Need for Electronic Health Record

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ABSTRACT

Electronic Health Records are digitalized, real-time, patient-centric records which is becoming the central source of information in the healthcare industry. The need for EHRs to replace paper-based entry and storage of patient data is high. Most developed countries have realized the need to switch to EHRs. India being one of the developing countries has not fully considered the idea of EHRs and is still contemplating on it. 5.2 million medical errors occur in India annually. A major reason for this could be due to lack of interoperability between facilities and absence of patient health record history. Often, personal health data is stored in multiple clinical institutions and in non-sharable formats. To provide effective, meaningful and continuity of care, patient health data must be centrally available and comprehensive. This can be achieved by adopting standardized electronic health record formats as defined in HL7 framework.

Keywords : EHR, healthcare, medical errors, interoperability, health record history, comprehensive, HL7

I. INTRODUCTION

Healthcare is evolving over the years to accommodate software to play an important role. Health IT is now involved in the development of automated and interoperable healthcare information systems, expected to improve medical care, lower costs, increase efficiency, reduce error and increase patient satisfaction. Electronic Health Record is the central component of health IT infrastructure. It must replace traditional paper-based medical history [5] as it embodies numerous drawbacks such as being at risk as paper records are vulnerable to fire or rain hazards, contain unambiguous physician notes, pose difficulty in searching for a patient's history among thousands or millions of records and fragmented patient documents. Thus, EHR are far more superior. A search of the term "Electronic Health Records" [4] returned over 1,500 results which depicts how the industry is thriving.

Although remarkable, EHR have certain limitations in implementation: financially demanding, obstacles in interoperability, design of user interface, discomfort to users, susceptibility to cyber-attack are some of the unintended drawbacks. To implement EHR systems on a wide scale in any country, back-up from the government in terms of funding is crucial. These systems are capital intensive [9] and tend to alter the economy of the country, which is one of the major reasons why EHR implementation is still not far spread in a country like India where government funds for Healthcare sector is insufficiently low compared to the United States of America. Another hurdle in the proper implementation of EHR is interoperability between different clinical institutions. Some facilities may have some form of EHR while others may not, some may be ready to disclose patient visit history where some may not. These records need to be of uniform standards across platforms.

The reaming part of this paper has been arranged as follows: following section describes the previous research, discussion on the current system in India, analysis of the current situation of healthcare in India and finally the conclusion has been summarized.

II. RELATED WORK

1. Software Engineering in Health Care

Jens H. Weber-Jahnke et al. [1] have presented a paper on software engineering in health care, its impact and challenges. They say, the most significant challenge for countries around the world is finding ways to provide

sustainable access to quality health care in the light of aging populations and increasing treatment costs. In addressing this challenge, software systems have the potential to be a key capacitating technology. However, some software engineering processes, methodologies and tools developed for other domains cannot be transferred easily to healthcare due to the unique and sensitive characteristics of the domain.

The paper talks about hurdles from a health care perspective such as subjectivity of actors involved, localized practices, ill-defined and conflicting goals, complex and evolving data and knowledge and poor user experience of information systems. It also talks about how software engineering in health care needs 'knowledge translation'. Knowledge translation refers to a continuous process of selecting and adapting research outcomes, amalgamating and implementing solutions, leveraging these outcomes and scrutinizing their effectiveness to inform the next iteration of the KT cycle. This model of adopting KT promises to increase impact of implementing software engineering in health care.

2. Empowering patient through personal healthcare system using interoperable Electronic Health Record

Dr. Yeong-Tae Song et al. [2] has presented a paper that talks about the importance of portability and interoperability of electronic health records. It is said that in the U.S., preventable medical errors claim the life of thousands of patients every year. Much of the blame is on the absence of interoperable medical records at crucial stages of a patient's health. Personal medical information is stored in several clinical facilities and is present in different, non-compatible forms including paper-based records. To provide quality health care, personal health data needs to be exchanged between facilities and patients must have control over their own medical record. This paper proposes a model that addresses such issues. It permits patients to observe and check their own health using medical record collection tool, ontological diagnosis support and personalized medical health education. It also allows communication between clinical facilities using standardized medical record format defined in HL7 to facilitate continuous care.

3. Electronic Health Record: A review

Manuel Grana et al. [3] has presented a comprehensive report on EHR, core motivation for its design and implementation, early attempts of EHR implementation and legal, ethical and political issues. The paper also discusses system implementation with respect to interoperability, big data and data mining studies.

This paper discusses about how cloud computing can be used to store EHR promising anytime, anywhere access to critical data. However, there is a possibility of slip of privacy and security from the hands of care providers. Encryption approaches and traffic shaping algorithms must ensure proper access of data. It also talks about how direct learning from EHR is a challenge because of heterogenous and structured nature of the data which encourages Machine Learning and Computer Aided Diagnoses. An example application of restricted Boltzmann Machines required ad hoc changes to obtain meaningful results in a predictive study on suicide.

III. PRIMARY ISSUES

We have seen the importance of EHR in today's world where software is taking over and making most tasks automated and hence simpler. Thus, the implementation of EHR in hospitals across a country is becoming the obvious way ahead. But this transition cannot be made in a single step and poses hurdles of its own. The question that any country needs to ask is "Are we keen to initiate the evolution of EHR?". In this segment, I present an outline of existing scenario and challenges for adoption of EHR.

A. Funding

EHR technology can be expensive in both implementation as well as usage. Finding the expenses to invest in training, support and physical infrastructure itself can be a common barrier, especially for small practices. Technologies like these will add burden to the health care providers and pose a major hike in the affordability of health care and thereby upset the economic state of a country. In a country like India where government spending towards healthcare in the year 2015-2016 was a mere 1.3 percent of GDP and 4.0 percent of GDP in the year 2012-2013 depicts the inability of the State in funding towards adoption of
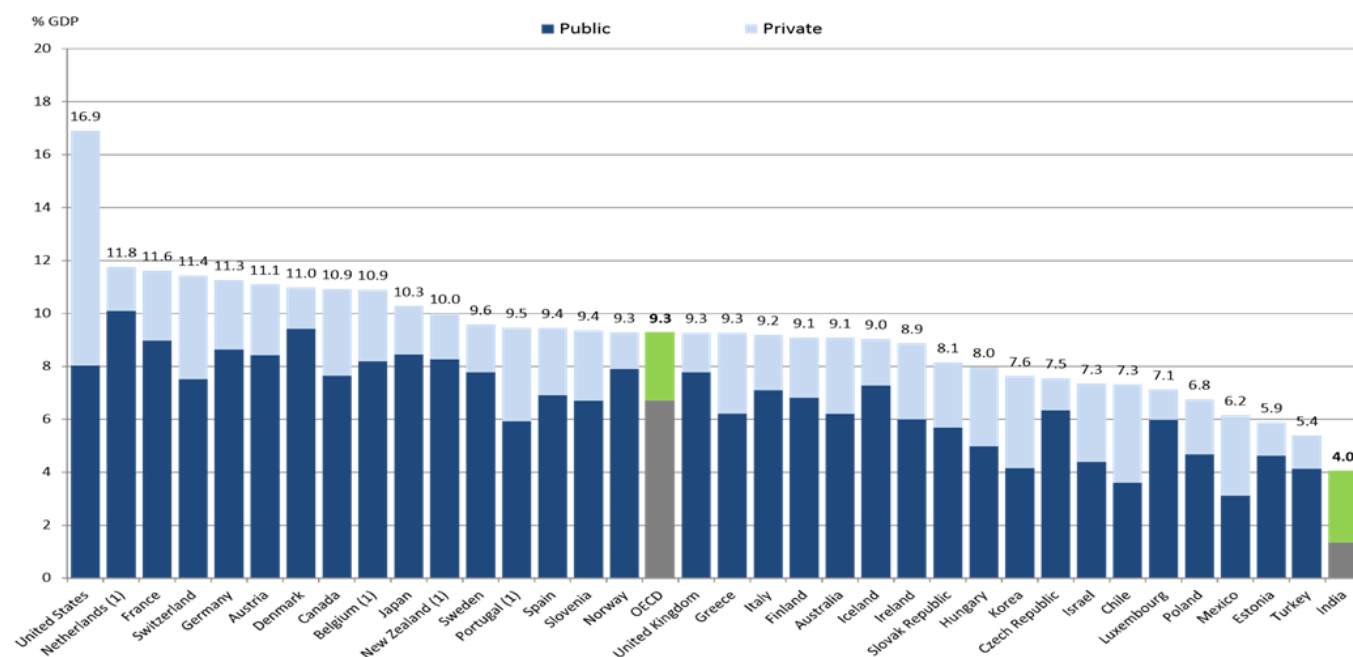
healthcare yet [6]. The figure 1 [8] represents how various governments compare in spending toward health care. We can see how USA ranks highest whereas India ranks low.

B. EHR Implementation Rate

As per Healthcare information and Management Systems Society Asia Pacific [12] there are eight stages of acceptance of EHR from stage 0 to stage 7 as listed in Table 1. In stage 0 there is no acceptance and stage 7 there is complete acceptance with little to no paperwork involved. As per analysis results of HIMSS adoption model, only 2.6% of hospitals had crossed the level-6. A bigger cluster of hospitals was measured at Level-3, which is a good sign. However, considerable paper work still exists in this level and hospitals cannot realize the complete quality and cost benefits.

Table 1. Stages of HIMMS

EMR Adoption Model Asia Pacific			
Stages	Cumulative Capabilities	2015 Q3	2015 Q4
Stage 7	Complete EMR, Data Analytics to improve care	0.4%	0.5%
Stage 6	Physician documentation(Templates), Full CDSS, Closed Loop Medication Administration	3.4%	3.9%
Stage 5	Full R-PACS	8.0%	7.4%
Stage 4	CPOE, Clinical Decision Support (Clinical Protocols)	1.7%	1.7%
Stage 3	Nursing/Clinical Documentation, CDSS (error checking), PACS Available Outside Radiology	0.7%	0.6%
Stage 2	CDR, Controlled Medical Vocabulary, CDS, HIE Capable	32.9%	32.7%
Stage 1	Ancillaries-Lab, Rad, Pharmacy-All Installed	4.6%	4.9%
Stage 0	All Three Ancillaries Not Installed	48.4%	48.2%

Figure 1. Health expenditure as a share of GDP, India and OECD countries

C. Interoperability

Data sharing challenges are widely present in health care, existing between different providers, hospitals and payers, also in departments within the same institution. Bringing together a myriad data relevant to patient care management is staggeringly cumbersome.

Clinical health records [10] consisting of primary care, hospital visits, pharmacy and prescription information, patient-generated health data, payment information and history, patient and family health history, hereditary information, clinical test data and so on – all this information needs to be easily available digitally for providers and patients to realize the need and promise of interoperability.

In this light, Health Level Seven International (HL7) founded in 1987[7], is a non-profit, ANSI accredited standards developing organization. It specifies set of international standards providing a comprehensive framework for integration, exchange and retrieval of electronic health data. "Level 7" refers to the seventh layer of the International Organization for Standardization(ISO) model for Open Systems Interconnection(OSI) – the application level. HL7 is being adopted by over 1,600 members and more than 50 countries, comprising of about 500 corporate members that represent pharmaceutical companies, healthcare providers, payers and consulting firms.

IV. CONCLUSION

The acceptance of EHR systems is currently mixed. There are studies that state documentation of patient health information takes up an excessive share of about 25%-50% of clinician's time. However, quality of health care has been found to have had a positive impact due to improvement in information input. The main users of EHR are nurses and attendants [11] who have little say in design or purchase decisions. The benefits of EHR is highest in emergency department as personnel must act quickly in a situation with no background information about the patient. Here, EHR plays a great role in providing certain crucial information in avoiding treatment errors that may occur due to ignorance. Training the user is significant both for acceptance of the system as well as achieving the expected benefits of it. Attempts of standardizing health information across platforms are being made. The lack of trust among patients toward storage of health data is an issue that is being dealt with where the United States of America passed the Health Insurance Portability and Accountability Act in 1996 which requires to publicize standards for electronic exchange, privacy and security of health information. These factors and attempts can be made fruitful with support from the government of a country that wishes to digitalize health data.

V. REFERENCES

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