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Research Paper

Exploring Barriers to Implement Electronic Healthcare Records (EHR) By the Ministry Of Defence and Aviation (MODA) Hospitals in Saudi Arabia

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DECLARATION:
"I hereby declare that is work has been carried out and presented by myself and have not been submitted or accepted for any previous degree. This work reflects my personal views and all the sources of the information in the dissertation were acknowledged by references including internet sources. Furthermore, this work has not violated the academic regulations in any form as I have read and understand the student handbook which describes all academic misconduct"
This dissertation is submitted in partial fulfilment of requirement for the degree of MSc. Leadership and Management in Health Care Practice, University of Salford.

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Saud F Alotaibi

ABSTRACT: *This research's purpose is centred on investigating the obstacles to the application of Electronic Healthcare Records (EHR) by the Ministry of Defence and Aviation (MODA) Hospitals in Saudi Arabia. In the KSA (Kingdom of Saudi Arabia), there has been much emphasis directed towards e-health, particularly in regard to maintaining electronic records, as recognised when taking into account the successful integration of e-health in a number of private hospitals. This research conducts an in-depth systematic review of the literature, with the CINHAL and MEDLINE databases utilised and searched for the period from 2005 to 2013. Markedly, exclusion and inclusion criteria were developed in consideration to different aspects, namely Intervention, Language, Outcome, Population and Study Design. This study analyses relevant literature in order to develop insight into the obstacles facing the implementation of EHR in the KSA. This delivers a summary centred on the advantages and drawbacks of the systematic review methodology. Systematic review searches conducted in this field previously have highlighted recommendations in regard to the application of exclusion and inclusion*

criteria. This study emphasises the fact that, despite the fact that integration may be achieved through technological innovation, long-term restrictions imply a number of notable IT-adoption-relevant risk in both healthcare and social fields, with emphasis needing to be directed in this regard by those adopting changes before investment. Fundamentally, healthcare organisations concerned with achieving future sustainability and success acknowledge that a patient education culture with the capacity to utilise the very best resources and techniques will be essential in achieving success, both in the present and in the future. In an attempt to overcome the difficulties linked with the Saudi Arabian healthcare sector and to improve levels of quality across the healthcare sector, the MODA has also implemented a national approach for healthcare service. With this noted, this research further highlights that subsequent studies are fundamental in order to maximise understanding of and insight into the obstacles facing the application of EHR in the context of the KSA.

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Chapter One: Introduction

I INTRODUCTION

The application and rationale of an ideology is recognised widely as being a method with a number of different dimensions, which takes into account various theories and concept in both the academic and practical field. The basic rationale initiating the approach comprises a systematic analysis of the pertinent theories in order to create an argument in favour of or going against the academic model, as highlighted by Clark et al. (2011). This is the initial phase of what is a long-term journey beginning with a systematic analysis, which can be on-going for a number of years prior to the generation of a hypothesis. This study encompasses a number of different elements seen to impact the Electronic Health Record system, with specific focus placed on the Saudi Arabian context.

1.1 Topic Overview

In the light of Kazley et al. (2012), at present, there seems to be a great deal of efforts within the UK—such as through The Health and Safety Executive (HSE) across the European Union and on a regional and international level through the World Health Organisation—to encourage the replacement of the traditional record system with a more modern one, from paper-based to electronic. The EHR (electronic health record) system is able to achieve the management of patients' health records; this can help to increase the levels of management effectiveness and efficiency in the context of patient records (Watanabe et al. 2011). The EHR helps to ensure the opportunity for healthcare entities to enhance their overall patient safety and quality care, although challenges do remain, such as in regard to the modern-day world of the provision of integrated healthcare which is concerned with ensuring accessible, comprehensive, relevant, reliable and timely patient data across all members of the healthcare team—whether in secondary or primary care; whether a nurse or a doctor, patient or allied health professional (Hernandez et al. 2012).

In line with the considerations made by Watanabe et al. (2011) and in adherence to this modernisation drive, healthcare service providers in various parts of Dublin and Limerick, targeting those with intellectual disabilities, initiated the application of a modern EHR referred to as ECRS (Electronic Client Record System), the aim of which was to provide improvements in the paper-based system utilised at that point in time, and to subsequently replace it entirely with a new HIS (Health Information System). Nevertheless, various obstacles and challenges were identified, with Laramee et al. (2011) highlighting one of the main ones as being the lack of financial resources. Importantly, it is recognised that the integration of patient information and access to the

present EHR is significant, and thus it may be held that such modern-day systems not primarily designed for normal use would involve notably high costs on an on-going basis. Moreover, it is further highlighted that, despite the fact that a number of different patients adhere to the right of patient access to their health data, it remains that legislation may mean that providers of such information a great deal of flexibility in terms of establishing how reasonable patient access should be in Saudi Arabia (Altuwaijri, 2008). With this noted, Colpas (2013) further discusses the point that suitable team-building and leadership techniques are critical for the sound management of such negotiations, enabling EHR implementation activity to be carried out.

The point has been raised by Bansler and Havn (2010) that a number of different scholars hold the view that information systems are recognised widely as being unsuccessful in their capacity to derive the advantages possible. A number of critical success factors of information systems have been established in a number of different researches, such as that by Lin et al. (2012). One of the most notable of these centres on the inadequacies of the implementation processes. Markedly, the potential to initiate the approach of information system assessment at the outset has been recognised by other scholars including Conn (2012) as notably important, and could ultimately result in improved outcomes.

The study of Simon et al. (2008) details which of the EHR systems are best able to assist office staff and physicians with netter navigating patient data throughout all stages of an office visit—before, during and after—as an integral aspect of enhanced service delivery. This is achieved through adopting a systematic approach to data.

It is recognised that EHR systems are able to capture a number of different elements throughout the course of a clinical visit. Prior to a patient entering the clinic, the system is able to manage scheduling, insurance status, medication lists, patient registration and health history, and to perform an electronic preview of the medical history (Hernandez et al. 2012). Moreover, during the course of the actual visit, clinical documentation is provided, meaning staff members are able to access laboratory tests, order tests, and prescribe medication (Kazley et al. (2012). After leaving the clinic, the system can manage bills, code relevant data, and manage claims submissions. Through the use of the system, clinicians are also able to communicate electronically with their consulting providers, laboratories, payers and pharmacies. On the other hand, however, the approach is not widely implemented, and regardless of being able to use resources, a number of different countries have been unable to completely adopt EHR, such as in the case of Saudi Arabia, for example.

So as to ensure EHR can be realised long-term, a number of scholars have suggested that there needs to be adherence to CSFs (Critical Success Factors) (Liu et al. 2011). Such aspects include, for example, the identification of specifications by clinicians, the training of users, and overall application to the assessment processes and benefit management of the IT project adopted. In Saudi Arabia, there is the aim of implementing a move towards e-health, especially in terms of maintaining records electronically, as can be seen when considering the successful integration of e-health in some of the more specialised private hospitals (Clark et al. 2011).

1.2 Area of Study:

As outlined by Simon et al. (2008), the healthcare sector is making notable developments in its aim to utilise EHRs, which are recognised as being able to enhance the safety and quality of patient care, and to further attain noteworthy effectiveness in the provision of healthcare. Much focus has been directed towards intelligent systems that are able to facilitate the care process and clinical decisions, in addition to the creation of health data for patient care. Considering the situation from a strategic perspective, it is essential that more than mere creativity is taken into account, with a plan developed that can achieve an EHR system that offers a high degree of integrity for both legal and business purposes (Liu et al. 2011). The health and business records management ideas and approaches need to be assessed and adopted in this fairly modern world of EHRs, where it is critical to adopt business process redesign and sound insight into the change management process (Yamamoto and Khan, 2006).

1.3 Necessitation of Study

Haughom (2011) mentions that the advantages associated with the use of EHRs have been well detailed in the literature; nevertheless, it remains that there are a number of application obstacles that have hindered their wide scale adoption. Previous papers have made clear the need for EHRs to be implemented in order to ensure data is available at the point of patient care, which helps to ensure increased awareness in terms of medical errors, helps to save lives, and provides greater focus on enhancing overall patient care (Liu et al. 2012). In line with the view of Holmes et al. (2012), user adoption is critical so as to achieve the advantages associated with EHR, with such integration nationwide by healthcare providers recognised as fundamental to the continuity of patient care. With this noted, it has been observed that the literature shows evidence to support that clinical system implementation has experienced failure owing to a lack of adoption by users on a number of occasions (Maust, 2012). Owing to the fact that the main provider and key coordinator of patient care is the physician,

EHR application acceptance rests on the physician, which will ultimately dictate the success achieved (Liu et al. 2011). Nevertheless, studies carried out previously show that physicians do not utilise products that inhibit or delay their workflow, place limitations on how they practice or change how patient care is delivered (Maust, 2012).

Estimating the factors behind the acceptance and rejection of physicians in the context of a new information system enables firms to actively implement corrective actions in an attempt to improve overall acceptability. Nevertheless, the emphasis for enhance such a change requires clarity of concept, efficient planning, and the careful and well-considered selection of models and approaches. Therefore, this paper aims to examine relevant literature in an attempt to garner understanding into the barriers facing EHR application in the specific location of Saudi Arabia.

1.4 Aims and Objectives

There is a need for investigators to provide a clear and structured study aim prior to formally initiating the study (Denscombe, 2010). The key study objective is to establish the elements that act as hindrances in the adoption of EHRs in Saudi Arabia, and which can be circumvented through the use of organisational management approaches. The objectives detailed as following are clearly aligned with the aims of this research:

1. To assess the electronic health record standards currently employed in Saudi Arabia.
2. To analyse concepts and models of electronic health records for sustainable development of Ministry of Defence and Aviation Hospitals in Saudi Arabia (MODA)
3. To identify methods that Ministry of Defence and Aviation Hospitals in Saudi Arabia can employ to align their strategies for effective implementation and use of health records management

1.5 Research Question

As highlighted through the work of Petticrew and Roberts (2005), it is imperative that any study ensure well-formed, understandable questions that can be measured and considered easily by examining the critical study area. Therefore, this research poses the following questions:

1. What are the factors causing barriers to the development and implementation of Electronic Health Record system at Ministry of Defence and Aviation Hospitals in Saudi Arabia?
2. How do organisational factors help in adopting Electronic Health Record system?

1.6 Research Methodology

This research project is initiated with the completion of a literature review, providing a sound context for the study question (Hussey, J and Hussey, 1997). Improved EHR practice is linked closely with the idea of business for organisation enhancement, which will be examined through the research's literature review. Owing to the restricted resources and time available, the recommendation has been made that a systematic review should be adopted as a study approach for this research. A systematic review is a type of study delivering a summary of reports on a particular question with the use of clear approaches for the searching, critical appraisal and literature synthesis (Josette, 2012). Moreover, a systematic review is recognised as varying from other types of literature review in the sense that adopts a strict protocol with the aim of ensuring all relevant research is taken into account and analysed in the most valid ways (Moore, 2000).

Digital database and reference list assessment are two examples of a methodical review approach; these will be adopted in this study with consideration to studies carried out during the period 2005–2013. Upon the completion of this assessment, quality evaluation mechanisms in combination with addition and elimination standards will be implemented in line with the studies obtained. Gathering data from the healthcare providers in the industry—with such data centred on the implementation of electronic medical records—is the overriding aim. As has been emphasised by Moore (2000), a methodical review is the instrument that will be utilised in order to bring together the results from the literature review; this is considered more dependable and reliable than alternatives. Furthermore, in consideration to the sensitivity of such data prevalent within the healthcare industry, some of the data cannot be examined as it will be prohibited or excluded.

1.7 Dissertation Structure

This report will be an entirely academic work, meaning that the choice of a suitable study structure is fundamental, and ensuring a clear direction in terms of achieving valuable findings is also critical. This paper, in line with the guidelines detailed by Salford University, will encompass five different chapters, notably Introduction, Research Methodology, Results and Findings, Discussion, and Conclusion and Recommendations. These chapters will help to emphasise the numerous factors to be analysed. It is essential for the study that a clear idea be communicated of the subject rationale, which needs to be positioned within an academic context. The study will draw conclusions by providing an overview of the results, including a number of

recommendations, in addition to the requirements fundamental to any subsequent researches in a comparable arena in order to establish greater knowledge and understanding of the subject at hand—that of e-learning application.

1.8 Summary

As shown through this chapter, various tasks and activities will be included in the study in order to bridge the gap between theoretical and practical aspects of the obstacles facing EHR implementation in Saudi Arabia, which will comprise in-depth discussions on various subjects in the chapters to follow. This will consider the application of EHR in mind of achieving improved organisational development and productivity in the context of MODA hospitals. The following chapter will provide an overview into the study approach utilised.

II CHAPTER TWO: METHODOLOGY

Introduction

Studies are commonly conducted in adherence to particular resources and time restrictions (Hussey and Hussey, 1997). Such restricted boundaries facilitate studies in being carried out in an effective and well-organised manner so as to ensure meaningful results can be garnered. A clear outline for how the study should progress is provided by the study methodology; therefore, a suitable choice in this regard can make the process smooth and development valuable. Accordingly, this chapter will consider the most important domain of the study whilst establishing a link between the goals of the study with the most suitable approaches and techniques for achieving such goals. The goal of this chapter is to consider the systematic review approach, and how this can be applied in order to examine the elements affecting EHRs, with specific focus directed towards the context of Saudi Arabia.

2.1 Research Strategy

The benefits and drawbacks of any efficient study approach need to be considered (Blaxter et al., 1996). A number of clear ideas establish the study approach necessary to fulfil the necessary aims. It is the investigator's responsibility to ensure awareness of and insight into the skill-set necessary to complete the research, as well as for the researcher to ensure awareness of how the task can be completed. At the same time, the study needs to utilise creative thinking skills and critical analysis (Moor, 2000); a good rationale behind selecting a particular approach is also fundamental. Choosing a suitable road out, which provides a good path towards the completion of the study approach, is fundamental. Moreover, the abilities, focus, independent thinking, management skills and motivation are also essential in terms of enabling the approach (Denscombe, 2010).

2.2 Systematic Review

A systematic review is a type of study delivering an overview of reports on a particular clinical question, utilising clear approaches to critically appraising, searching and synthesising the literature on a systematic basis (Petticrew and Roberts, 2005). Systematic reviews vary from other forms of literature review in the sense that they adhere to a clearly outlined protocol; this helps to ensure all research has been taken into account and reviewed in the most appropriate way (Josette, 2012).

2.2.1 Advantages of the Systematic Review Approach

It is held by Gray (2004) that systematic reviews are very valuable in amalgamating several researches that have been carried out separately, occasionally with contrasting results, and subsequent interpretation. Through delivering an overview of all researches dealing with a particular clinical question, such a review enables the investigator to consider a number of relevant results from studies on a certain subject—not only one or two researches (Petticrew and Roberts, 2005). Accordingly, by providing an answer as to what has been established or what is not known in the field, insight can be gained in order to plan new primary research (Josette, 2012). This approach was developed in particular mind of the aim of decreasing the influence of the bias held by the researcher. This was achieved by making the decision, in advance, as to what evidence can be used and in what ways; thus, the study is not impacted by the findings prior to them being recognised (Catterall, 2000).

2.2.2 Disadvantages of the Systematic Review Approach

Gray (2004) suggests that, despite a thoroughly completed primary data review can be advantageous to patient care, the approach nonetheless is recognised as time-consuming and complicated, necessitating notable resources and well-informed investigators. Accordingly, throughout the course of this chapter, the methodology was analysed in order to circumvent the resources necessary. A good systematic review can only be carried out if the majority or all of the data on a subject is analysed; all potential articles can be established through a sensitive search approach (Josette, 2012). Electronic databases, the internet and reference lists were searched in

order to establish all relevant materials in the area of interest. A systematic review can only be as good as the research it contains (Petticrew and Roberts, 2005). Therefore, quality assessment was recognised as pivotal to the study so as to ensure the evidence used was examined objectively in order to suitably assess the quality of the review results.

2.3 Literature Scoping

The research studies identified for review are recognised as being based on initial literature scoping (Brymann and Bell, 2007). This was carried out in the paper through searching various databases, including MEDLINE and CINAHL, for terms linked with the areas of interest through EBCOS. Such activities may initially highlight the presence of only a select few methodologically sound researches (Josette, 2012). Nevertheless, via preliminary analysis, a large range of literature was established in relation to EHR implementation.

Upon consideration of a systematic review, there needs to be attention directed towards whether or not a review of good quality is already available, or whether such a review is lacking or otherwise in development (Blaxter et al. 1996). In an attempt to establish this, the Cochrane Database of Systematic Reviews (CDSR), Database of Abstracts of Reviews of Effectiveness (DARE) and the Health Technology Assessment (HTA) Database were searched using the search terms 'Electronic Health Record', 'Electronic Medical Record', 'Saudi Arabia Health Record', in addition to searching throughout the process of literature scoping. When doing this, there was the identification of two comparable systematic reviews in the subject areas.

A review analysing EHRs in the context of emerging economies was carried out by Conn (2012), with the review establishing only two pertinent, on-going trials in the primary care setting, and establishing the need for a systematic and controlled approach in order to identify electronic records. As a result, the researcher had the aim of searching literature for any information on the elements linked with EHR as it was considered that this would provide a greater spectrum of evidence for analysis. Moreover, the study researcher also aimed to encompass all pertinent types of primary research as this would also improve the evidence available for the utilisation of the systematic review. Accordingly, with a greater volume of literature available, there may be the drawing of conclusions that otherwise may not have been suggested owing to a lack of evidence identified in the review carried out by Maust (2012).

Kumar and Aldrich (2010) also carried out a review relevant to this study, which examined electronic health records, the efficiency of the system in regard to the patient, and the implications apparent to service providers. For the period 2005–2013, articles on EHRs and their application have been searched; however, there was a clear lack of evidence for analysis, meaning the research has been restricted to the review carried out in researches published during 2005–2013 owing to the fact that the review of Conn (2010) had already been carried out prior to this date. The overlap year of 2005 has been used owing to the fact that leaving a timescale gap could ultimately cause researches to be missed.

Furthermore, only MEDLINE was searched by Conn (2010). It was outlined by Lin et al. (2012) that searching MEDLINE only failed to establish all potential researches for a systematic review; thus, two electronic databases were reviewed, in addition to the extended search approaches in this review.

2.4 Search Strategy

Searching for researches is concerned with generating an in-depth list of primary researches that may be appropriate to delivery explanations and answers to the study question (Moore, 2000). An in-depth search should encompass the analysis of studies from different sources, namely electronic databases, reference lists and the internet (Josette, 2012).

2.5 Electronic Databases

A search filter is a combination of search terms that capture relevant articles in an electronic database (Petticrew and Roberts, 2005). Abstracts and bibliographic details of published materials are detailed in electronic databases (Brymann and Bell, 2007). Creating the right combination of search term for in electronic databases can be facilitated through breaking down the review into different elements. The components detailed are intervention, outcome, population and study design (Josette, 2012), with key terms developed subsequently in order to create a search approach.

MEDLINE and CINAHL were the databases searches for the period spanning 2005–2013. The date limits were implemented in line with the limitation of researches published after 2000 owing to the review carried out by Conn (2012). It should be noted that MEDLINE is recognised as the key source for gaining access to clinical medical data; however, as highlighted previously, it has been acknowledged that searching MEDLINE alone is inadequate in establishing all potential researches for a systematic review (Catterall, 2000). Accordingly, numerous databases within the EBCOS platform were examined.

2.5.1 Electronic Search Strategy Documentation

For this particular type of study, it has been advised by Josette (2012) that there is the need to complete a sensitive search as opposed to one that is overly particular; this will help to decrease the potential to miss other researches. Importantly, sensitivity is considered to be the portion of all articles of relevance, established through a search approach expressed as a percentage of all articles pertinent to a particular subject (Brymann and Bell, 2007). Accordingly, the final search approach does not encompass the entire search terms devised during the course of the literature scoping. From this, it was recognised that the search terms were still too insensitive in terms of their ability to establish all articles in the field.

2.5.2 Extended Search Approaches

A research carried out by Petticrew and Roberts (2005) in regard to the efficiency of search approaches in Systematic Reviews established that a notable volume of literature could be gathered through the use of extended search approaches. Such approaches include hand-searching relevant journals and scanning reference lists. Searching study and review references lists through databases can also help to establish additional researches for consideration (Josette, 2012).

2.5.3 Hand-searching and the Internet

Publications of relevant may be missed when conducting electronic searching owing to incomplete or inaccurate database indexing, or otherwise a poor search approach (Denscombe, 2010). It is also fundamental that publications of relevance be identified for those articles that have not yet been quoted in other works or which have not been included in electronic databases.

Nevertheless, owing to the fact that there was not a particular journal based on EHR that could be established, the view was held by the writer that a hand searches would not be suitable for this research. Rather, in mind of the study purpose, the decision was made to identify any potential articles missed by prior studies through conducting an internet search. It is considered that the internet is a valuable tool for seeking out data on both completed and on-going studies, especially those not yet published formally (Moore, 2000). For this study, EBCOS will be adopted.

2.6 Inclusion and Exclusion Criteria

There may be a number of problems associated with data synthesis and interpretation from a significant group of researches (Denscombe, 2010). Accordingly, both inclusion and exclusion criteria establish the papers that may assist in answering the review question (Hussey and Hussey, 1997). Systematic reviews have the potential to become biased owing to the exclusion of pertinent researches and the inclusion of poor researches (Moore, 2000). Both inclusion and exclusion criteria are associated closely with the study question; thus, they may be based on the participant, intervention, outcome or study design. As can be seen in the table below, which has been adapted from the work of (Gray, 2004), the inclusion and exclusion criteria has been facilitated in order to follow on logically from the study question.

Articles may be excluded from review completion if they are written in particular languages as this can necessitate the need for interpretation and translation, as noted by (Josette, 2012). Nevertheless, this can decrease accuracy and can introduce bias (Petticrew and Roberts, 2005). Upon the initiation of the research selection process, the pros and cons of including particular languages were weighted; however, the issue did not arise.

Table: Formulation of Inclusion and Exclusion Criteria

Research Question *'What are the elements inducing obstacles to the development and implementation of the Electronic Health Record system at Ministry of Defence and Aviation Hospitals in Saudi Arabia, as well as the way in which different organisational elements can facilitate in the adoption of the Electronic Health Record system'*		
Selection Criteria	Inclusion Criteria	Exclusion Criteria
Population	Patients experiencing improved results using electronic health records	Patients containing non electronic records
Intervention	Administration of electronic health record in acute setting.	Long term implication of electronic health record development and management
Outcome	Impact of electronic health record and facilitation for improved patient care services from both medical and administrative point of view	Studies not measuring implementation and effects of electronic health record on patient outcome
Study Design	Primary studies after Year 2005 and before 2013	Research before year 2005 and after 2013
Language	English language	Arabic or any other language

The suggestion is made by Petticrew and Roberts (2005) that, even with the outlining of explicit criteria, it remains that a choice regarding the inclusion of studies is somewhat subjective. In order to circumvent this issue, the inclusion/exclusion criteria were considered with the study supervisors in order to ensure studies would not be included or excluded inappropriately, which could ultimately impact the scope of studies garnered.

2.7 Quality Assessment

The main drawbacks associated with a systematic review include the fact that it depends on the overall quality of the materials utilised, and also that it is retrospective (Denscombe, 2010). Various researches analyse the same topic through various approaches, or may complete analysis differently, and so such researches may differ significantly in terms of their strength and quality (Gray, 2004).

Critical appraisal of the methodological quality of primary studies is a critical aspect of systematic reviews, as noted by Petticrew and Roberts (2005). Critical appraisal is the approach associated with systematic examination of evidence in order to evaluate its relevance, results and validity. Through the course of a systematic review, the approach associated with examining quality should seek to achieve the same high standards as the rest of the review; it needs to be bias-free, valid and repeatable (Moore, 2000). As recognised by Josette (2012), there should be the application of appraisal checklists to assist in the examination of researches; different types of checklist can be identified for different research designs, and assist in establishing what needs to be examined in order to grade the quality of the research.

2.8 Data Extraction

The extraction of data is the approach centred on gathering data from the literature (Petticrew and Roberts, 2005). Such data may attract bias and error, and may be subjective; thus, the belief is held by Denscombe (2010) that a data extraction approach needs to be adopted, which needs to encompass the paper's bibliographic details, study characteristics, results, and outcome measures. The data extraction approach has been developed through the use of the study of Josette (2012). Similarly, this will be utilised in order to gather review findings.

2.9 Summary

The study approach is initiated with a view that can attract views for and against, in addition to relevant brainstorming that may establish a research question. The question should be answered throughout the course of the study. Creating a suitable study question involves a number of critical processes, and further outlines the study direction, in addition to highlighting the approaches and methods to be utilised in order to satisfy the outcome required. The researcher's task is to assess the situation and accordingly to provide a rationale for the choices made during the process. A study is a focused task necessitating the capacity to assess, investigate, propose, differentiate, and envision sense. It is an on-going approach, with the study findings, practices and theories helping subsequent examinations in the field in question, which may either support or contradict findings garnered in the past. Frequent framework testing may result in established laws, with the investigator making progress methodically in an attempt use all resources in such a way so as to garner accurate findings.

This chapter has described and provided an overview for the pros and cons of the systematic review approach. Previous systematic review searches in this subject field have been carried out, with suggestions made from these considered when creating the inclusion and exclusion criteria. Subsequently, inclusion and exclusion criteria, search strategy, data extraction and quality assessment have all been examined and presented.

III CHAPTER THREE: LITERATURE EXTRACTION

Introduction

This chapter is centred on representing the results of data synthesis and data extraction of the twelve researches identified, including that of quality assessment. The main themes are subsequently established and considered, in addition to a critical review of the research involved.

3.1 Selection of Articles

Following the search for keywords with the use of the 'Electronic Medical Records', 1,762 papers were garnered through MEDLINE and more than 1,271 through CINHAL databases. Subsequently, the articles were filtered in line with the inclusion and exclusion criteria. Altogether, a total of more than 1,731 papers from MEDLINE and more than 1,241 from CHINAL were excluded. As a result, through MEDLINE, 42 papers were included and 29 from CINHAL. From the researches, the abstracts and titles from both CINHAL and MEDLINE were screened to determine significance. Following the second phase of exclusion, 37 papers from each of the databases were included. Following the subsequent elimination phase in which EMR related topic,

current practices across the world, MODA practices, need of resources and publications timeline was considered, most relevant 6 papers from each of the databases were recognised as relevant to the study.

3.2 Data Extraction

The process of data extraction is concerned with gathering data from primary studies, as noted by Maust (2012). Data extraction was carried out with the use of the data extraction. Throughout the data extraction process, the research studies were quality assessed with the use of the instruments established previously (Methodology chapter). For each piece of research, the data extraction is detailed was carried out in order to highlight the way in which the selection criteria were adopted, both objectively and consistently.

3.3 Critical Analysis of the Research Considered

Completing a more description stage in the data synthesis process needs to be very clear; research needs to be described briefly, placing emphasis on the differences and similarities (Lowery et al. 2012). It is considered, as highlighted by Liu et al. (2012), that the intervention of electronic medical records is likely to rest on various significant elements linked with who delivers it, who received it, as well as how and in what ways.

3.2 Data Synthesis

In the context of the systematic review, data synthesis has the objective to gather and summarise the findings of the primary researches established prior (Haughom, 2011). The findings need to be summarised in a valuable way, such as through the application of tabulation, which permits the identification and representation of between-research variations. The main findings reported in twelve articles were interpreted through publishing year, subject characteristics, EMR related barriers, EMR implications in Saudi Arabia and current practices within the industry. This will be further explained and discussed in the following sections.

3.5 Key Themes of the Findings

Below is an overview of all of the articles chosen for analysis.

3.5.1 Saudi Healthcare Overview: Clark et al. (2012)

According to Clark et al. (2012), the Saudi Arabian government has assigned much importance to healthcare service development across all provider levels, namely primary, secondary and tertiary. As a result, the Saudi population's status of health has witnessed much improvement in recent years (AL-Bejaidi, 2010). Nevertheless, Sidorov (2006) mentions that it remains that various obstacles and issues have been observed in the healthcare system, including the various roles of the health ministry, the lack of health professionals, ever-changing patterns of disease, restricted financial resources, significant demand as a result of from-from-charge services, a lack of a national health information system, and the lack of application in regard to electronic health approaches. This study examines the present structure of the Saudi Arabian healthcare system and its historical development, with focus directed towards the challenges and opportunities within the healthcare system and the public health sector.

However, the study suggests by Qurban and Austria (2008), that there is growing concern regarding the under-utilisation of electronic health systems in Saudi Arabia, with the adoption of electronic and e-health information systems already witnessed in various businesses and organisations, including the King Faisal specialist hospital and research centre, university hospitals, National Guard health affairs, and the medical services of the armed forces. Altuwaijri (2008) outlines, although the adoption of such e-health systems is developing slowly amongst MoH establishments, various information systems are in operation in central hospitals and in regional directorates. Unfortunately, such information systems are not linked with one another, nor are they linked with specialised or private health entities. In order to develop e-health services within the public domain, the MoH allocated a significant investment budget (amounting to approximately US$1.1 billion) for the running of a 4-year development scheme (spanning the years from 2008 to 2011) (Clark et al. 2011).

In the light of Bansler and Havn (2010), the progression and development of health services, in addition to a number of other elements, such as greater accessibility to public education, better life conditions and improved health awareness across society, have all added to the notable enhancements recognised through health indicators highlighted previously. Nevertheless, Sidorov (2006) says that irrespective of the multiplicity of health service providers, there is a lack of communication and coordination amongst providers, thus causing duplicated efforts and wasted resources. It is therefore evidence that there is a great need of focusing on building technological healthcare infrastructure in Saudi Arabia, which EMR can be part of.

3.5.2 Boundaries of E-Health: King et al. (2012)

It has been noted by King et al. (2012) that the key issues facing health- and social care systems across the globe is the significant issue associated with an older population with complicated social care and healthcare requirements. Timely and accurate access to information relating to patients and their treatments could

ultimately derive improved levels of care at lower costs. Greenhalgh et al. (2008) go on to suggest that the way in which geographical, professional and structural boundaries have impacted the application of e-health in social and healthcare arenas has been examined by Scholl et al. (2011) through the adoption of an empirical research centred on the application of an electronic version of SSA (Singe Shared Assessment) in Scotland with the utilisation of three reflective, qualitative case studies across three different Health Board locations.
Burt and Sisk (2005) believe has been established that the progress related to the efficient sharing of electronic data has been both inconsistent and slow, with this potentially explained by the presence of structural boundaries; this causes poor cooperation, incompatible IT infrastructure and systems, and competing priorities. Furthermore, Mole et al. (2006) argue that another cause may be considered to be the presence of the professional boundaries which impact on the acceptance and understanding of data amongst staff, as well as their differing data requirements due to significant variation in their professional expertise, technological knowledge, and in some instances qualification.

The research of Bansler and Havn (2010) itself centres on the provision of holistic care amongst patients with complicated social and healthcare requirements and highlights the need to develop integrated approaches for the provision of care. Successful integration requires a number of practices, including sound government and project management, ensuring good training and support, leadership and system interoperability, in line with clear efforts to enhance overall working relationships across different domains and clear communication in terms of project vision.

3.5.3 Overcoming EMR Barriers: Kumar and Aldrich (2010)

The study of Kumar and Aldrich (2010) shows that this paper examines a number of key benefits, challenges, obstacles and opportunities associated with the regional application of an EMR system within the USA. Improvements in efficiency and quality of the provision of healthcare are also taken into account. On a national scale, EMR system adoption in the USA could result in more than US$81 billion in annual savings. However, Conn (2012) outlines other industry estimates have positioned such annual savings as being as much as US$300 million. At the present time, less than one-third of all physicians in the USA utilise electronic medical records; when compared with other countries, such as New Zealand, the Netherlands and the UK, for example, figures stand at almost 90%.

Importantly, Colpas (2013) mentions in the USA, less than 10% of all hospitals utilise a health information database that encompasses physician order-entry and record capabilities. It is recognised that the application of an EMR system could help to significantly decrease medical errors and workloads amongst clinicians whilst also saving the US healthcare system significant costs. However, Haughom (2011) says when contrasted alongside other developed countries, the USA appears to be lacking.

Mole et al. (2006) considered the benefits, efforts and obstacles associated with the efforts of the EMR system, in addition to the phases required in order to progress the USA more in terms of the EMR system. The examination encompasses a blueprint for EMR adoption, as well as industry comparisons with the aim of highlighting the differences between EMR initiatives—both successful and unsuccessful, benefit and cost information, and root cases. Notably, Kazley et al. (2012) suggest there will be the incorporation of 'poka-yokes' (Japanese for avoiding (yokeru) mistakes (poka)) in order to deliver understanding into the way in which obstacles and issues can be circumvented systematically. Such application necessitates upfront costs, with the inclusion of patient privacy; this needs to be dealt with early on in the development process. Importantly, the report suggests that in order to adopt EMR across the USA, there is the need of government incentives, mandates and structure.

According to Greenhalgh et al. (2008), the wide-scale implementation of EMR and associated technologies, if adopted effectively, would give significant improvements across the US healthcare system whilst also achieving notable savings. A number of policy options could be utilised in an attempt to increase EMR development. However, Bansler and Havn (2010) say that with this noted, there is a need for healthcare staff to initiate staff training for the ultimate technologies upgrades to be implemented. In a sector where there is little exposure to modern technology and communication when compared with others, there is the need for educational programmes to be devised and adopted.

3.5.4 Empowering Patients of EMR: Tomsik and Briggs (2013)

According to Tomsik and Briggs (2013), their research considers that providers of healthcare are making significant efforts to Stage 2 meaningful-use (MU) requirements in a time-effective way. Although there are various obstacles to overcome for technology vendors and providers, one key issue recognised across the sector concerns the complicated nature of establishing patient portals. Although Burt and Sisk (2005) argue, it is not directly necessary in the Stage 1 MU requirements, the adoption of patient portals is recognised as providing an efficient and natural method for fulfilling various aims, including the provision of patient access to, for example, clinical summaries of office visits, timely access to health data, and patient-specific educational

resources. Tomsk and Briggs (2013) suggest that in the case of the second stage, which is already being implemented, a number of professionals in the field hold the view that patient portals will prove fundamental in order for healthcare entities to fulfil the needs identified. In particular, Sidorov (2006) suggests that it is known that patients will need to be able to download, transmit and view data directly from their own health record through an EHR. Furthermore, the requirements concerning the patient are expected to become more complex as the sector progresses into subsequent stages. In simple terms, the development and implementation is centred on providing patients with access to their records and also educating them in regard to more active involvement in their care.

Laramee et al. (2011) argues that during the second stage of MU, a greater degree of electronic access to patient records, as well as a greater degree of electronic interaction between clinicians and patients, is the target, with access to the best educational resources also recognised as being fundamental to positive outcomes. Valuable utilisation is only one of the numerous federal schemes motivating the need for more focused patient education approaches devised with the aim of ensuring a good effect across the sector.

3.5.5 Challenges and Strategies of EMR: Scholl et al. (2011)

This report details an ethnographically motivated interpretative case study concerned with the EMR system in the context of India, targeting Sankara Nethralaya Hospital (Scholl et al. 2011). It provides insight into the obstacles present in regard to the application of the system, and how these may be overcome through the use of strategies and methods. One of the key challenges was that of a user base, which centred on users lacking in skills, sceptical users, and those with a history of rejecting designs (Mole et al. 2006). According to Haughom (2011), irrespective of the various challenges, however, the hospital was successful in adopting the EMR system. Key obstacles were linked with system success, such as the design strategy, and more social and technical aspects of the system designed in order to provide sceptical users with support. In the light of Burt and Sisk (2005), the study also provides value in terms of deepening the overall understanding of the environment in developing countries, which can be linked with EMR system adoption, and which assists in terms of informing as to the approaches that can be adopted in order to enhance EMR system adoption in comparable contexts—in both developing and developed regions.

According to Fins (2008), EMRs are recognised as having the potential to provide a number of key benefits within the healthcare arena. The healthcare sector is lagging behind many other sectors in terms of IT application, with EMRs no exception. One contributory element Colpas (2013) says that it is the fact that healthcare entities are notably complicated and encompass a number of different complex work practices, such as a hierarchy of distributed responsibilities and strong role interdependency, both of which may impose notable difficulties owing to the fact that workflows may be impacted through changes in other workflows. For these hospitals, MISs (Medical Informatics Systems) can induce challenges in terms of design and application, with almost 50% experience failure owing to resistance amongst staff and users.

However, Lin et al. (2012) suggest that a number of different elements may impact EMR system implementation at large hospitals in developing countries. A significant range of possible advantages can be assigned to such systems, with some of these—including the reduction of patient waiting times—potentially greater for those entities in developing countries than those elsewhere. In line with the developed world environment, hospitals in developing countries may be viewed as notably complicated.

In accordance with Nemeth et al. (2008), obstacles linked with fulfilling a number of different system-related interests from various requirements in the system from different actors, as well as in terms of fulfilling the needs of users lacking IT skills and those who are sceptical will be faced in a number of different circumstances. Such issues can be circumvented through the application of efficient communication practice with management in an attempt to achieve support for the application of PD approaches, as well as the wide-ranging adoption of such approaches. However, Shaw et al. (2011) suggest that notably levels of user input from clinical staff would be required and may be assisted through technique application, including evolutionary and cooperative prototyping, in addition to an integration approach to implementation and design, which encompasses the use of the physician champion in the position of the main UI designer.

Fins (2008) outlines that the system ultimately applied may need to encompass aspects that direct attention to fulfilling the needs of users lacking IT skills, as well as sceptical users. Users may be made to feel more comfortable with system application if user interfaces are pursued that are similar to paper records. Moreover, the system's more social aspects, which include financial and social incentives of system use, in addition to programs that facilitate computing promotion beyond the work context, could also prove to be valuable. It is evident there is a need of developing effective MIS system, as well as users skills to adapt to electronic usage of medical health record.

3.5.6 Accepting EMR System: Boonstra and Broekhuis (2010)

According to Boonstra and Broekhuis (2010), the key aim of their study was to establish, categorise and examine the obstacles recognised by medical staff in the application of EMRs so as to deliver insight into potential intervention options. There was the completion of a systematic literature review, which centred on studies spanning 1998–2009 in regard to acceptance barriers amongst physicians in the context of EMRs. Four individual databases, namely 'Science', 'EBSCO', 'PubMed' and 'The Cochrane Library', were utilised during the course of the search. Kazley et al. (2012) argue that research was only incorporated in the review if they detailed the barriers perceived by physicians in the application and use of EMRs. In this regard, electronic medical records were defined as computerised medical data systems that gather, display and store patient data. The research incorporated 22 different reports, all of which took into account EMR-centred obstacles as recognised by physicians. Obstacles were assigned to eight different groups with the inclusion of 31 sub-categories; the eight categories were financial, technical, time, psychological, social, legal, organisational, and change process, all of which were seen to be interlinked with one another. More specifically, the 'organisational' and 'change process' groups were considered to be mediating elements in regard to other obstacles. King et al. (2012) argues that through implementing a change management perspective, various obstacle-related interventions were developed as potentially circumventing the issues. Irrespective of the positive impacts of the use of EMR in medical contexts, the rate of adoption in terms of such systems remains low and meets résistance amongst physicians. In the light of Conn (2012), such a review highlights that a number of obstacles may be encountered by physicians upon the application of EMR. The conclusion can then be drawn that the EMR implementation process needs to be viewed as a change project, and must be led by change management or implementers in medical fields. Gastaldi et al. (2012) suggest that the change management quality ultimately adopts a key role in the overall success of EMR implementation, with the interventions suggested intended to act as a reference for EMR implementers. There is the need to ensure a careful diagnosis of the situation at hand prior to the identification of suitable solutions.

3.5.7 Lessons for Smoothing HER Project: Krisik (2013)

According to Krisik (2013), having been at ground zero for several dozen EHR application, incorporating practice sizes, vendors, geographical regions and specialities, there are a number of common obstacles that cause healthcare entities to struggle, in mind of which there are a number of insider tips for healthcare organisations attempting to progress through the EHR integration process. Lin et al. (2012) suggest that the initial phase is to evaluate the willingness of the practice. There is a need to collaborate and communicate with the IT vendor in order to gain insight into the minimum requirements of the EHR application, and accordingly to establish the hardware and software utilised by the practice. Subsequently, the new technologies, networking infrastructure and/or bandwidth need to be established, which can assist in the optimal use of EHRs. Lastly, Fins (2008) outlines that checks need to be performed with end users, which is fundamental in terms of ensuring staff are willing and able to apply the HER. Moreover, the way in which the new EHR impacts the workload, time spent with patients and documentation staffs, as well as the communication capabilities of staff, are elements that should be demonstrated and assessed. According to Altuwaijri (2008), upon the selection and preparation of EHR solution integration, there should be communication amongst peers in terms of how the EHR can be adopted. All EHR adoptions experience issues. Importantly, success can only be garnered if there is understanding of how the EHR is to be used. Therefore, this study's key theme suggests that communication is paramount in regard to training and the time successful practices require.

3.5.8 Healthcare Provider Attitudes Towards for EHR: Holmes et al. (2012)

Holmes et al. (2012) outline that the problem is a fundamental aspect of the EHR, which enables practitioners to view the health issues and diagnoses of patients; however, there is the need to subjectively edit the information owing to its volume, with the decision therefore needing to be made in terms of who does this job. According to Maust (2012), the way in which a problem list is compiled lacks standards, which ultimately inhibits efficiency in this regard in terms of improving patient care, especially as a tool for population management tools and clinical decision support. The aim of this research was to establish the views of practitioners in regard to the problem list, as well as the rationale behind their views, in regard to clinical circumstances. Reina et al. (2012) suggest that there was the completion of an observational cross-sectional research at two key Boston teaching hospitals, where the views of practitioners in regard to the problem list were gathered through the application of an online questionnaire and in-person interviews. Questions were centred on the use of vignettes of clinical scenarios, with practitioners queried on their preferences towards the problem list.

In accordance with Laramee et al. (2011), such information provided further support for previous studies, where practitioners are seen to vary in terms of their views of the management of the problem list; however, across the majority of the responses to the questionnaire, a common technique was implemented amongst most of the subjects. Moreover, Nemeth et al. (2008) outline that basic demographic characteristics were not seen to have a significant impact on the problem list. The findings show support for the view that EHR tools and policies are necessary in order to induce a positive approach. A reliable and accurate problem list has the potential to deliver key advantages to patient care through making sure practitioners are aware of the most critical health factors, and establishing a more advanced database through which disease-specific populations may be established (Nemeth et al. 2008). It is evident that this result can also assist in establishing the issues that could provide the greater advantages from a defined policy, as well as the degree of restriction imposed by problem list EMR policy in regard to the various forms of data.

3.5.9 Pros and Cons of EMR: Ventura et al. (2011)

The design of electronic medical record (EMR) software has a strong impact on user acceptance (Ventura et al. 2011). To keep up with the growing complexity of activities performed today in Neonatal Intensive Care Units a well-designed EMR must provide an overall vision of all up-to-date information concerning the patient , both machine generated and clinical diagnostics, and be equipped with and computerized physician order entry (CPOE) system (Simon et al. 2008). According to Yamamoto and Khan (2006), the diffusion of new technological innovations in critical care environments can have unintended consequences, including changes in workflow, staff roles, and patient outcomes. We rely on the pros and cons of a 10-year successful implementation of an electronic medical record in a third level neonatal care unit, initially dedicated exclusively to neonatal intensive care, then extended to intermediate care and finally reaching the nursery.

Kazley et al. (2012) note that in order to improve treatment of the most critical patients, it is nowadays imperative to implement a paperless system capable of effectively coordinating bedside clinical observation with machine monitoring data, life sustaining instruments and results from the laboratory. Conn (2012) argues that the implementation of an electronic medical record is an important social beyond its technical and data management breakthroughs. The success of a project of this kind relies on the technical characteristics and flexibility of the selected product, the interoperability and availability of technical assistance. This study's key theme outlines that most of all it is important to learn from prior evaluation regarding the system's impact on the work organization and the involvement of clinicians, physicians and nurses, in the design and development of the information system.

3.5.10 Evaluation of EHR System: Takian et al. (2012)

According to Takian et al. (2012), the healthcare reform strategies of many governments now encompass dedication to EHR systems, with the politically-initiated large-scale efforts in this regard notably challenging owing to their impressive and elaborate agendas of change, their short timescales, the scale of resources needed, and the large number of stakeholders involved. Such ideas need to undergo examination and assessment in order to determine whether or not they represent value for money and improve overall care. Liu et al. (2011) argue that with regard to such issues, critical reflection in regard to the experience of implementing the first national, longitudinal, and sociotechnical evaluation of the implementation and the adoption of England's National Health Service's Care Records Service (NHS CRS), there are two key views to be considered: primarily, national EHR initiatives are likely to be witnessed throughout the shift of changing socio-political and socio-technical contexts, both of which are able to affect them in various ways. However, Tomsik and Briggs (2013) suggest that this induces a notable challenge in regard to traditional assessment techniques, which are known to utilise a framework of baseline operations intervention changed operations. Secondly, such program assessments need to consider such change through ensuring context adaptation, which requires a creative and careful choice of epistemological, ontological and methodological assumptions. Lowery et al. (2012) mentions that when assessing national EHR application efforts, new and notable challenges are experienced, and so the argument is made that there needs to be a method of assessment that directs attention away from viewing EHR systems as ICT projects necessitating an outcome-centred evaluation, with a more interpretative approach adopted instead. Therefore, it is evident that this can help to reflect open the ever-changing and situated nature of EHR, recognised in a number of different settings and highlighting the various changing settings of policies, software and strategy.

3.5.11 Embedding an Electronic Health Record: Lowery et al. (2012)

Lowery et al. (2012) notes that their research seeks to establish the degree and level of EHR application in a number of government-linked hospitals in Saudi Arabia. An additional aim is centred on developing a website with the potential to act as an exchange medium regarding EHR development in the country. Notably,

all of the government hospitals in the Eastern Province were included in the study, with the IT management in these hospitals forming the target population. According to Mole et al. (2006), there was the development and application of an online questionnaire, with all 19 of the government hospital management invited to completed the questionnaire. The responses were downloaded and analysed with the use of descriptive statistics. Importantly, only 3 of the 19 hospitals utilise EHRs; these were established in 2005, 1995 and 1984. Lin et al. (2012) mention, the EHR software were implemented and used successfully, with all three utilising the three key features of laboratory, pharmacy electronic modules and radiology. Some of the modules were incorporated within the EHR system but were not widely adopted, say Haughom (2011). Some of the key challenges associated with the IT management in terms of EHR implementation within the hospital was centred on the lack of acceptance of nurses and physicians. The Saudi Arabian government has placed emphasis on e-health development, with funding allocated to this field for the period 2008–2011. During the course of this period, a number of government sectors directed keen efforts to the development of e-health services (Meinert and Peterson, 2006). In this regard, it was hoped that there would be the greater implementation of EHRs than what was established during the research. The theme of this article suggests that there needs to be acceleration in terms of the rate of implementation with the goal of fulfilling basic EHR functionality within such hospitals. Upon the fulfilment of this goal, further functionality could be incorporated at different phases.

3.5.12 Extent of Usage of EHR in Saudi Arabia: Alharthi et al. (2011)

According to Alharthi (2011), the implementation of an electronic health record across the community health services of Durham and Darlington delivered an ideal opportunity for health visitors to play a key role in improving the system so as to reflect their paper clinical record. The anxieties, concerns and fears of practitioners in regard to confidentiality and accountability caused further development of the project with the inclusion of the employment of three full-time IT facilitators. Simon et al. (2008) suggest that all of these individuals were experienced 'IT champions' and health visitors with good insight into and understanding of data governance, with a particular responsibility to deliver supervision and clinical support to health visitors in the context of record-keeping. Laramee et al. (2011) outline such individuals were critical in the system development, and were pivotal in achieving success, ensuring that there was the sound incorporation of electronic records within the health visiting practices; this helped to achieve enhanced levels of patient care quality. Kazley et al. (2012) mention that irrespective of the planning, it was clear that this could not be viewed as only an IT system; professional involvement needed to be seen across all arenas of the process in order to ensure sustainability could be achieved. The key theme of this study suggests that the application of the clinical IT facilitators is essential to the success of electric medical records, helping the system to function in line with health visiting.

3.6 Summary

Throughout the course of this paper, there has been the completion of data extraction with the use of data extraction and quality assessment instruments. There was also the completion of data synthesis, the findings of which were considered in line with the results measured. Researches were appraised critically, providing a link to help answer the study questions in the chapter. In the subsequent chapter, the findings will be discussed in greater depth so as to deliver an answer for the research questions. Any implications for subsequent studies and practices will also be examined, with a reflection also provided in line with the dissertation process. This research highlights the fact that, although integration can be achieved through technological developments, long-term boundaries mean there are significant IT-application-related risks across the social and healthcare arena, with much consideration needed amongst those implementing key changes prior to investment. Essentially, forward-looking healthcare entities acknowledge the fact that a patient education culture that is able to draw on the very best teaching approaches and resources will prove fundamental to success in the present, as well as in the future in terms of pay for performance.

IV CHAPTER FOUR: DISCUSSION

4.1 Introduction:

This systematic review provides a critical examination of the efficiency associated with the electronic medical records for enhanced productivity, in addition to the structural efficiency associated with this aspect. In this chapter an overview of the findings, potential elements impacting the results, as well as implications, limitations and subsequent study directions will be examined. Prior to evaluating the adoption of the aforementioned adverse impacts and results, the review carried out will be discussed in terms of its quality through testing the approach adopted. This systematic review comprehensively covers the implementing a comparison alongside other reviews carried out in this field.

4.2 Boundaries of EMR System:

According to King et al. (2012), in an attempt to deliver holistic care, there is the recognised requirement to develop integrated approaches to the provision of health and social care. Policymakers have come to acknowledge that e-health initiatives, especially electronic record systems, can help to enhance data-sharing. Ventura et al. (2011) argued that importantly; IT facilitates those providing social care and healthcare to exchange patient-related information without location- and time-related restrictions. With this noted, access to accurate and timely efficient information concerning patients and their treatments is fundamental in the context of providing enhanced care at lower costs (King et al. 2012). Nevertheless, success had not been totally forthcoming on a local, regional, national or international scale, nor have they been integrated with other social care or healthcare systems, thus suggesting that IT-related expenditure is a waste (Watanabe et al. 2011).

4.3 EMR Comparative Barriers:

The many barriers, benefits, challenges and opportunities associated with the nationwide application of an EMR system have been highlighted by Kumar and Aldrich (2010), with efficiency and quality improvements in the provision of healthcare taken into account. In Saudi Arabia, the national application of EMR systems has the potential to result in more than US$81 billion in annual savings (Gastaldi et al. 2012). However, a number of other sector estimates have positioned yearly savings at around the US$300 billion mark, as a potential huge cost saving to health care providers. At the present time, less than one-third of all physicians operating in the USA utilise electronic medical records; in other countries, such as the Netherlands, New Zealand and the UK, for example, as many as 89% of health professionals use these systems. Markedly, a strong health information system comprising physician order-entry capabilities and associated records is seen applied in less than 10% of US hospitals (Krisik, 2013), therefore the issue is not adequate measures being taken for the widespread usage of EMR in US. Thus, it is evident that success of this system is not only bound to how advance a country is in technology, but to appropriate policies, procedures and management practices.

It has been recognised that, in the context of EMR application on a national scale, there is a macro-perspective, say Watanabe et al. (2011).

4.4 EMR Case Discussion:

According to Lowery et al. (2012), in 2008, County Durham and Darlington Community Health Services (CDDCHS) presented an electronic health record that was adopted across community services, including child health, health visiting, and urgent care settings. Primarily a strategically led IT initiative involving clinical input, it was soon made clear that subsequent system development was required in order to ensure there was adherence to the System-One from health visitors (Shaw et al. 2011). This is due to the fact that the most suitable application of health informatics facilitates the gathering, management, use and sharing of information in such a way so as to support healthcare provision and health promotion (Council for Health Informatics Professions, 2012).

Lowery et al. (2012) suggested that the Health Visiting service requirements differ to those of other areas within the trust owing to the fact that the Health Visiting service seeks to utilise this as a full health record, which has consequences in regard to professional accountability and clinical record-keeping (Nursing and Midwifery Council (NMC), 2010). The challenge was most predominantly concerned with addressing these, with much investment necessary in the system was to be utilised to its full capacity and the advantages garnered, therefore it is one of the challenges for HER programme to be able to meet the requirements of a range of professionals with a variety of needs.

However, with the application of a transformational leadership style (Meinertand and Peterson, 2009), the researchers encouraged health visitors to utilise their insight, experience and skills to achieve system design and improvement in such a way that it would work for them, providing staff with ownership and resulting in a system designed for professionals by professionals. With the use of the Prince2 Project Management methodology, the project board delivered much advice and guidance in regard to IT and connectivity, smart card distribution, training and IT support and unit configuration, amongst other elements, as suggested by Gastaldi et al. (2012). The project group created the design of various aspects, particularly in regard to HV practice, such as through the use of templates with associated read codes for the purpose of facilitating the gathering and organisation of data. These included blood spot, breast feeding information, clinical contact, and maternal mood. Therefore, it is evident that with appropriate leadership engagement, the clinicians involvement in the design of the programme and good project management for EMR is realistic and useful.

4.4.1 Potential Problems in Implementing EMR:

Lowery et al. (2012) argue that importantly, despite the involvement, leadership etc there were still concerns because, on the day the system was to go live, professionals felt the system was inadequate in terms of

fulfilling their requirements. Although the system enabled record-keeping and facilitated employees in evaluating care and booking visits, it nevertheless lacked some of the more critical instruments in day-to-day activities. Hernandez et al. (2012) suggested that assessment tools, event tools and care plans recognised as fundamental to clinical record-keeping were not provided through the system. Accordingly, irrespective of the availability of IT staff and planning aimed towards supporting health visitors, uncertainties were recognised as a difficulty facing the full utilisation of electronic record-keeping. Ventura et al. (2011) argue that concerns surrounding clinical record-keeping, confidentiality breaches, data governance, and the risk facing the NMC registration of staff were all considerations to be made, which can be resolved through effective leadership involvement.

It became clear that a more specific approach to health visiting practice was required in regard to electronic regards. The point is made by Shaw et al. (2011) that a new record system should be introduced, including accountability, planning patient care and time management. A review of paper records was carried out previously in an attempt to ensure consistency; it became clear an electronic system was needed—one that would provide clear guidance and confidence that record-keeping policy could be met (CDDCHS, 2007) and NMC record-keeping standards maintained.

4.4.2 EMR Case Compilation:

According to Lowery et al. (2012), regardless of the planning invested in the system, it became apparent that the system could not be described as only an IT system; professional involvement needed to be apparent throughout all scales of the process if sustainability was to be achieved. The application of clinical IT facilitators was paramount in order to ensure staff involvement to making the system work for health visiting. King et al. (2012) argue that it was acknowledged by employees that the system was not only an IT system but also an electronic health record that would need development and adaptation in order to ensure efficient record-keeping and professional accountability in line with the NMC Code. In the light of Shaw et al. (2011) and Shaw (2006), the design of the system was carried out by practitioners for practitioners, accepting the advantages garnered through data-sharing and improvement communication, with health visitors having successfully incorporated an electronic health record into clinical practice, which provided evidence when paper versions ceased to be used. This was followed by applying the system amongst child health information services and nursing services, adopting a four-level framework to clinical care plans in order to document levels of need, and increasing the profile level of requirements against health visiting potential to commissioners.

4.5 Empowering Service Providers:

Tomsik and Briggs (2013) outline, a number of hospitals are, at present, researching the options available for the creation of patient-oriented websites in order to enable improved communication. In order to achieve compatibility in this regard, a number of EHR vendors are recognising the need to develop patient portals as an additional component of the EHR system. King et al. (2012) argue that with the progressive consideration of developers towards how the foundation of such applications should be approached, it is essential that they work alongside educational publishers in order to create clinical subject libraries, providing literature for non-clinical patients. Moreover, Gastaldi et al. (2012) suggested that it is also essential to establish solutions that deliver regular content updates in line with the changes of industry evidence. It is important to note The National Action Plan to Improve Health Literacy (Tomsik and Briggs, 2013), which outlines a number of different objectives associated with health literacy improvement. These aspects merge approaches for patient education delivery improvement, in addition to encouraging greater education and knowledge in the fundamental healthcare issues relevant at the present time.

Takian et al. (2012) suggested that one of the main objectives detailed in the plan is the requirement to create and distribute health and safety data that is accessible, actionable and accurate. However, Nemeth et al. (2008) mentions that achieving this objective through patient portals necessitates patient access to resources that are actionable in the sense that they may be understood by people of varying ages, education, income and race. Although the requirements of such groups differ from one to the next, it remains that all patients experiencing significant illness, injury or stress have one common denominator: the requirement for clear and simple data (Ting et al. 2012).

According to Takian et al. (2012), it is essential that the most suitable educational tools are identified for integration into patient portals, such as insight into and knowledge surrounding reference materials that have the capacity to deal with limited health literacy. Though, King et al. (2012) argues that there is also a need for vendors to take into account how educational leaflets, such as for diseased and drugs, can be best designed in order to achieve the average reading level of the common public, in addition to how interaction monographs may be utilised in line with various clinical decision-support functions. In the light of Nemeth et al. (2008), patient-oriented care is a positive development with the capacity to change and enhance the provision of care through more proactive patient involvement. Holmes et al. (2012) suggest that fundamental to the success of this

movement is the application of patient educational approaches that deal with limited health literacy through the deliverance of suitable consumer-level content that considers cultural, linguistic and written requirements.

4.6 EMR Case via MIS:

According to Scholl et al. (2011), the successful application of Management Information System (MIS) within large-scale, complicated businesses necessitates suitable alliance between the requirements and working patterns of the target business and system functionality. This commonly necessitates the adoption of a socio-technical method and system design, which is modified and altered in specific regard to the business. Boonstra and Broekhuis (2010) argue that this customisation encompasses both technical system-related elements, as well as more social features in the form of business changes. Such elements need to support one another, and should be developed on an iterative basis.

Notably, Takian et al. (2012) mention that there are numerous elements that makes a custom-built EMR system difficult to implement. One of the most widely acknowledged aspects inherent in Computer Supported Cooperative Work (CSCW) theory is that different expectations, as held by different users, can result in systems that establish a disparity between those who invest additional efforts to support the system and those who benefit from the system. This can also result in the failure of the system (Shaw et al. 2011).

In the light of Boonstra and Broekhuis (2010), this same concern can be seen documented in EMR system-related research, with management commonly adopting the position that EMR systems are organisational change facilitators, whilst clinicians consider them as documentation process facilitators. Such varying perspectives can induce issues in attempting to fulfil the original requirements for system implementation, say Watanabe et al. (2011). A number of recommendations have been postulated in an attempt to handle this problem through ensuring the system effects are taken into account in specific regard to stakeholder groups. Although this may seem like common sense, this is a subject commonly disregarded.

4.7 Development of EMR System:

In the light of Scholl et al. (2011), one of the key results garnered through this research shows that, in much the same way as industrialised regions' large hospital environment, the design environment was found to be notably complicated while developing EMR. There was the presence of many issues and challenges that could cause the system to fail, with preliminary versions of the system failing as a result of user resistance. Regardless of these challenges, however, a version of the EMR system was ultimately implemented in the context of clinical practice (Shaw, 2006).

According to Reina et al. (2012), one of the key elements associated with the complicated business environment of the system is the fact that the EMR system was expected to provide numerous advantages, a number of which were not reported previously as reasons behind EMR adoption in developed countries. Though, Ting et al. (2012) suggest that Telemedicine support incorporates within a system additional technical and social needs, such as through data security, incentive structures and work flow impacts become more complex. The storage space reduction and decreases in waiting times are also recognised as a significant consideration for urban hospitals in emerging nations. Meinertand and Peterson (2009) suggest that it is also recognised that records storage could pose an issue owing to high volumes of patients. A lack of cultural norms and poor ICT infrastructure utilising technology could mean that the making of appointments is more problematic for patients (Hernandez et al. 2012). Markedly, the possible advantages to be garnered through EMR systems could be even more wide-ranging in the context of emerging countries than what has been highlighted for developed countries in the sense that they are able to fulfil similar requirements linked with supporting clinical research and work, and can also be adopted in order to circumvent various particular local challenges associated with a lack of infrastructure and resources, and overpopulation (Boonstra and Broekhuis, 2010).

According to Shaw (2006), the significant possible advantages to be derived through these systems also mean the presence of a number of other issues as they will introduce a number of other social and technical requirements. This may be viewed in regard to present EMR system research carried out in emerging contexts and which have been carried out in large hospitals, without consideration to issues linked with organisational complexity, such as research from developed countries (Ting et al. 2012).

However, Scholl et al. (2011) argue that this provides a somewhat indistinct picture concerning the overall complexity that may be experienced during the EMR system design process for large hospitals functioning in the developing world. This research implies that, in a number of different contexts, complicated environments comparable with those witnessed in industrialised regions may be experienced in non-industrialised countries. Takian et al. (2012) suggest that gaining insight into socio-organisational aspects as opposed to only developing world-specific issues will usually be fundamental to the successful application of EMR systems. In this regard, sound design and application activities will need to be utilised, with subsequent researches conducted in order to

enhance environmental understanding in particular hospital contexts in developing countries. This will help with the application of EMR systems.

4.8 Weaknesses in EMR System Research:

Scholl et al. (2011) also criticises this case as a number of health personnel at public hospitals hold memberships for labour unions. In these circumstances, the link between EMR design teams, management and healthcare employees could be significantly different to those reported in the research. The restrictions in terms of data analysis, as detailed in the methods section, should also be highlighted owing to the somewhat restricted scope of the research throughout the information-gathering stage, and the issues in carrying out subsequent data analysis as a result of partial data loss. Such issues could cause various important and interesting points to be raised in regard to the results not being reported in the research related to the development of EMR system.

4.9 EMR Challenges in Saudi Arabia:

According to Clark et al. (2011), although a number of different stages have been carried out by the MODA with the aim of making changes to the Saudi healthcare system, various challenges remain. These are associated with the health workforce, costs and financing, variations in disease patterns, healthcare service accessibility, the introduction of the cooperative health insurance scheme, the utilisation of electronic health approaches, public hospitals' privatisation, and the development of a national health information system (Alharthi et al. 2011). According to Clarke et al. (2011), one of the key challenges include a different workflow for the healthcare practitioners, which means they have to document more information as compare to manual records. Therefore, it requires using a hybrid electronic record system that permits healthcare practitioners to revert back and forth between paper and electronic records. Gastaldi et al. (2012) outline that another key challenge is the use of aggressive consequential program, as pushing back around the industry requires significant amount of time for defining, crating, refining

4.9.1 Health Workforce:

According to Nemeth et al. (2008), the healthcare system in Saudi Arabia faces issues such as a lack of healthcare staff, including nurses, pharmacists and physicians. Most healthcare staff are expatriates, which causes workforce instability and a high rate of turnover. However, Boonstra and Broekhuis (2010) suggest that the capacity to create and adopt practical approaches to retain and attract more Saudi nationals into health and medical roles, especially nursing, is a fundamental priority when aiming to achieve efficient reform for the healthcare system in Saudi Arabia.

Ting et al. (2012) suggest that more long-term approaches and realistic strategies need to be consolidated through the MODA in line with the private sectors and the government. One sound case of such cooperation is that of the King Abdullah international scholarship programme, which was initially devised by the Ministry of Higher Education. Scholl et al. (2011) outline that in its four phases; priority was assigned to medical specialists, such as nursing, medicine, pharmacy and others. Nevertheless, many medical training programmes and colleges needed to be established on a country-wide scale. New regulations and laws were devised, with human resources rearranged by the MODA (Altuwaijri, 2008).

4.9.2 Privatisation:

Shaw (2006) argues that public hospitals' privatisation has been viewed by many academics and policy-makers as a sound approach to Saudi healthcare reformation. The activities involved in privatisation have been initiated and regulated by the government. Accordingly, Meinertand and Peterson (2009) suggest that various hospitals are likely to be sold and/or rented to private organisations in the coming years. Privatisation in this context is expected to induce various benefits for both the country and the government, including the integration of electronic medical records between private- and public-sector healthcare providers (Nemeth et al. 2008), however, another challenge can be that it can cause a fragmenting of EMR systems where people procure their own and then they don't link to each other, as has happened in UK. Therefore, it is the aim that privatisation will aid in improving the decision-making process, decreasing the annual expenditure of the government on healthcare, will achieve improvements in healthcare, and will create new financial sources for the MODA.

4.9.3 EMR Recommendations:

Lowery et al. (2012) suggest that EMR's widespread implementation, as well as that of associated technologies, has the potential to enhance healthcare in the USA if applied correctly. A number of different policy options could be utilised in order to increase the pace of EMR development. With this noted, healthcare administrators need to start preparing employees for the ultimately technological improvements that will be adopted. Scholl et al. (2011) argues that it is considered that the advantages to be gained through a series of

interoperable systems or one unified system will include improved compliance from doctors and greater consistency in patient treatment and care. The most optimal services will be identified in subsequent studies. In addition, a global EMR system, which is compatible with other countries and which adheres to worldwide standards, should be analysed (Lowery et al. 2012). Gastaldi et al. (2012) outline that to advocate the implementation of EMR, it is imperative to establish a centralized group for coordination or the National Alliance of healthcare practitioners. As learned in the key themes, leadership style such as transformational and visionary, project management tools such as Prince2, key stakeholders interests analysis and strategic planning can swiftly integrate EMRs into the healthcare industry. Though, it is also important to keep financial viability, resources management, training and development, as well as clinicians' engagement intact.

4.10 Need of Future Study

In consideration to efforts, resources and time invested in accreditation initiatives, it is fundamental that subsequent studies be carried out into cost-efficiency, which is apparently absent. This could enable decisions to be made as to how this programme can be introduced and advantages garnered. A greater depth of data should be collected on the advantages and drawbacks of accreditation to patients, providers and society. Moreover, balance between the advantages and costs could enable funding bodies, governments and regulatory bodies in the decision-making process relating to the adoption and investment in accreditation initiatives.

4.11 Appraisal of Review Quality

Through providing insight into what is not and is known on the topic, a new primary study can be planned following the systematic review approach (Boonstra and Broekhuis, 2010). It is held by Reina et al. (2012) that systematic reviews are valuable in assimilating researches carried out separately, sometimes comprising conflicting results, and completing a results interpretation. This can be seen through this paper: the researches were brought together systematically.

Moreover, irrespective of some contradictory results, interpretation has been carried out with the aim of providing an answer to the study question (Lowery et al. 2012). It may be stated that the systematic review has proven valuable as the study contained and research included in the view all comprised some methodological error, as highlighted in the preceding chapter, thus meaning the drawing of definitive conclusions could be difficult in terms of answering the study questions; however, there may be insight into associations that could have implications for subsequent study and practice.

4.12 Search Strategy

As considered in the methodology chapter, for literature-scoping, all of the key terms were not included in the ultimately search as it was considered this would aid sensitivity in the findings garnered (Catterall, 2000). Nevertheless, this could induce a number of drawbacks considering not all elements were addressed in the ultimately search approach. Nevertheless, as this research was not centred on specifically analysing only one approach, this was not an issue. Accordingly, all methodologies were encompassed within the research with the aim of gathering a significant volume of evidence for examination and analysis.

Through the application of electronic search strategy, the data identified was restricted to researches published in or after 2005. There was the possibility that studies that could have further supported the results of this review were disregarded. Nevertheless, as established by Meinertand and Peterson (2009), this would not be the case as a lack of high-quality research was carried out prior to 2005, thus meaning no additional study evidence would have been incorporated within the systematic review.

In the methodology, it was outlined that, owing to the lack of a particular journal centred on an identified EMR, a manual search would not be recommended for this research. The preliminary choice not to complete a search in this way remains justified owing to the fact that, due to the small scale of the project, the approach would have been very costly time-wise when considering the need to search through general journals on respiratory medicine, and not only those centred on EMR development. This point is highlighted further through the large number of journals published in the articles included.

4.13 Inclusion/Exclusion Criteria

Inclusion and exclusion criteria establish the articles that can help to provide answers to the questions detailed (Gray, 2004). The inclusion and exclusion criteria were seen to be particular and specific enough to facilitate the targeting of suitable research, with the reports identified linked with the ability to provide answers to the study questions.

It is recognised that systematic reviews could become prejudiced owing to numerous researches being excluded and weak researches being included (Josette, 2012). The view has been postulated that some of the research included was weak from a methodological standpoint; however, the choice was made to include all relevant studies owing to a lack of evidence in a review carried out previously by Josette (2012). As highlighted

previously, various researches of relevance could have been excluded owing to the date restriction criteria; however, this was owing to the fact that this evidence has been reviewed previously.

4.14 Quality Assessment

The methodological quality of primary research should be critically appraised, which is regarded as a fundamental aspect of systematic reviews (Petticrew and Roberts, 2005). Markedly, the adoption of MEDLINE and CINHAL delivered a sound research methodology critique, with the EMR tool incorporated within with the 'barriers' and 'potentials'.

4.15 Data Extraction

In the light of Josette (2012), qualitative studies that have critical appraisal have been incorporated within this review, especially those linked with quality of insight and interpretation, which depend significantly on subjective assessment. A systematic review carried out by only one individual may be biased in regard to their own ideas, although studies have specifically sought to ensure objectivity. Such a review could be considered well-suited to a panel review involving professionals with a number of different perspectives (Meinertand and Peterson, 2009). The selection of the research, data extraction and quality assessment could be carried out by different reviewers on an independent basis through utilising a standardised approach, which would help to ensure biases were minimised. In accordance to Moore (2000), data extraction was objectively and dependably adopted through the use of data extraction forms, as can be seen in the Appendices. Involving two independent individuals in the data extraction and quality assessment performance could improve data extraction reliability; however, this was not feasible when considering the project scope. Through including all research methodologies, twelve pieces of research were established in the review.

4.16 Summary

A number of elements can impact the application of EMR systems at large hospitals in developing countries. A number of possible advantages can be attributed to such systems, some of which, including lower patient waiting times, could be greater for hospitals in emerging nations than in the industrialised world. In much the same way as the developed world, the environment in large hospitals in industrialised regions may be quite complicated. Challenges linked with fulfilling particular interests in the systems from different actions and in accommodating sceptical users and those without IT skills proficiency will be experienced in numerous circumstances. Such issues can be overcome, although the utilisation of efficient communication practices with management is necessary so as to support the adoption of PD approaches, and the wide-ranging utilisation of such approaches. Significant levels of user input from clinical employees will be required and can be supported through the application of various approaches, including cooperative and evolutionary prototyping, in addition to an integrated approach centred on the application of design, which involves the application of the physician leader as the main UI designer.

The system to be adopted ultimately could require the inclusion of numerous elements that direct focus to accommodating sceptical users, as well as those lacking in IT proficiency. Consideration should be directed towards adopting user interfaces that are comparable with paper records as this will assist users in becoming more comfortable with system application. The system's overall social elements, which include financial and social drivers for system use, in addition to initiatives that aid in the promotion of computing outside of the working environment, could also prove fundamental.

V CHAPTER FIVE: CONCLUSION

5.1 Introduction:

This chapter will provide an overview of the results and conclusions associated with the systematic review. The preliminary objective of this project was to identify the obstacles facing EMR system application in MODA hospitals in the context of the KSA. The aims involved in fulfilling this objective were concerned with considering the literature, and national and international practices, and analysing the suitability of the topic area selected in line with the Saudi medical industry, as carried out in the introductory chapter. Secondly, establishing the data sources for inclusion in the study through the formulation of a study approach, inclusion and exclusion criteria, and a quality assessment, achieved in the methodology chapter. Lastly, to thoroughly and comprehensively review the literature, and to complete an interpretation and discussion of the findings, bringing together a number of fundamental points and providing a critical analysis of the results, as detailed in the Results and Discussion chapters.

5.2 EMR Review Journey:

According to Kumar and Aldrich (2012), following the completion of the aforementioned objectives, the belief is held that the aim of identifying the facts to create and adopt EMR in MODA hospitals has been fulfilled. The findings deliver support for the evidence introduced in the preliminary section, which highlights that in addition to a number of other aspects, an EMR is able to maintain the overall healthcare system owing to the enhanced effectiveness for patient care services, in addition to resource effectiveness. However, the drawing of firm conclusion was not achieved owing to the methodological drawbacks associated with this research; however, there was the identification of various associations, such as leadership practices, project management tools, IT infrastructure. As a result, it is recognised that greater quality studies in this area need to be garnered in order to provide support for the results.

It is evident through this review that the implications surrounding subsequent studies, as a result of answering the study questions, have been established in line with the need for higher quality evidence in the field of EMR. Lastly, reflection has highlight that personal development and learning has been garnered throughout the study process, which can be applied to subsequent personal development. There have been key themes examined and identified throughout the study process, all of which have acted as obstacles to EMR application in the context of the KSA.

5.3 EMR Perceived Barriers:

This systematic review has examined the factors underpinning the relatively low rate of implementation of EMRs amongst physicians. The adoption of an EMR system changes medical practice workflow by reducing patient waiting times, patients' information access and record management, as well as increase resource efficiency. Furthermore, EMR application is a significant change experienced throughout practice, which necessitates complementary innovation and changes in a number of other areas, including practice culture and organisational structure (Bansler and Havn, 2010).

As suggested by Ting et al. (2012), the results findings may be applied in the form of an overview of the obstacles potentially facing health professionals in the application of EMR systems, and therefore could prove valuable to EMR implementers and policymakers. These findings reinforce the need of effective leadership, project management tools, coordination between clinicians and management and resource management for effectively cross any obstacles for the development of EMR. The researches suggests that there is a need for policymakers to ensure greater awareness of the reality associated with the removal of financial and technical obstacles, and how this is inadequate in terms of ensuring the fulfilment of EMR-related promises. Kumar and Aldrich (2012) outline that a number of other measures, as highlighted in this research, may be required if physicians are to make positive choices in regard to the incorporation of such systems in their day-to-day activities, such as checking medical history and sharing information for diagnostic and treatment, reducing transcription times and cost by direct entry of the information, eliminating incorrect drugs prescriptions. The research further implies various interventions that could prove valuable to implementers in surmounting such obstacles. Nevertheless, it would not be accurate to state that there is a 'one method fits all' (Krisik, 2013). Change managers and EMR implementers need to select and choose relevant solutions in consideration to their individual situation and circumstances. At the same time, the condition and structure of the practices with which they are dealing warrant consideration, which poses a challenging and interesting task. In the light of this systematic review (Reina et al. 2012; Bansler and Havn, 2010), the following model of barriers and perceived interventions has been developed, which includes a number of aspects explored in chapter 3 and 4.

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Perceived Barrier		Possible obstacles-associated intervention approaches
1	Finance	• Provide documentation on return on investment. • Provide financial compensation. • Show profitable examples from other EMR implementations.
2	Technical	• Acquire third party for support during implementation • Adapt the system to existing practices. • Educate physicians and support ongoing training. • Implement EMR on a section basis, such as finance, admin, and clinician. • Link EMR with existing systems. • Promote and communicate reliability and availability of the system.
3	Time	• Implement a user friendly help function and help desk. • Provide support during implementation phase to convert records and assist. • Provide training sessions to familiarise users. • Redesign workflow to achieve a time gain
4	Psychological	• Adapt system to current medical practice.

		• Demonstrate ease of use. • Discuss usefulness of the EMR • Include trial period. • Let fellow healthcare practitioners demonstrate the system. • Start with voluntary use.
5	Social	• Discuss advantages and disadvantages for healthcare practitioners, administrative and management staff, and patients. • Ensure support, leadership, and communication from management. • Information and support from healthcare practitioners, administrative and management staff, who are already users.
6	Legal	• Communicate on safety and security of issues. • Develop requirements on safety and security in cooperation with physicians and patients. • Ensure EMR system meets these requirements before implementation.
7	Organisation	• Adapt EMR to organization type. • Adapt EMR to type of medical practice. • Redesign workflow to realize a better organisational fit.
8	Change Process	• Communicate the advantages for healthcare practitioners. Use incentives. • Ensure support, leadership, and communication from management. • Let physicians (or representatives) participate during the implementation process. • Select a project champion, preferably an experienced healthcare practitioners, administrative and management staff.

According to Reina et al. (2012), these approaches are commonly aimed towards enhancing a legal and technical structure for medical data-exchange, and are commonly sponsored or funded through public sources. Accordingly, Bansler and Havn (2010) suggest that a number of EMR schemes are directed towards overcoming obstacles in financial, legal and technical domains, such as establishing a context in which EMRs are affordable (finance), where use is permitted (legal) and available (technology). Nevertheless, Bansler and Havn (2010) outline that obstacles taxonomy, as developed in this report using systematic review approach on twelve articles, suggests that healthcare practitioners, admin and management staff commonly experience other types of obstacle, all of which need to be managed systematically in order to achieve high rates of application. Ventura et al. (2011) mention that the interventions and solutions suggested are developed in such a way so as to enable implementers and policymakers—at local, regional and national levels— to develop multi-level, multi-dimensional and therefore more efficient application approaches. Reports detailed on efficient EMR implementations provide support for this view, and suggest that a wide range of situation-particular solutions is a prerequisite for application. For instance, it is noted by Krisik (2013) that, 'it is important to stress that focusing on just one factor of implementation readiness is not sufficient… all factors work in concert to influence desired change associated with an EMR implementation. The factors work best as an integrated whole, overlapping and reinforcing each other'.

5.4 Developing EMR at MODA:

In the light of Watanabe et al. (2011), irrespective of these attainments, both public and private sector health industries healthcare practitioners, administrative and management staff, are continuing to face a number of obstacles, such as: the diversification of financial sources; the implementation of cooperative health insurance, effective management of chronic diseases, and public hospital privatisation; human resource development; separation of the multiple roles of the MODA. It is also imperative to develop practical policies' for national crises; and the implementation of adequate national health information systems and the presentation of e-health. Ting et al. (2012) outline in an attempt to manage the aforementioned obstacles and to achieve continuous improvement of the healthcare system within the KSA, MODA and other associated sectors need to coordinate their efforts towards application and ensure the new healthcare approach is a success.

Irrespective of the positive outcomes garnered through EMR application in medical practices, the application of such systems remains low and physicians resist such adoption. Through this report, in consideration to the completion of a systematic literature review which included 12 research articles, the obstacles facing physicians accepting EMRs have been established.

Moreover, the obstacles have been arranged and grouped into different categories. Notably, 'Change Process' and 'Organisational' are two obstacle categories seen to mediate the remaining six, notably 'Financial', 'Legal', 'Psychological', 'Social', 'Technical' and 'Time'. In all of these groups, a number of different sub-categories were established and examined, as outlined in chapter 3 and 4 of this review.

This report examines the factors behind the somewhat low rate of application concerning EMRs amongst physicians. The application of the EMR system clearly changes the medical practice workflow, and is also regarded as being a significant change relevant throughout the practice as a whole; therefore, innovation and complementary adjustments will need to be seen in regard to the cultural and structural components associated with the practice.

The research findings may be utilised in the form of providing a summary of the obstacles potentially facing physicians in the application of EMR; therefore, they may prove valuable for the implementers and policymakers of EMR. The research suggests that there is a need for greater awareness amongst policymakers in regard to the fact that the circumvention of financial, legal and technical barriers is not adequate in ensuring EMR benefits are garnered; in actuality, as highlighted through this research, other tools may need to be implemented in order to ensure physicians can make sound choices over the use of such systems in their day-to-day activities (Reina et al. 2012). The research also implies that interventions may also be useful to implementers in overcoming such obstacles. Nevertheless, it would be incorrect to conclude that there is an approach that fits all situations. Markedly, change managers and EMR implementers need to select and decide upon the most suitable solution in consideration to their individual situations and circumstances. Similarly, the conditions and structures associated with the practices with which they are dealing need to be considered, which is challenging.

5.5 Summary

In order to deal with the obstacles associated with the healthcare system in Saudi Arabia, and in an attempt to enhance the overall healthcare service quality, the MODA has established a national approach for healthcare services. This method has been approved by the Council of Ministers, and places emphasis on diversifying funding sources; creating information systems, developing the labour force, implementing monitoring and supervision roles, encouraging the private sector's involvement in health service provision; enhancing curative, preventative and rehabilitative care quality, and disseminating healthcare services across all regions. The national approach to healthcare service provision is to be applied by the MODA and MOH in line with a number of other healthcare providers, which will be supervised by the Council of Health Service. Markedly, the aims outlined are set to be fulfilled within a 20-year period.

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