



BAM2016

This paper is from the BAM2016 Conference Proceedings

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EMR Implementation in Eastern Prominence: Challenges and Opportunities

Towards EMR Benefits Management

Abstract

This research aims to investigate the current status of EMR implementation in the Eastern provenance of Saudi Arabia to identify the level of implementation, main challenges and to identify the main opportunities to exploit the power of EMR in this region. It is based on surveying 23 hospitals and a focus group from different hospitals. None of the hospitals in this area has fully implemented the EMR. Although there is a positive attitude towards EMR, the main critical reasons for why hospitals having different implementation levels are the believe that EMR enhances the quality of services provided and the level of top management support to implement EMR. The main challenges are the level of fund to support EMR in post-implementation phase; users (doctors, nurses and administrative staff) need continuous training on the system; and devoting and dedicating benefits management team to assure the benefits are identified, planned, owned, realised and reviewed so that the top management support is ongoing.

Keywords—Electronic Medical Record System, Benefits Management, Diffusion of Technology, Medical Information Systems, Information Systems in Developing countries

I. INTRODUCTION

The Electronic Medical Record System (EMR) is an information system that integrates, streamlines and facilitates processes in order to improve health care services. Although there is a good deal of information regarding the overall status of EMR implementation in advanced countries, few studies have been undertaken concerning Kingdom of Saudi Arabia (KSA) hospitals. The literature indicates that few studies to date have explored the current situation of EMR implementation at a national level in Saudi Arabia. What is known is that there is evidence of negative attitudes towards EMR systems. For instance, according to Alharthi et al.,(2014) out of 220 physicians in one hospital, 40% of them were dissatisfied with the EMR. Moreover, 70% of those who did not want to return to a paper system wanted to change the particular EMR system. This begs the question as to whether this is because of the vendor or because of other

factors. Furthermore, it is not known if this is also the case in other hospitals in Saudi Arabia. For instance, it has been found that more than three quarters of physicians in another hospital in the same area indicated that they felt that EMR had a positive impact on their work and the quality of care (Nour El-Din 2007).

EMR is not a goal in itself (Iakovidis 1998) but a tool for supporting the continuity of care and, consequently, the quality, accessibility and efficiency of healthcare delivery. Hence, the adoption of an interoperable birth-to-death EMR system can make a significant contribution towards achieving a sustainable health system (Hovenga 2008). Additionally, according to a comparative study carried out by Thakkar and Davis (2006) and based on hospital size of the risks, barriers and benefits of EMR, EMR systems could save billions of dollars in healthcare costs annually while maintaining healthcare quality.

Although EMR offers many benefits, there are difficulties associated with its implementation, and about 50% of EMR implementation initiatives have failed (Gleason, Farish-Hunt 2014). In developing countries such as Saudi Arabia, physicians' satisfaction with EMR is only 40% (Alharthi, Youssef et al. 2014). In other words, making the transition from Paper-Based Health Records (PBHR) to EMR in a healthcare setting takes time (Delpierre, Cuzin et al. 2004) and certain factors may affect the time required for such a transition. These include: the availability of financial support, uncertainty about the return on investment, the existing standard of technology, and the level of resistance to and priority of change (Dick, Steen et al. 1997). Although some studies have explained these factors in different contexts, as explained in the literature review, it is not clear in the Saudi context why some hospitals achieve a higher level of EMR implementation than others.

In Saudi Arabia, little is known regarding the adoption of EMRs, and in particular within MoH hospitals, owing to the lack of studies and government roles (Altuwaijri 2008, Bah, Alharthi et al. 2011). According to the few papers concerning health IT systems in Saudi Arabia (e.g., Alkraihi, Jackson et al. 2011), there is a current need for such studies to assess the levels of EMR capabilities and adoption within Saudi hospitals. In the context of Saudi Arabia, the concept of EMRs is relatively new and therefore requires more attention (Bah, Alharthi et al. 2011, Alkraihi, Jackson et al. 2011).

Therefore, this research aims to discover the level of EMR implementation in the Eastern Province of Saudi Arabia and to identify the main barriers and motivators affecting its

implementation. To sum up, this research seeks to propose a framework for integrating benefits management practices into EMR discipline with the aim to improve the success rate and to increase the level of EMR implementations in hospitals.

II. LITERATURE REVIEW

A. *Electronic Medical Record (EMR)*

Several terms for Electronic Health Records (EHR), such as the Electronic Medical Record (EMR), Computer-Based Patient Record (CPR) and Electronic Patient Record (EPR), are used interchangeably in the literature (Smolij and Dun, 2006). Owing to uncertainty about what exactly constitutes a Computer-Based Medical Record, several definitions of EHR have been presented in the literature. For example, Tang and McDonald define EHR as "a generic term to describe a repository of electronically maintained information about an individual's health status and health care" (Tang and McDonald, 2001). Burns (1998) defines EHR as "a specific term used in Information for Health to describe a longitudinal record of patient's health and healthcare from "cradle to grave", based in primary healthcare & including periodic care, e.g., summaries from electronic patient records." The Healthcare Information & Management Systems Society (HIMSS, 2011) defines the Electronic Health Record (EHR) as "a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports."

In an attempt to differentiate between EHR and EMR, the National Alliance for Health Information Technology (NAHIT) produced two different definitions. It defines EMR as "the electronic record of health-related information on an individual that is created, gathered, managed, and consulted by licensed clinicians and staff from a single organisation who are involved in the individual's health and care" while EHR is defined as "the aggregate electronic record of health-related information on an individual that is created and gathered cumulatively across more than one health-care organisation and is managed and consulted by licensed clinicians and staff involved in the individual's health and care" (Amatayakul, 2006).

Likewise, Garets & Davis (2005) argue that EMR and EHR are not the same and represent different concepts. They define EMR as "computerized clinical records generated in health care

facilities and physician offices” whereas EHR represents “the capacity to share medical records among health care staff, patients, and sponsors of health care services”. Thus, EHR has more inherited problems than EMR, such as sharing patient information across different information systems in different hospitals, which can increase the risk to patients’ privacy (McMullen et al., 2014). Since Saudi Arabia has not yet integrated its hospital systems (Altuwajiri, 2008; Alnuem et al., 2011), this research focuses on EMR, not EHR.

Health IT systems have the potential to reduce health care costs, improve efficiency, and enhance the quality of care and patient safety (Hammond 2008). While the interest in EMR adoption is high (HIMSS, 2014), the actual rate of adoption still remains low in many countries (Simon, Kaushal et al. 2007). Many countries have launched national programmes to move towards a single shared EMR for patients and to connect general practitioners and hospitals (Hendy, Reeves et al. 2005, Hendy, Fulop et al. 2007, Currie, Guah 2007). One of the main initiatives of these national programmes is to study in depth the different challenges facing the adoption of EMRs in those nations (Gagnon, Ouimet et al. 2010).

However, one of the major challenges in identifying the level of EMRs and their use is the lack of consensus on what constitutes EMR capabilities (Jaana, Ward et al. 2012). Differences in the definitions used regarding EMRs and methodological issues in previous studies in the literature might explain some variations in the EMR adoption rates in some countries, such as the US or European countries (Jaana, Ward et al. 2012).

B. Frameworks which Explore the Spread of Electronic Health Records

Although there has been more than three decades of experience in implementing electronic health records, uptake is less than 20%, even in the US and Canada, and almost 50% of implementations fail. In the literature, a range of different frameworks explain EMR diffusion and uptake.

Concerning the processes of EMR adoption, many studies in the literature were found to have taken different research approaches and to have provided different explanations (Vishwanath, Scamurra 2007). Most of these studies were based on Rogers’ sociology model (2010) for the adoption of technological innovations to explain the adoption of EMRs (Vishwanath, Scamurra 2007). Rogers’ theory (2010) explains how individuals or groups learn about innovations and thereafter make a decision either to adopt or reject them.

This theory (2010)(Roger, 2010) defines five innovation characteristics that might influence the adoption of any new technology. These generic and very broad characteristics are widely prevalent across technologies (Vishwanath and Scamurra, 2007). In addition, previous studies have often subsumed factors into a single one of the five generic innovation characteristics, which reduces the possibility of clearly measuring and understanding the complete effect of each factor (Vishwanath and Scamurra, 2007). Furthermore, every social situation is conditioned by interacting variables, such as time and culture, and therefore no two situations are identical (Irani, 1998). For example, early research into health IT adoption found other factors beside the five broad generic innovation characteristics of Rogers' theory (2010), such as the role of the hospital and environmental factors (e.g. a hospital's scale and ownership), in taking decisions regarding the adoption of technology (McCullough, 2008).

Recent studies have reported several issues associated with the adoption of EMRs. For example, governance strategies can successfully address certain issues associated with the adoption of EMRs, such as cost and the security and privacy of patient data, issues which might, in other circumstances, act as barriers to the adoption process (Blendon et al., 2004). Vishwanath and Scamurra(2007) explained a variety of factors attributed to the low rate of EMR adoption. These included macro-level factors (e.g., a lack of national policy and a lack of informatics standards) and micro-level factors (e.g., perceived complexity and resistance from physicians).

After analysing the literature, there are four main models that can help us in understanding the diffusion of EMR in hospitals. These include: Socio-technical models (Golden and Martin, 2004); Technology Acceptance Models (Venkatesh and Davis, 2000a; Tavakoli et al., 2013; Marler et al., 2009; Kowitlawakul et al., 2015; Seeman and Gibson, 2009); and Information Systems Success Models (Delone and McLean, 2002; DeLone and McLean, 1992; Petter et al., 2008a; Badewi et al., 2013) and EMR Critical Success Factors models (Ash 2003) and Benefits Management models (Badewi 2015, Badewi, Shehab 2016, Badewi 2016). However, none of these frameworks provides a clear theory to explain why some hospitals are implementing EMR more than others even though they are under the same level of constraints (i.e. financial resources).

1) Technology Acceptance Models (TAM)

Although socio-technical theories explain the role of the environment or setting, and the relationship between people, processes and technology, these theories do not consider in depth the attitudes of the users (Ajzen and Fishbein, 1977; Fishbein and Ajzen, 1975; Ajzen, 1991). Indeed, the users' attitudes toward the system are the cornerstone of change management (Kotter, 1995). Therefore, technology acceptance models were designed in response to this weakness since they offer another perspective with regard to the diffusion of technology and could be a focus for understanding the motivational and de-motivational factors affecting an EMR implementation.

The Theory of Planned Behavior (TPB) focuses on the factors that affect the intention to use (Ajzen, 1991). Hsieh (2015) extended this model to consider organisational trust and perceived risk as factors affecting the intention to use EMRs. According to Davis (1989), the Technology Acceptance Model (TAM) is an information systems theory which discusses how users accept a technology and start using it. He asserts that, when a new technology is introduced to users, there are a number of factors which influence "how and when" users will start using that respective technology. These factors are termed "perceived usefulness (PU)" and "perceived ease of use (PEOU)". In other words, the medical staff who perceive that the EMR is easy to use, aligned with their professional norms, supported by their co-workers and patients, and able to demonstrate tangible results, are more likely to accept this new technology (Gagnon et al., 2014). Likewise, researchers found that the TAM explains that attitudes towards a system are determined by the perception of usefulness and ease of use (Tavakoli et al., 2013; Aldosari, 2012; Ahlan and Ahmad, 2014).

Although the TPB & TAM spotlight the role of perception in the diffusion of the use, they do not explain other factors that affect this perception or how this affects a user's attitude (Seeman and Gibson, 2009). In addition, intention to use alone is not sufficient to understand the motivations and de-motivations affecting the further implementation of a system. However, it could help in understanding some aspects of socio-technical factors in terms of perceptions regarding ease of use and perceived usefulness.

2) *Information Systems Success Model*

Unlike the TAM theory which focuses on use behaviour, Delone & Mclean (2003) developed another framework to consider more concepts in understanding the success and diffusion of IT projects in general. The success of IT projects is determined by perceptions of

their net benefits, not by their use. However, use behaviour is a key factor in realising the benefits. According to Petter et al. (2008a) the quality of the system, its services and its information, affect both its use and user satisfaction which, in turn, affect the perceived net benefits. Likewise, Meidani et al. (2012) theorised that the quality of the organisation affects the success of the EMR implementation and this success affects the quality of the hospital processes and services.

Although Information Systems Business Success Theory is useful to explain use behavior and the bilateral impact of perceived net benefits, as well as customer satisfaction and use, it does not say anything about the impact of these positive perceptions and top management's decisions regarding further EMR implementation. Thus, Badewi et al. (2013) considered the attitudes of top management to a new information system, and how these attitudes affected both its use and users' resistance to change through the investment, in terms of time and effort, in learning, as well as other factors that might affect this resistance. Indeed, although this model interprets many important relationships in the diffusion of the use of information systems in organisations, it has not been applied to medical systems in general and to EMRs in particular.

3) Benefits Management

Benefits Management (BM) is a framework used with the aim of increasing the success of IT projects (Badewi and Shehab, 2016; Breese, 2012; Serra and Kunc, 2015; Badewi, 2016). The Benefit Realisation Management (BRM) concept was developed in the 1980s and 1990s in response to the need to rationalize investments in IT projects (Bradley, 2006). This concept evolved over time and it is interpreted, to some extent, differently across industries and countries (Breese et al., 2015). Bradley (2010) defines Benefit Realisation Management (BRM) as "a process of organising and managing, so that potential benefits, arising from investment in change, are actually achieved". Furthermore, Ward & Daniel (2006) define Benefit Management (BM) as "The process of organising and managing such that the potential benefits arising from the use of IS/IT are actually realised". Actually, BM and BRM may be synonymous. Based on these definitions of BM, a change should happen before any benefits are realised. According to the Cranfield benefits management model, benefits management goes through six processes: identification, planning, implementation, execution, reviewing and exploitation of benefits (Ward et al., 1996).

In order to allow bridge-building between Project Management, which targets implementing the predefined features and functions of EMR system on time and within budget, and Benefits Management, Badewi (2014), conceptualised Project Benefits Management as “the initiating, planning, organising, executing, controlling, transitioning and supporting of change in the organisation and its consequences as incurred by project management mechanism to realise predefined project benefits”. Indeed, the benefits management approach alone without being combined with project management is undermined (Badewi, 2014). Only when Benefits management is integrated with project management, the benefits are realised (Badewi, 2016). Indeed, the perception of benefits motivate senior leaders to proceed in implementing the targeted the system (Badewi et al, 2013).

III. RESEARCH METHODOLOGY

This research adopts mixed research methods (Ridenour, Newman 2008). It was started by exploratory questionnaire to address the level of EMR implementations in the Eastern Provenance and to spotlight the common challenges and opportunities. The content of the questionnaire was developed based on the review of the literature, together with the researcher’s experience and experts’ feedback. The main source for the development of the questionnaire found within the literature was the HIMSS model. The HIMSS categorisation scheme was adapted from the classification approach developed by Garets and Davis (2005), which is thought to be the most appropriate available model to investigate the stages of the adoption of EMR systems in hospitals (Jaana et al., 2012). This model consists of EMR stages based on the implementation status of various interrelated medical systems and helps in examining the extent to which the EMR systems within hospitals are implemented. The system allows hospitals with different medical systems to be classified at a number of stages depending on the nature of these systems, their complexity and the degree of interface.

Once the first draft of the questionnaire was developed, the researcher examined its suitability and accuracy by piloting it amongst experts, such as the researcher’s supervisors and IT experts in Saudi hospitals; the content was then adjusted based on their feedback and perceptions. Pre-testing was performed to improve the validity and reliability of the questionnaire. This was done by distributing questionnaires to five sample hospitals in order to look for any errors that might have been missed by the researcher. The length of the questionnaire and the time spent to

complete it were particularly important since some of the intended participants were senior managers and therefore their time for completing the questionnaire was limited.

We emailed the survey to 29 hospital directors in eastern province MOH hospitals, and a response rate of 79% (or 23 responses) resulted. This figure is acceptable and comparable to other similar studies. Work in Canada by Jaana et al. (2012), for example, targeted Chief Executive Officers (CEOs) in their respective hospitals and had a similar response rate of 84%. Afterward, interviewees were conducted with 19 decision makers from 19 hospitals to understand the root causes of the problems and how to overcome them for proceeding in EMR implementations.

IV. EMR CURRENT STATUS IN SAUDI EASTERN PROVINCE

A. *EMR in the Eastern Province*

The status of the EMR system is illustrated in. According to Figure 1, none of the hospitals had fully implemented EMR functionality. Two hospitals met the criteria of level one, only one achieved level three, and the remaining 20 hospitals were at level zero.

Based on the analysis of the 23 hospitals in, three hospitals were selected to be investigated and studied in greater depth since numbers 1, 5 and 18 had so far achieved a greater level of implementation than their peers. Therefore, it was necessary to understand their experience when adopting the system and also to understand why they had not progressed further.

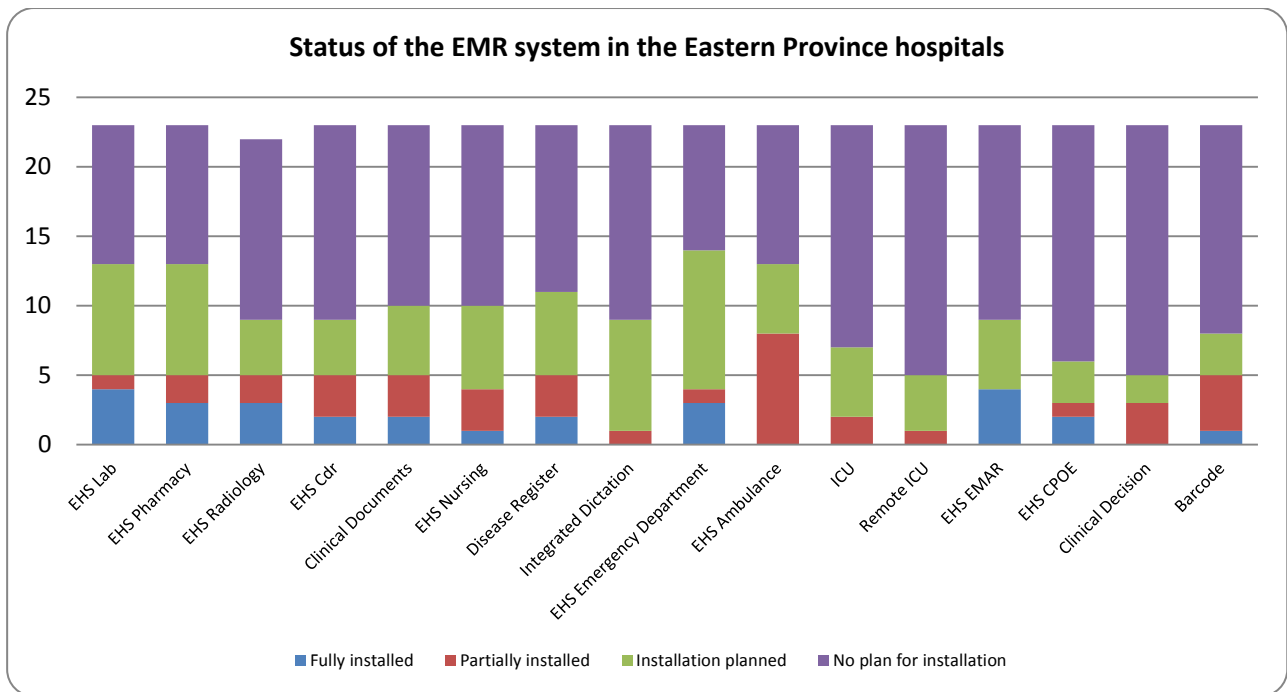


Figure 1 :EMR Implementation in the Eastrn Provence

B. Perception of ease of use

There were only three hospitals with implemented EMR. However, there was a positive attitude toward EMR implementation among respondents. As illustrated in Figure 2, more than 60% of the respondents believed that the system was easy to use. Furthermore, no organisation strongly agreed that EMR was difficult to use while less than 10% agreed that it was difficult to use. This could be a signal that the perception of ease of use is not a critical factor affecting the level of EMR implementation.

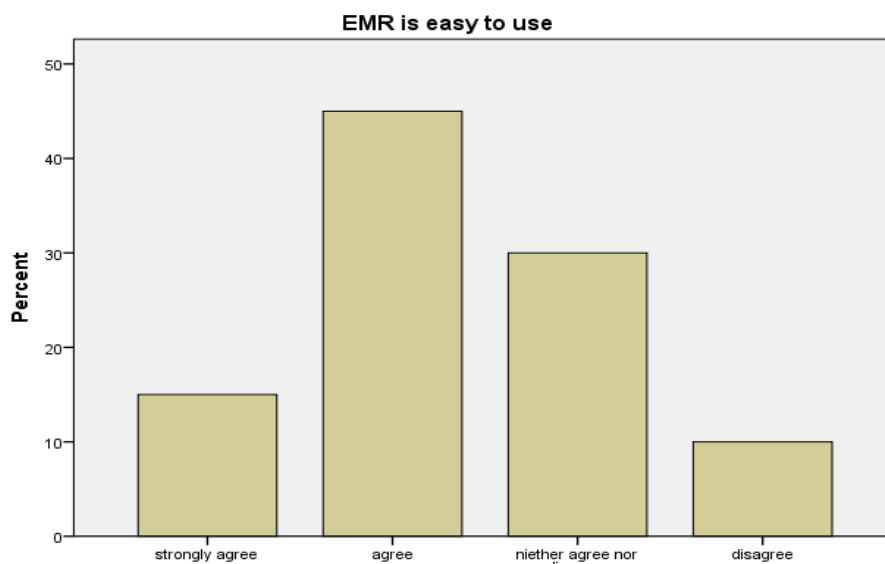


Figure 2: EMR is easy to use

Therefore, discovering the level of significance of ease of use by using regression analysis could be helpful in finding out whether or not this factor affected the level of EMR implementation. Using SPSS 19 revealed that the relationship between the perception of ease of use and the level of implementation of EMR was not significant enough to declare that perception of ease of use was a factor in determining the level of EMR implementation, as illustrated in Table 1. In summary, ease of use was perceived as generally positive among Eastern Province hospitals but this was not a critical factor in motivating them to move further in implementing EMR.

Table 1: The relationship between the EMR implementation level and perception of ease of use

Factor	R2	Sig	Significant at 95%
Ease of Use	14.8%	0.118	No

C. Perception of fulfilling needs

Unlike the perceptions of ease of use, perceptions as to whether the system fulfilled the needs of users varied widely. In general, as illustrated in Figure 3, no clear attitude toward this dimension emerged as more than 40% disagreed that the current EMR fulfilled their needs while 40% agreed. This could be because most organisations had not implemented EMR or because the system was indeed not useful.

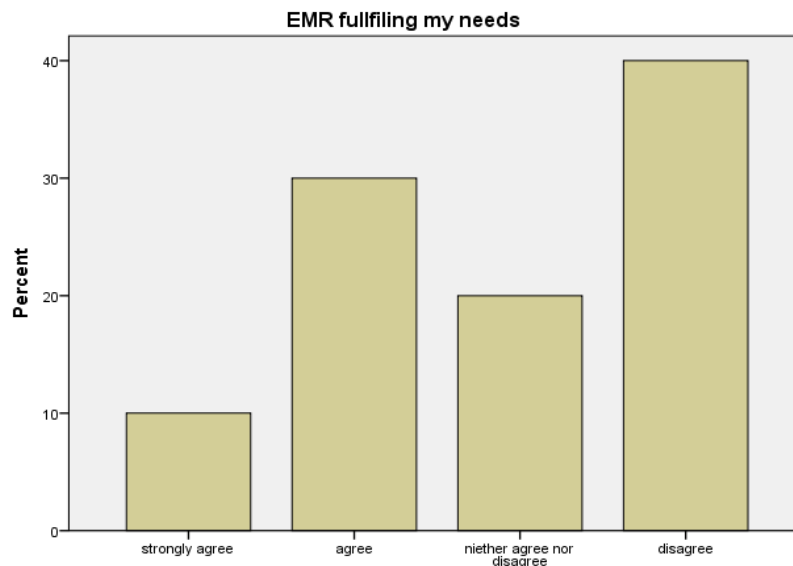


Figure 3: EMR fulfilling my needs

This variance in responses regarding the differences in perception in terms of fulfilling needs does seem to affect significantly the impact of implementing EMR. Indeed, as shown before, most hospitals have not yet implemented the system. This suggests that this figure represents whether or not the system could fulfil the needs; however, it does represent perceptions regarding its future use. Therefore, this is a positive sign in terms of motivation to implement. Indeed, the case studies conducted later were aimed to find out whether or not the system actually fulfilled the needs of adopters.

As shown in Table 2, there was no evidence that the EMR implementation level was a factor affecting perceptions as to whether the system fulfilled the needs of users.

Table 2: The relationship between the EMR implementation level and the perception that the EMR fulfilled users' needs

Factor	R2	Sig	Significant at 95%
Perception of fulfilling the needs	0.1%	0.905	No

In summary, there was no agreement among respondents about the benefits of the EMR in fulfilling the needs of users. Additionally, this perception did not have any impact on the level of EMR implementation.

D. Perception of fitness of EMR to the hospital system

Perceptions regarding the compatibility of the EMR with hospital procedures, standards and policies were relatively high. As shown in Figure 4, more than half agreed that it was compatible with the current state of the hospital while 25% disagreed. Indeed, this could be an indicator of motivation to implement of EMR in these hospitals.

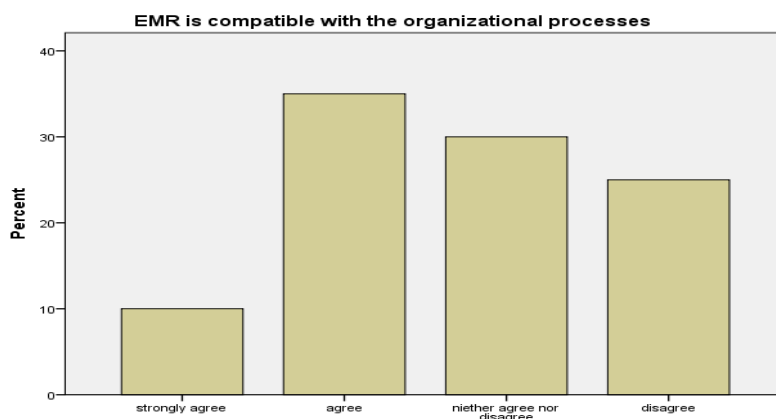


Figure 4: Perceptions regarding the compatibility of organisational processes with the level of EMR implementation

The regression analysis results shown in Table 3 do not provide sufficient evidence to claim that the compatibility of the system affects the level of EMR implementation.

Table 3: The relationship between the EMR implementation level and perceptions regarding the compatibility of the system with current hospital processes, procedures and policies

Factor	R2	Sig	Significant at 95%
Compatibility of the system with the hospital procedures, processes and policies	12.1%	0.15	No

E. Perception of enhancing the quality of care

In addition to the perception of fitness as an indicator of motivation to change, the belief in an EMR as an enhancer of quality is also an indicator. As illustrated in Figure 5, only 10% of the hospitals did not believe that the EMR functioned as an enabler in enhancing the hospital's quality.

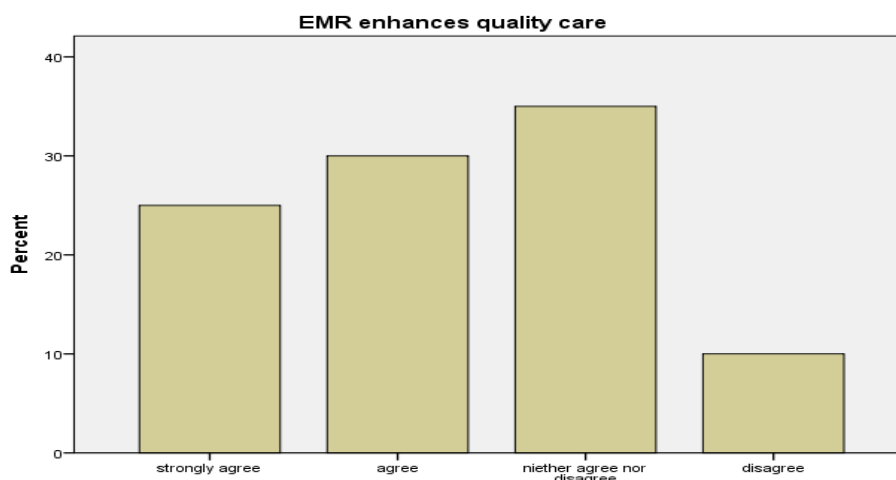


Figure 5: EMR enhance quality care

From a co-relational perspective, as tabulated in Table 4, perceptions with regard to enhancing the quality of care were revealed to be a critical factor in determining the level of EMR implementation in hospitals. The more staff believed that EMR enhanced care, the more the hospital had implemented the EMR. In other words, it can be restated that, the hospitals that had implemented EMR perceived something differently from those who had not: i.e., the quality of healthcare.

Table 4: The relationship between the EMR implementation level and perceptions that the EMR led to enhancing the quality of care

Factor	R2	Sig	Significant at 95%
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Perception of enhancing the quality of care	65%	0.003	Yes
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F. Organisational support

Another factor that motivated the implementation of EMR in the hospitals was organisational support. As illustrated in Figure 6, only 20% of the studied organisations disagreed that there was organisational support to implement the system.

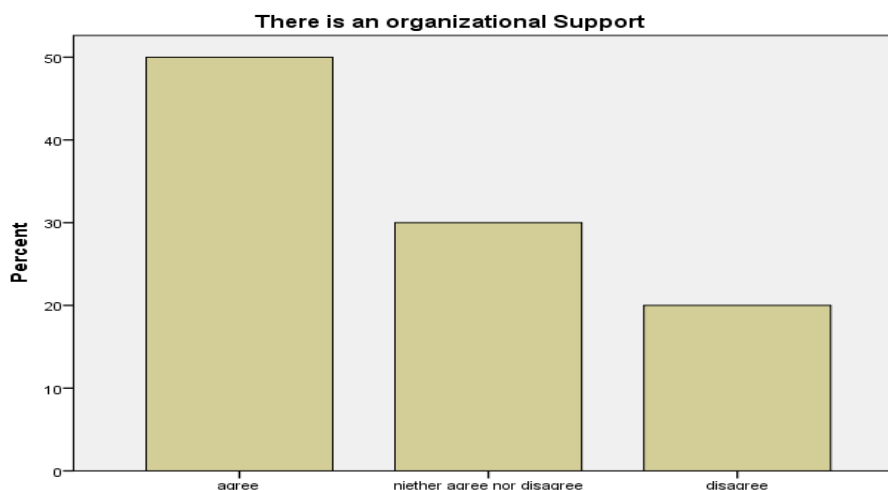


Figure 6: There is an organizational support

Indeed, based on the regression analysis summarised in Table 5, there was strong evidence that organisational support was a factor in determining the level of EMR implementation. This means that organisational support is a driver in further implementing EMR.

Table 5: The relationship between the EMR implementation level and perceptions of organisational commitment and support to implement

Factor	R2	Sig	Significant at 95%
Organisational Support	23.5%	0.04	Yes

G. Opportunities and Challenges

Hospitals in the Eastern Province of Saudi Arabia varied are varied widely among the hospitals. However, as illustrated in Table 6, only the perception concerning the EMR's ability to enhance quality and the existence of organisational support were found to be drivers for implementing EMR in Eastern Province hospitals.

Table 6: Attitudes and critical motivating factors regarding EMR

Factor	Attitude	Critical Factor
Ease of use	Positive	No

Fulfilling the needs	Varied widely	No
Compatibility	Positive	No
Enhancing quality	Positive	Yes
Organisational support	Positive	Yes

The main challenges are addressed by experts in the focus group is the lack of fund. Indeed, the required fund was not mainly for buying new applications or new technologies; rather it is for funding the training projects and also for managing the attitude toward the EMR. Although there is a positive attitude toward the EMR, but, according to experts, the age and experience level with IT of board of directors could be a factor in deciding whether to proceed or stop. This point can be solved by devoting EMR implementation team. This team is not a technical team; it's a sponsorship team. Sponsorship team shall be composed of senior doctors, nurses and administrative staff who are responsible for creating the hospital strategy in the long run. Indeed, without aligning EMR implementation and benefits with the hospital strategy, the EMR benefits will not be realised because staff will be psychologically detached from it. Second, doctors and nurses shall own the benefits in terms of responsibility and accountabilities. In other words, part of compensation system and performance management reports shall consider the level of benefits realised from the EMR by each doctor and nurse. Therefore, doctors and nurses shall identify the benefits and the developing plans to realise these benefits.

Because benefits owners are not experienced in how to identify benefits and how to plan for realising them, business change management (BCM) position is to motivate and help owners to own and to be able to realise the targeted benefits. The BCM is indeed somebody from the beneficiary department and s/he has the passion of the EMR. This person is responsible for studying and understanding the EMR before the implementation and understanding the medical decision making' and medical and clerical processes' needs of the benefits owners. His/her position is to be the liaison between technology requirements and medical and process requirements. This is the person who is responsible for motivating and encouraging benefits owners to own, believe in and work on the predefined benefits.

Finally, benefit audit shall be conducted by external body from time to time to feedback into performance management system for rewarding the benefits owners. Without considering the

use and recouping of benefits by benefits owners in compensation and performance management systems, it would not be expected they will actively seek to realise them.

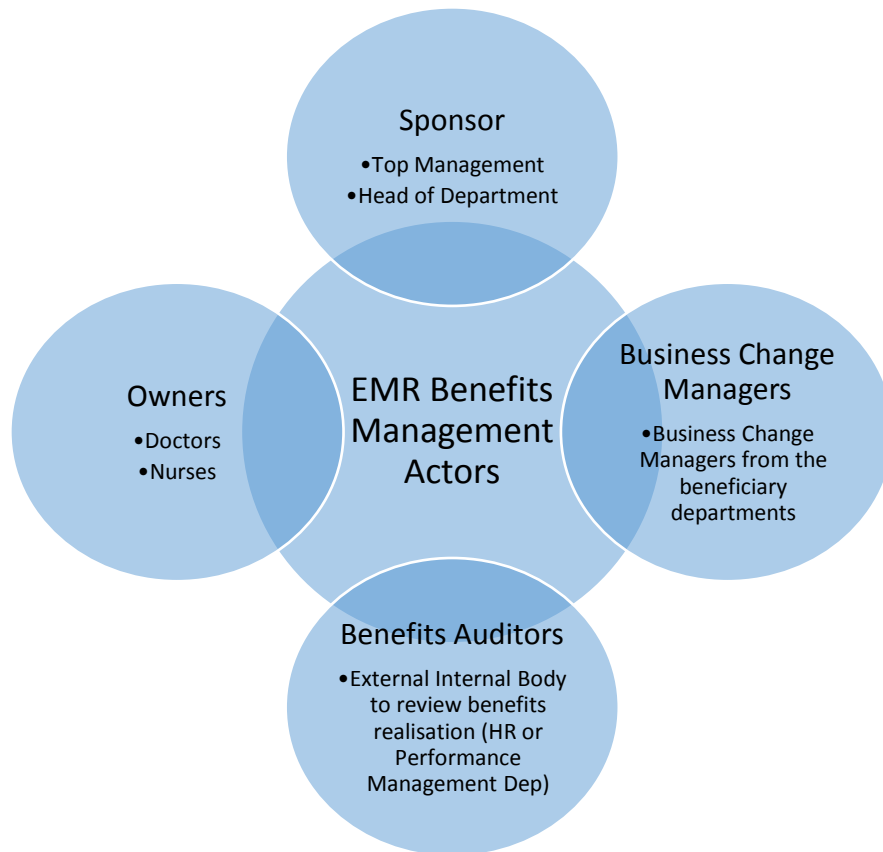


Figure 7: ENR Benefits Management Governance Framework

V. DISCUSSION AND CONCLUSIONS

This paper contributed to the literature by spotlighting the current AS-IS of the Eastern Provence hospitals. There is a positive attitude toward the EMR and there is a positive perception that the EMR is compatible to their organisation processes. However, there is no clear perception that EMR can fulfil the needs of the hospitals. Nevertheless, all of these factors are not the driving factors. The main drivers are the perception of enhancing the quality of the hospital and the organizational support. Indeed, this indicates that if the hospital supports the EMR, the benefits will be realized. This will lead to top management commitment which in turn leads to motivations for further implementation of the system. This phenomenon is described in Badewi et al (2013) to show the role of benefits management framework for improving the top management commitment toward proceeding in implementing Enterprise Resource Planning

System (ERP). However, this research is new for understanding the same phenomenon in the context of EMR. Finally, this research shed the light on the importance of having sponsorship, benefits ownership and benefits auditing for realizing EMR benefits and this in turn motivates top management to proceed in implementing it.

VI. PROFESSIONAL IMPLICATIONS AND FUTURE RESEARCH

These research findings have many implications that can help professionals and decision-makers in the health sector to increase the probability of EMR success and to enhance organisational attitudes, encouraging the implementation of higher levels of EMR than exist at present in their organisations. Since top management's commitment is perceived to be the main driver of success, a governance board of decision makers (such as a sponsoring group or Senior Responsible owner) should be set up to:

- a. Bear the responsibility and accountability for implementing the system. Otherwise, without a real buy-in to the EMR system from top management, the investment in it is a waste of time and money.
- b. Appoint business change managers to
 - i. to help benefits owners to define, model and owning (i.e. being accountable and responsible) the benefits.
 - ii. Report and Manage the perceptions and attitudes of users regarding the EMR system.
- c. Appoint Benefits auditors to
 - i. Set and enforce (using a carrot and stick approach) newly required EMR medical processes, policies and rules, as it has been found that the ability to enforce these new policies was one of the key success factors for the third case studied in this research.
 - ii. Assuring the benefits are realised as expected and if not, investigation is led by them to discover the reasons.
- d. Hold regular meetings with EMR users to learn the challenges that they face.

The future research shall be directed to exploring and investigating the role of benefits management in improving the success of EMR systems and motivating key stakeholders to proceed in implementing EMR. A comprehensive case study in action research methodology to develop and implement a benefits management framework to find out the difficulties in implementing it in the health sector in general and EMR in particular.

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VIII. QUESTIONNAIRE

Instructions for completing the questionnaire

Please read each question carefully.

There are no right or wrong answers.

The questionnaire is divided into three sections (A, B, C, D). Section A asks for general information about the hospital where you work. Section B asks for information about the hospital information technology department. Section C asks about the components of electronic health records, and the last section, Section D asks questions about the process of adopting and implementing electronic health records.

A) General Information				
Your age:	Your gender:	Years of experience working in a hospital:		
Hospital Name:	Hospital City:	Hospital Region:		
Number of beds:		Number of employees:		
Number of doctors:		Number of other staff:		
The hospital is: <input type="checkbox"/> self-operated OR <input type="checkbox"/> company-operated			Year hospital was founded:	
B) Hospital IT Department Information				
The IT department is: : <input type="checkbox"/> self-operated OR <input type="checkbox"/> company-operated				
The IT systems are: : <input type="checkbox"/> outsourced OR <input type="checkbox"/> in-house developed				
Year IT department was formed:		Number of staff in IT department:		
What is the percentage of IT professionals to the total IT department staff?				
<input type="checkbox"/> <10%	<input type="checkbox"/> 10% - 20%	<input type="checkbox"/> 21% - 30%	<input type="checkbox"/> 31% - 40%	<input type="checkbox"/> 41% - 50%
<input type="checkbox"/> 50% - 60%	<input type="checkbox"/> 61% - 70%	<input type="checkbox"/> 71% - 80%	<input type="checkbox"/> 81% - 90%	<input type="checkbox"/> ≥91%

C) Types of electronic systems: Please tick one box

Which types of electronic health records (EHR) exist in the hospital?	Fully Installed	Partially Installed	Installation planned but not installed	No plan for installation
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1	Laboratory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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2	Pharmacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Radiology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Clinical data repository (CDR)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Clinical documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Nursing notes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Disease Registry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Integrated Dictation System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Emergency department system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Ambulatory practice system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Intensive Care Unit (ICU) system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Remote patient monitoring—ICU	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Electronic medication administration record (eMAR)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Computerized Practitioner/Physician Order Entry (CPOE)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Clinical decision support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Bar coding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D) The adoption process: Please tick one box

SN	Topic	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
1	EHR systems are easy to use:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	EHR used in the hospital meet my needs:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3	EHR systems used are compatible with hospitals procedures, standards and policies:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	There have been benefits in terms of quality of care, patient safety and business enhancement as a result of using HER	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	There has been organisational support for the introduction of EHR systems (for example technical support, managerial support, training, awareness campaigns, or incentives to use):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What are the most significant barriers to successfully implementing electronic health records in your hospital?

What are the main factors which have helped implementation of electronic health record systems in your hospital?

MANY THANKS FOR TAKING PART IN THIS SURVEY