilities are vital to have meaningful and quality healthcare decision making [4]. This

socio-technical, information accountability driven, conceptual EHR knowledge-based information sharing model is considered for this study [4], illustrated in Figure 1 below.

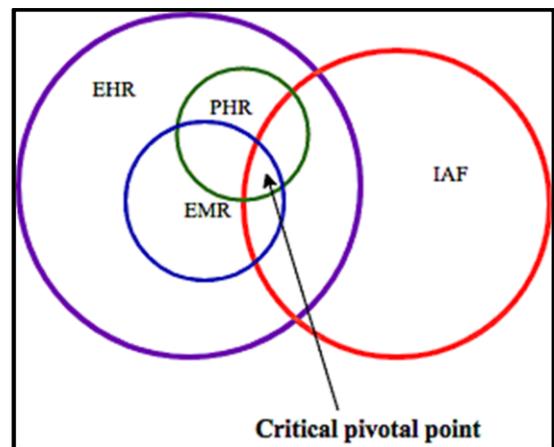


Figure 1– Information Accountability Driven EHR Model [4]

A brief description of Figure-1 elements are presented below:

1. **EMR** (electronic medical record)– information is amended; updated personal health records (**PHRs**) are managed by authorized clinicians and healthcare organizations (the professional view). While the information stored in this area is vital for the clinical decision-making process, at the same time the **PHR** will be managed to link the "Patient" for specific information sharing.
2. **PHR**– is recognizable; where individual information is stored, collected, shared and controlled by the individual (the public view). This set of information supports the individual "Patient" healthcare journey. The Healthcare Information Exchange (**HIE**) requires meaningful linkage of the **EHR** to complete the "Patient" journey.
3. **EHR**– is a key element of the model that is recognizable [1, 2]; and "a comprehensive interconnected health information record that can capture and share a variety of information about people's health status, their history of encounters with the healthcare system, the results of all diagnostic and therapeutic interventions, and (ideally) their key social and demographic characteristics".
4. **IAF**– is the Information Accountability Framework, the principle defined and implanted [1, 2] for the model. The governing principles of Information Accountability is "that information usage should be transparent so it is possible to determine whether a use is appropriate under a given set of rules".

5. Ω —this pivotal point is a significant balance [4] between healthcare services providers (policy makers and practitioners) and consumers (“Patient”) to be maintained transparently when sharing the EHR.

The aims of this paper are to establish a socio-technical, information accountability driven, conceptual EHR knowledge based information sharing model demonstrated in preceding sections. The following sections present the data set retrieved based on infodemiological discoveries, organized and analyzed using an intervention study using Interrupted Time Series Analysis [6 & 7], as well as a discussion of the findings.

Methods

The OECD has assessed the Technological Readiness of countries (TOR) and the Data governance readiness through a series of surveys and assessments between 2015 and 2017. A Quasi-Poisson model was used to determine the variances. The statistical analysis was carried out using the R function *glm* and necessary adjustments were accommodated to estimate time seasonality.

Results

The dispersion parameter for the *quasipoisson* family is taken to be 0.1841. The ITS generated post 2015 projection illustrated that some countries are within the acceptable range while others are not. This illustrates that by using assumptions about the impact of Information Technology, some countries are ready to accommodate this HIT whereas others are not.

Discussion

An adoption of EHR associated technologies provides sustainability of healthcare systems and enables population-based outcomes. Furthermore, ‘modern’ healthcare systems affordability and equity depend on its performance. The proposed model (Figure 1) allows consumer-directed exchange of health information. With the patient-empowerment principle in the background, it is reasonable and practicable to search for the coexistence of HIT infrastructure that facilitates the model capabilities, possibilities and opportunities to establish the patient controlled EHR system.

This study describes an *infodemiological* exploration of patient empowerment measured through EHR adoption using OECD data analyzed through ITS models. This approach would help and “*could shed light on unmet medical needs and research priorities for the future, and provide guidance for the decision making in public policy*” [7]. An alternate approach would be to employ a randomized control trial (RCT), however this exercise would be impractical and difficult to generalize to “real world” settings.

Conclusions

Use of personal health data creates opportunities for health system improvement, research and disease surveillance, but requires the right governance frameworks to realize these benefits while managing risks. Patient-empowerment facilitates and provides HIT factors including sharing electronic health records providing functional data interoperability and meaningful use to minimize the security and privacy concerns. This paper investigated potential and opportunities for shared EHRs in Patient-empowerment from a sociotechnical perspective. The intervention study used an interrupted time

series analysis (ITS) of the publicly available data, and its prediction diagnosis for opportunities and usefulness are based on recent developments of the EHR on two readiness factors: Technical and Operational (TOR), and Data governance (DGR), which are part and parcel of the socio-technical interactions.

This makes better use of health data in this exponential growth of digital technologies, which is warranted to establish the support of Patient-empowerment. Sharing data under a thoroughly functional data interoperability regime would support other community benefits like migrant inflow to the health watch of the communities. Establishing ‘quality of care’ among such community elements should also be supported. The Healthcare expenditure and health policy implementation is controversial and a troubling location. Healthcare spending might be managed and reduced by use of HIT however, long-term planning on studies like this and longitudinal experiments on the use of **shared EHR** should benefit most counties that require immediate healthcare support.

Based on the information available from OECD countries, employing and implementing an intervention study of interrupted time series regression analysis (ITS) on available and practicable HIT infrastructure information is a promising start.

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The authors acknowledge that this paper neither analyses the situation per country nor provides predictions for a country. This analysis is out of the scope of this paper since the granularity of the data is complex and unknown.

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