Research Article

Attitudes toward implementing electronic medical record among Saudi physicians

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Abstract

Back ground: Although the electronic medical record (EMR) offer several benefits, its application is still meager. This article describes the state of EMRs, their advantage over existing paper records, and the problems impeding their implementation.

Objective: To assess the readiness of the physicians in Al-Hada Military Hospital in Taif city toward implementing EMR.

Material and Methods: Questionnaire consisting of personal demographic variables, practical demographic variables, beliefs and attitudes variables, and security and confidentiality variables were distributed on 131 practicing physician, accepting to participate, present at the time of the study (not on vacation or leave), and working in Al-Hada Military Hospital in Taif city (excluding visiting or locum physician).

Result: Of 129 physicians, 107 were male subjects, which represented 83%, while female subjects represented only 17%. Most of the participants were from family and community medicine (25%), followed by surgery (20%), pediatrics (14%), medicine (12%), and then OBG (8%). Other departments represent almost 21% cumulatively. Most of the physicians showed an encouraging awareness and beliefs about the potential benefits of implementing EMRs. About two- third of physicians believe in easiness of using EMRs, and only 4% expressed their need for intensive training.

Conclusion: Generally, the attitudes of Al-Hada Military Hospital physicians toward computerization of medical record were excellent. These positive attitudes fall in favor of adopting EMRs.

KEY WORDS: Electronic medical records, attitudes, physician

Introduction

Health-care information systems are composed of many components. One main component is electronic medical record (EMR), which is a computer-based patient medical record. EMR is used to save and retrieve patients' administrative and medical information. It facilitates access of patient data by clinical staff at any location anytime, prescribing, scheduling, sending requests and viewing laboratory and radiology reports, updating clinical notes, and many other functions.[1]

Many studies have reported on advantages of EMRs. It was found that EMR applications have the potential to improve the quality and reduce the cost of health care.[2] When compared with paper records, the main advantages of EMRs are greater accuracy[3] and a higher proportion of correct information[4]; more economical use of financial resources; and greater ease and speed of recovery of patient data.[5] On the other hand, several articles have reported on the limitations of such technologies, highlighting the resistance and difficulties of using EPR among health-care professionals, especially physicians.[6]

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importance was also given on portions related to discretion of data and value for privacy, the requirement for enduring training and support for human resources,[7] and the deficient of evenness and codification of the data recorded.[8] EMR has shown the potential to improve the quality and reduce the cost of health care.[2] For such and many other reasons, EMR was adopted by most of the developed countries.[9] The results were dichotomous with positive[10] and negative[11] views and beliefs.

Those beliefs and attitudes were shown to be influenced by several common concerns and expectations, for example, confidentiality, security, need for training, cost, easiness to use, and availability of useful extra features.[12] Awareness and welcoming enthusiastic attitude of physicians is crucial in order to implement EMR system successfully. This is obviously the reason of targeting physicians' beliefs and attitudes by many studies.

EMR systems are implemented partially or fully in some of hospitals in Saudi Arabia. However, this is still an untouched, unexploited area for research with no found published data in this regard (EMR) from Saudi Arabia or gulf countries. So, the aim of the current study was to assess the readiness of the physicians in Al-Hada Military Hospital in Taif city toward implementing EMR and to implement it perfectly with minimal chance of unexpected errors and complications, anticipate possible obstacles, and explore possible solutions.

Materials and Methods

Type of the Study

This was a cross-sectional survey conducted in Al-Hada Military Hospital in Taif city, which is located in the western area of Saudi Arabia.

Study Population

The study was conducted in Taif city. Taif has been selected because the investigator works in Al-Hada hospital, Taif. The city covers about 360 km^2, with population of 885,400. It is the capital summer of Saudi Arabia; it is located on the western region, at high of 6000 feet above the sea level. It is characterized by its nice temperate and climate, green mountains, and fresh air, which made it the summer capital, as it used to be called. The medical services are introduced by three governmental sectors: Ministry of Health, Medical Services Department of Ministry of Defense, and Aviation and Medical Affairs of National Guard. The medical service is introduced to people at three levels: primary, secondary, and tertiary health-care hospitals. There are nine major governmental hospitals; four of them are military hospitals, and the major one is Al-Hada Hospital at which the study was conducted. Al-Hada Military Hospital is a secondary-care hospital with a capacity of 350 beds. The hospital serves military personnel and their dependents who live in Taif city. In Al-Hada Military Hospital, there were 199 practicing physicians at the time of the study, January to February 2014.

Selection Criteria

The inclusion criteria for the selected sample for the study were: practicing physician, accepting to participate, present at the time of the study (not on vacation or leave), and working in Al-Hada Military Hospital in Taif city (excluding visiting or locum physician).

Sampling Method

Simple random sampling was used. According to the inclusion criteria, physicians' names and departments were obtained from administration office, and then a random list of registered physicians was created by SPSS v.12.

Sample Size

The sample size was based on range of error of the mean of (±5%) with 95% level of confidence. The calculation was made for an expected response rate of 80%, with total population of 199. The sample size was calculated by Sample Size Calculator® Software, which is free online. A satisfactory sample size estimated by using Sample Size Calculator was 131. In order to account for nonresponse and to achieve reliable and precise result, the researcher increased the sample size to 150. The response rate was 87.3%, which was considered satisfactory. This relatively high response rate, compared with other studies,[13,14] can be explained by the fact that the data collection strategy was very assertive and organized although it was time consuming.

The Questionnaire

An existing, validated questionnaire was adopted as the data collection tool. The questionnaire was self-administered, in English language, based on the principles outlined in the 1991 Institute of Medicine report. Questionnaire consisted of personal demographic variables, practical demographic variables, beliefs and attitudes variables, security and confidentiality variables, and usefulness variables. Ten resident physicians generated a test–retest reliability rate of >80% for each item over a 2-week interval. Six physicians with expertise in medical informatics screened the questionnaire for content validity, and 12 academic family physicians reviewed the instrument for structure, clarity, and relevance to test face validity.

Study Phases

The study phases can be divided into five phases: preparatory phase, 1 week; pilot study phase, 2 days; main study phase, 3 weeks; and data handling and analysis and writing phases, 4 weeks.

Preparatory Phase

This phase of the study started in April 2013 by selecting the topic for the study after discussion with the supervisor. Then, literature review was prepared. The researcher prepared the questionnaire with the help and advice of supervisor and two advisors. Approval from the hospital administration was then obtained.

Pilot Study Phase

A pilot study was done on 10 family medicine resident physicians who were randomly selected from the Joint Program of Family and Community Medicine, Jeddah. The benefits of the pilot study were more training for the researcher; testing the understanding of physicians to the questionnaire and correcting it accordingly; knowing the average time needed to fill the questionnaire, which was about 4 min; knowing the opinion of physicians and any addition to the questionnaire before doing the main study; and remodeling the relevant variables suitable for the statistical methods to be used.

Main Study Phase

The main study started from January 21, 2014, to February 8, 2014. According to the inclusion criteria, the physicians were selected by simple random way. The names and numbers of the target group were obtained from the administration office. The questionnaires were handed personally to the head of each clinical department. The empty forms were enclosed with consent of "agreement to participate" and distributed among all practicing physicians by the head of each department; then, the filled forms were collected in the same manner. With every concerned department, the researcher spent 5 min explaining the purpose of the study and the questionnaire format during the main weekly meetings.

Data Handling

Data gathered from the study samples were readily coded, checked, and entered into the computer. Accepted response rate per questionnaire was 80% and above. In that way, the participant was allowed to miss responding to five questions in a questionnaire as maximum in order to include it in the study. Otherwise, the deficient forms were to be excluded; fortunately, no forms were excluded.

Data Analysis

The researcher, using SPSS version 12, performed the analysis; χ^2-test was used for assessing between qualitative variables, and all the variables were qualitative. A *p*-value equal or less than 0.05 was considered statistically significant.

Results

Sample Size and Response Rate

Of 150 distributed questionnaires, 131 practicing physicians responded. The response rate was 87.3%. Some of the participants missed reporting some data. The data were analyzed according to the valid number of the participant under each category, which would be mentioned if it was less than 131.

Personal Demographic Characteristics of the Sample

Sex

Of 129 physicians, 107 were male subjects, which represent 83%, while female subjects represented only 17%. Male and female participants were found to differ significantly only in their major departments (χ^2 = 27.2, *df* = 8, *p* = 0.001) and in average number of patients seen in the clinic per week (χ^2 = 22.9, *df* = 3, *p* = 0.00).

Age

Of 127 participants, less than 10% were from the age groups of 50 years and above. Other physicians distributed almost equally among other age groups.

Job Position

The total number of the participant was 123. Most of them were residents (39%), followed by consultants (32%), and then specialists (24%).

Latest Qualification

Of 130 participants who responded to this variable, 40 of them revealed the last qualification to be MBBS, which represented 31%, followed by board (25%), master degree (15%), diploma (10%), PhD (6%), and others.

Latest Qualification Origin

The total number of the participant in this variable was 130. Forty-seven of them obtained their latest qualification from Saudi Arabia, which represented 36%, followed by other Arab countries and then Europe, which represented 25% and 23%, respectively. Qualifications from North America represented only 5%, and the rest (11%) was distributed among other countries. Among MBBS holders, 31 of 40 had obtained their degree from Saudi Arabia, which represented 77.5%. Most of the board qualifications were obtained from Europe (42%), followed by Saudi Arabia (33%).

Practical Demographic Characteristics of the Sample

Major Work Department

Most of the participants were from family and community medicine (25%), followed by surgery (20%), pediatrics (14%), medicine (12%), and OBG (8%). Other departments represented almost 21% cumulatively.

Average Number of Patients Seen in the Clinic Weekly

Of 126 subjects, 45 physicians saw less than 50 patients per week, which represents 36%, while 25 physicians, representing 20%, saw more than 100 patients per week. Thirty-two physicians represented 25% saw between 50 and 100 patients per week. The rest saw none.

Computer Technology Use

The total number of the participants was 130. One hundred of them (77%) used computer at work and home, Internet, and electronic mail (complete use of technology). The rest, 23%, reported incomplete use of computer technology. Only 1.5% of the rest reported no use of computer technology at all. Latest qualification of the participants showed a significant effect on their practice of computer technology use (χ^2 = 18.7, *df* = 5, *p* = 0.002). On the other hand, sex, age, job position,

Table 1: Practice of computer technology use by the participants in relation to practical demographic characteristics

	Practice of computer technology use		*p*
	Complete use (%)	Incomplete use (%)	
Major department			
Medicine	11 (69)	5 (31)	NS
Surgery	21 (81)	5 (19)	
OBG	8 (80)	2 (20)	
Pediatrics	9 (50)	9 (50)	
Dentistry	4 (80)	1 (20)	
Family and community medicine	27 (82)	6 (18)	
Radiology	3 (75)	1 (25)	
Laboratory	2 (100)	—	
Other	15 (94)	1 (6)	
Average number of patients seen in the clinic per week			
Less than 50	32 (73)	12 (27)	NS
50–100	23 (72)	9 (28)	
More than 100	21 (84)	4 (16)	
Not applicable	21 (88)	3 (12)	

Table 2: Agreement on "medical records should be computerized" and current component of EMR in relation to personal demographic characteristics

	Medical records should be computerized		*p*	Current component of EMR			*p*
	Strongly agree (%)	Agree (%)		Strongly agree (%)	Agree (%)	Unsure (%)	
Sex							
Male	87 (84)	17 (16)	NS	77 (74)	23 (22)	4 (4)	NS
Female	18 (86)	3 (14)		13 (59)	9 (41)		
Age groups (years)							
25–29	16 (73)	6 (27)	NS	16 (70)	6 (26)	1 (4)	NS
30–34	24 (96)	1 (4)		18 (72)	7 (28)		
35–39	20 (83)	4 (17)		18 (75)	5 (21)	1 (4)	
40–44	20 (87)	3 (13)		19 (79)	5 (21)		
45–49	11 (69)	5 (31)		11 (65)	5 (29)	1 (6)	
50 and above	11 (92)	1 (8)		7 (59)	4 (33)	1 (8)	
Job position							
Resident	38 (81)	9 (19)	NS	34 (71)	13 (27)	1 (2)	NS
Specialist	21 (75)	7 (25)		18 (67)	8 (29)	1 (4)	
Consultant	34 (92)	3 (8)		27 (71)	9 (24)	2 (5)	
Others	6 (86)	1 (14)		5 (71)	2 (29)		
Latest qualification							
MBBS	30 (77)	9 (23)	NS	26 (65)	13 (33)	1 (2)	NS
Diploma	12 (92)	1 (8)		10 (77)	3 (23)		
Master degree	16 (89)	2 (11)		16 (94)	1 (6)		
PhD	6 (75)	2 (25)		5 (63)	2 (25)	1 (12)	
Board	26 (84)	5 (16)		21 (66)	9 (28)	2 (6)	
Other	14 (88)	2 (12)		12 (71)	5 (29)		
Qualifications origin							
Saudi Arabia	38 (83)	8 (17)	NS	31 (68)	13 (28)	2 (4)	NS
Arab countries	29 (91)	3 (9)		25 (81)	6 (19)		
Europe	22 (82)	5 (18)		20 (67)	8 (27)	2 (6)	
North America	7 (100)			6 (86)	1 (14)		
Other	8 (62)	5 (38)		9 (69)	4 (31)		

Table 3: Agreement on "medical records should be computerized" and current component of EMR in relation to practical demographic characteristics

	Medical records should be computerized		*p*	Current component of EMR			*p*
	Strongly agree (%)	Agree (%)		Strongly agree (%)	Agree (%)	Unsure (%)	
Major department							
Medicine	12 (80)	3 (20)	NS	11 (69)	5 (31)		NS
Surgery	23 (85)	4 (15)		16 (62)	10 (38)		
OBG	8 (89)	1 (11)		3 (30)	7 (70)		
Pediatrics	10 (59)	7 (41)		12 (67)	6 (33)		
Dentistry	5 (100)			4 (80)		1 (20)	
Family medicine	28 (90)	3 (10)		27 (84)	4 (13)	1 (3)	
Radiology	3 (75)	1 (25)		4 (100)			
Laboratory	2 (100)			2 (100)			
Other	14 (88)	2 (12)		12 (80)	1 (7)	2 (13)	
Average No. of patients seen in the clinic per week							
Less than 50	37 (86)	6 (14)	NS	31 (71)	11 (25)	2 (4)	NS
50–100	24 (80)	6 (20)		21 (66)	10 (31)	1 (3)	
More than 100	21 (88)	3 (12)		15 (63)	8 (33)	1 (4)	
Not applicable	20 (83)	4 (17)		20 (87)	3 (13)		
Computer technology use							
Complete	85 (88)	12 (12)	0.029	72 (74)	22 (23)	3 (3)	NS
Incomplete	19 (68)	9 (32)		19 (64)	10 (33)	1 (3)	

qualification origin, work department, and average number of patients seen in the clinic per week showed no significant effect on practice of technology use [Table 1].

Attitudes Toward Implementing Electronic Medical Record

Medical Records Should Be Computerized

Of 127 participants, 105 (80%) strongly agreed that medical records should be computerized. Only one participant was unsure. The rest, which represented almost 20%, agreed on the statement. None of the participants disagreed on it. Hence, only those who strongly agreed and those who agreed were analyzed further. Computer technology use by the participants showed significant effect on the level of the agreement—agree and strongly agree—of the participants with the above statement ($\chi^2 = 4.7$, $df = 1$, $p = 0.029$). Sex, age, job position, latest qualification, qualification origin, work department, and average number of patients seen in the clinic per week showed no significant effect on agreement of the participants with the statement [Tables 2 and 3].

Current Components of EMR, Laboratory Inquiry, and Medications Are a Useful Tool for Physicians

Of 128 participants, 91 (71%) strongly agreed with this statement, followed by 33 (26%) participants agreed on it, while 4 (3%) were unsure. None of the participants disagreed with the statement. Work department of the participants showed a significant effect on the level of agreement on this statement ($\chi^2 = 33.1$, $df = 16$, $p = 0.007$), while sex, age, job position, latest qualification, qualification origin, average number of patients seen in the clinic per week, and computer technology use by the participants revealed no significant effect on their agreement with the statement [Tables 2 and 3].

Use of EMR Would Improve the Quality of Care in a Physicians' Clinic

Ninety-nine (76%) of the participants strongly agreed on the abovementioned statement, 28 (21%) agreed on it, while 4 (3%) of them were unsure. None of them disagreed on the statement. Sex, age, job position, latest qualification, qualification origin, work department, average number of patients seen in the clinic per week, and computer technology use by the participants revealed no significant effect on agreement of the participants with the statement [Tables 4 and 5].

Widespread Use of EMR Would Improve Health-Care Quality in Saudi Arabia

Ninety-one (70%) of the participants strongly agreed on the abovementioned statement, 32 (24%) agreed on it, while 8 (6%) of them were unsure. None of them disagreed on the statement. Work department showed significant effect on the level of agreement of the participants on this statement ($\chi^2 = 35.4$, $df = 16$, $p = 0.004$). Computer technology use by the participants also revealed significant effect on the

Table 4: Agreement on "use of EMR will improve the quality of care" and "widespread use of EMR will improve the health quality of care" and current component of EMR in relation to personal demographic characteristics

	Use of EMR will improve the quality of care			*p*	Widespread use of EMR will improve the health quality of care			*p*
	Strongly agree (%)	Agree (%)	Unsure (%)		Strongly agree (%)	Agree (%)	Unsure (%)	
Sex								
Male	81 (76)	22 (20)	4 (4)	NS	78 (73)	23 (21)	6 (6)	NS
Female	17 (77)	5 (23)			13 (59)	7 (32)	2 (9)	
Age groups (years)								
25–29	19 (83)	4 (17)		NS	17 (74)	4 (17)	2 (9)	NS
30–34	23 (92)	2 (8)			20 (80)	4 (16)	1 (4)	
35–39	18 (75)	5 (21)	1 (4)		17 (71)	6 (25)	1 (4)	
40–44	17 (68)	7 (28)	1 (4)		17 (68)	6 (24)	2 (8)	
45–49	10 (56)	7 (39)	1 (5)		10 (56)	7 (39)	1 (5)	
50 and above	9 (75)	2 (17)	1 (8)		7 (58)	4 (34)	1 (8)	
Job position								
Resident	39 (81)	9 (19)		NS	36 (75)	10 (21)	2 (4)	NS
Specialist	21 (72)	6 (21)	2 (7)		18 (62)	7 (24)	4 (14)	
Consultant	28 (72)	9 (23)	2 (5)		25 (64)	12 (31)	2 (5)	
Others	5 (71)	2 (29)			6 (86)	1 (14)		
Latest qualification								
MBBS	32 (80)	8 (20)		NS	30 (75)	7 (18)	3 (7)	NS
Diploma	11 (85)	2 (15)			7 (54)	6 (46)		
Master degree	15 (79)	3 (16)	1 (5)		15 (79)	2 (11)	2 (10)	
PhD	4 (50)	4 (50)			5 (63)	3 (37)		
Board	24 (73)	7 (21)	2 (6)		21 (64)	10 (30)	2 (6)	
Other	12 (71)	4 (23)	1 (6)		12 (71)	4 (23)	1 (6)	
Qualifications origin								
Saudi Arabia	39 (83)	8 (17)		NS	36 (77)	8 (17)	3 (6)	NS
Arab countries	24 (75)	7 (22)	1 (3)		24 (75)	6 (19)	2 (6)	
Europe	17 (57)	10 (33)	3 (10)		15 (50)	12 (40)	3 (10)	
North America	7 (100)				5 (71)	2 (29)		
Other	11 (79)	3 (21)			10 (71)	4 (29)		

participants' agreement (χ^2 = 6.8, *df* = 2, *p* = 0.034). On the other hand, sex, age, job position, latest qualification, qualification origin, and average number of patients seen in the clinic per week showed no significant effect on agreement of the participants with the statement [Table 5].

EMR Would Reduce My Risk of Making Medical Errors

Fifty-three (41%) of 129 participants strongly agreed with this statement, 55 (43%) agreed with it, and 16 (12%) were unsure about it. Here, the first disagreement started to show up, with only five (4%) participants disagreed with the statement. Work department showed significant effect on the level of agreement of the physicians with this statement (χ^2 = 51.6, *df* = 24, *p* = 0.001). All other demographic variables showed no significant effect on their agreement including sex, age, job position, latest qualification, qualification origin, average number of patients seen in the clinic per week, and computer technology use by the participants [Tables 6 and 7].

Interest in an EMR That Would Connect All Physician Practices, Laboratory, Radiology, and Hospitals in an Area Securely for the Exchange of Patient Data

Ninety-two participants (70%) reported strong agreement with this statement, 37 (28%) agreed with it, while 2 (<2%) were unsure about it. Sex showed significant effect on the level of agreement of the participants on this statement (χ^2 = 9, *df* = 2, *p* = 0.011), while age, job position, latest qualification, qualification origin, work department, average number of patients seen in the clinic per week, and computer technology use by the participants showed no significant effect on agreement of the participants with the statement [Tables 6 and 7].

Table 5: Agreement on "use of EMR will improve the quality of care" and "widespread use of EMR will improve the health quality of care" and current component of EMR in relation to practical demographic characteristics

	Use of EMR will improve the quality of care			*p*	Widespread use of EMR will improve the health quality of care			*p*
	Strongly agree (%)	Agree (%)	Unsure (%)		Strongly agree (%)	Agree (%)	Unsure (%)	
Major department								
Medicine	12 (75)	3 (19)	1 (6)	NS	12 (75)	3 (19)		NS
Surgery	17 (63)	9 (33)	1 (4)		16 (59)	9 (33)		
OBG	8 (80)	2 (20)			2 (20)	8 (80)		
Pediatrics	11 (61)	6 (33)	1 (6)		9 (50)	7 (39)		
Dentistry	5 (100)				5 (100)		1 (20)	
Family medicine	28 (85)	5 (12)			30 (91)	2 (6)	1 (3)	
Radiology	3 (75)	1 (25)			3 (75)	1 (25)		
Laboratory	2 (100)				2 (100)			
Other	13 (81)	2 (13)	1 (6)		12 (75)	1 (7)	2 (13)	
Average no. of patients seen in the clinic per week								
Less than 50	33 (73)	10 (22)	2 (5)	NS	31 (71)	11 (25)	4 (9)	NS
50–100	24 (75)	7 (22)	1 (3)		21 (66)	10 (31)	2 (6)	
More than 100	22 (88)	3 (12)			15 (63)	8 (33)	1 (4)	
Not applicable	19 (79)	4 (17)	1 (4)		20 (87)	3 (13)	1 (4)	
Computer technology use								
Complete	80 (80)	17 (17)	3 (3)	NS	75 (75)	22 (20)	5 (5)	NS
Incomplete	18 (60)	11 (37)	1 (3)		15 (50)	12 (40)	3 (10)	

Security and Confidentiality of Electronic Medical Record

For the statement "EMRs are more secure than paper medical records," the total number of participants was 129. Of them, 73 (57%) strongly agreed with the statement, 32 (25%) agreed with it, 22 (17%) were unsure, and 2 participants disagreed with it. Sex, age, job position, latest qualification, qualification origin, work department, average number of patients seen in the clinic per week, and computer technology use by the participants showed no significant effect on agreement of the participants with that statement [Tables 8 and 9].

EMRs Are More Confidential Than Paper Medical Records

Sixty-three (49%) of 129 participants reported strong agreement on this statement, 32 (25%) agreed with it, 30 (23%) were unsure, and 4 (3%) disagreed with the statement. Again, sex, age, job position, latest qualification, qualification origin, work department, average number of patients seen in the clinic per week, and computer technology use by the participants showed no significant effect on agreement of the participants with the statement [Tables 8 and 9].

Objection to Sharing EMR Data With Other Physicians

Thirty-seven participants (28%) strongly agreed with this statement, 19 (15%) agreed with it, 18 (14%) were unsure, 45 (34%) disagreed, and 12 (9%) strongly disagreed. Sex, age, job position, latest qualification, qualification origin, work department, average number of patients seen in the clinic per week, and computer technology use by the participants showed no significant effect on agreement of the participants with the statement [Tables 10 and 11].

Discussion

The chief purpose of the EMR is to provide a repository of the clinician's remarks and investigation of the patient. History and physical examination forms the beginning of recorded data between a clinician and a patient. The medical record serves a number of other purposes. For instance, it offers records that a patient was analyzed or a test was carried out in order that the clinician can claim for repayment by an insurance company or government agency. It also acts as a means of interaction among various clinicians and ancillary professionals (i.e., nurses, physical therapists, and respiratory therapists) who analyze the patient. In addition, the medical record serves as a legal record in the event of claims owing to malpractice or occupational injury. Finally, it also is used to abstract data for medical research.[15]

The attitudes of Al-Hada Military Hospital physicians toward computerization of medical record were excellent. These positive attitudes support adopting EMRs. Majority of physicians possesed an encouraging awareness and beliefs about the advantages of implementing EMRs. About two-third of physicians believed in easiness of using EMRs. This result goes hand in hand with other studies done on nurses.[16]

Our study reflected that most of the physicians were currently using computers (98%): at both home and work (78%),

Table 6: Agreement on "EMR will reduce the risk of medical errors" and "EMR would connect all physician practices securely" in relation to personal demographic characteristics

	EMR will reduce the risk of medical errors				*p*	EMR would connect all physician practices securely			*p*
	Strongly agree (%)	Agree (%)	Unsure (%)	Disagree (%)		Strongly agree (%)	Agree (%)	Unsure (%)	
Sex									
Male	46 (44)	40 (38)	15 (14)	4 (4)	NS	80 (75)	27 (25)	2 (9)	NS
Female	7 (32)	13 (60)	1 (4)	1 (4)		12 (55)	8 (36)	1 (4)	
Age groups (years)									
25–29	5 (23)	12 (55)	4 (18)	1 (4)	NS	17 (74)	5 (22)	1 (4)	NS
30–34	11 (46)	11 (46)	1 (4)	1 (4)		19 (76)	5 (20)		
35–39	10 (42)	11 (46)	3 (12)			16 (67)	8 (33)		
40–44	13 (52)	8 (32)	4 (16)			17 (68)	8 (32)		
45–49	7 (39)	7 (39)	2 (11)			13 (72)	5 (28)		
50 and above	6 (50)	3 (25)	2 (17)	1 (8)		9 (75)	3 (25)		
Job position									
Resident	3 (37)	20 (42)	8 (17)	2 (4)	NS	32 (76)	15 (31)	1 (2)	NS
Specialist	13 (46)	12 (43)	2 (7)	1 (4)		18 (62)	10 (35)	1 (3)	
Consultant	18 (46)	15 (39)	4 (10)	2 (5)		30 (77)	9 (23)		
Others	1 (17)	4 (67)	1 (16)			7 (100)			
Latest qualification									
MBBS	13 (33)	19 (49)	6 (15)	1 (3)	NS	26 (65)	12 (30)		NS
Diploma	5 (42)	6 (50)	1 (8)			9 (69)	4 (31)	2 (5)	
Master degree	11 (58)	6 (32)	2 (10)			17 (90)	2 (10)	—	
PhD	4 (50)	3 (38)	1 (12)			6 (75)	2 (25)	—	
Board	13 (39)	15 (46)	3 (9)	2 (6)		22 (67)	11 (33)	—	
Other	7 (41)	5 (29)	3 (18)	2 (12)		11 (65)	6 (35)	—	
Qualifications origin									
Saudi Arabia	15 (33)	22 (49)	7 (16)	1 (2)	NS	32 (68)	13 (28)	2 (4)	NS
Arab countries	18 (56)	13 (41)	1 (3)			25 (78)	7 (22)		
Europe	11 (37)	11 (37)	4 (13)			21 (70)	9 (30)		
North America	2 (29)	4 (57)	1 (14)	4 (13)		6 (86)	1 (14)		
Other	6 (43)	5 (36)	3 (21)			7 (50)	7 (50)		

at work only (8%), and only at home (12%). This result is almost similar to the study findings done in Indiana, USA.[17] Most of the physicians were found to use Internet (98%) and e-mail (96%). These findings are even better than the results of Indiana study.[17] However, the time gap between the two studies, 5 years, may justify the difference.

Despite the very limited use of some primary components of EMRs, all physicians in Al-Hada Military Hospital (100%) believed that medical records should be computerized. This may be related to the fact that most of them (97%) perceived that current components of EMR—laboratory inquiry and medications—are a useful tool for physicians. This was not the case in Indiana study, where two- thirds of respondents believed in computerization of medical records and only half of them found their current EMRs useful.[17] There was a reassuring magnitude of belief that EMRs will improve the local (97%) and national (94%) quality of care and reduce medical errors (84%). This was lacking in Indiana study.[17] Most physicians (98%) expressed interest in a system that would securely connect all physician practices, laboratories, radiography facilities, and hospitals in their area for exchanging patient data. We were similar in this finding to the Indiana study.[17]

In general, the attitude of Al-Hada Military Hospital is in favor of adopting EMRs. Similar positive attitudes were concluded by studies from Israel,[11] Iran,[18] and South Africa.[12] Looking at the other side of the coin, negative attitudes were noted by many other studies including those from Pennsylvania[10] and Netherlands.[19]

Work department, computer technology use, and sex were noted to exhibit a statistically significant effect on the strength of some positive attitudes toward computerization

Table 7: Agreement on "EMR will reduce the risk of medical errors" and "EMR would connect all physician practices securely" in relation to practical demographic characteristics

	EMR will reduce the risk of medical errors				*p*	EMR would connect all physician practices securely			*p*
	Strongly agree (%)	Agree (%)	Unsure (%)	Disagree (%)		Strongly agree (%)	Agree (%)	Unsure (%)	
Major department									
Medicine	6 (40)	5 (33)	4 (27)		NS	12 (75)	4 (25)	—	NS
Surgery	7 (27)	12 (46)	5 (19)	2 (8)		18 (67)	8 (29)	1 (4)	
OBG	1 (10)	8 (80)	1 (10)			2 (20)	8 (80)	—	
Pediatrics	6 (33)	7 (39)	3 (17)	2 (11)		10 (56)	7 (39)	1 (5)	
Dentistry		5 (100)				5 (100)		—	
Family medicine	22 (67)	11 (33)				27 (82)	6 (18)	—	
Radiology	2 (50)		1 (25)	1 (25)		3 (75)	1 (25)	—	
Laboratory		1 (50)	1 (50)			2 (100)		—	
Other	9 (56)	6 (38)	1 (6)			13 (81)	3 (19)	—	
Average no. of patients seen in the clinic per week									
Less than 50	17 (40)	20 (46)		1 (2)	NS	36 (80)	8 (18)	1 (2)	NS
50–100	15 (47)	10 (31)	5 (12)	2 (6)		21 (66)	11 (34)	—	
More than 100	12 (48)	12 (48)	5 (16)	1 (4)		14 (56)	10 (40)	1 (4)	
Not applicable	9 (12)	11 (45)	4 (17)			18 (75)	6 (25)	—	
Computer technology use									
Complete	44 (44)	42 (42)	12 (12)	2 (2)	NS	73 (73)	26 (26)	1 (1)	NS
Incomplete	9 (32)	12 (43)	4 (14)	3 (11)		18 (60)	1 (37)	1 (3)	

and expected benefits of EMRs. This could be related to the difference in work demands in different departments, which was indicated by some studies,[8] and effect of previous computer experience, as concluded by some other studies.[10]

In general, most physicians addressed their trust in security (82%) and confidentiality (74%) of EMRs. That sounds great on the ground of remarking that we are short of clear standards for security and confidentiality of medical records (paper and electronic) similar to that created by HIPAA (the Health Insurance Portability and Accountability)—for example—in the USA.[13] That may reflect the trust of physicians in administration choice of a secure system and the knowledge about security and confidentiality of EMRs that were reported in many studies.[20] Most of the rest participants were unsure about security (17%) and confidentiality (23%). Those represent a room for more education and training.

The trust of the participants in confidentiality of EMRs falls behind their trust in its security. Replies to the open-ended question indicated that many of them, for a variety of reasons, revealed common concerns about issues of confidentiality of EMRs. About 43% of physicians did not object to sharing EMR data with other physicians, 43% objected, while 14% were hesitating. This equal dichotomy may be caused by different understanding of the issue addressed. Some participants might think that sharing EMR data was a breach of confidentiality while some thought it pools in the patient care and welfare.

In contrary to the general trust feeling toward security and confidentiality of EMRs noted in our study, many studies reported concerns of the participants about more security and confidentiality risks involved with EMRs than paper records.[7,17] Those concerns were appraised as a gap in knowledge that should be targeted by educating physician about.

Limitation of the Study

The target population was not representative of Taif population because the survey was done in a military hospital. It did not include the facilities of Ministry of Health or other health services in Taif city because of shortage of time and lack of recourses. The population was also limited to physician, but it can be extended to include other health-care personnels such as physical therapist, nurses, and laboratory and radiology technicians.

Conclusion

Generally, the attitudes of Al-Hada Military Hospital physicians toward computerization of medical record were excellent. These positive attitudes fall in favor of adopting EMRs. Most of the physicians showed an encouraging awareness and beliefs about the potential benefits of implementing EMRs. About two- third of physicians believed in easiness of using EMRs and only 4% expressed their

Table 8: Agreement on "EMR are more secure than paper medical records" and "EMR are more confidential than paper medical records" in relation to personal demographic characteristics

	EMR are more secure than paper medical records				*p*	EMR are more confidential than paper medical records				*p*
	Strongly agree (%)	Agree (%)	Unsure (%)	Disagree (%)		Strongly agree (%)	Agree (%)	Unsure (%)	Disagree (%)	
Sex										
Male	60 (57)	24 (23)	19 (18)	2 (2)	NS	50 (47)	25 (24)	27 (26)	3 (3)	NS
Female	13 (59)	7 (32)	2 (9)	—		13 (59)	6 (27)	2 (9)	1 (5)	
Age groups (years)										
25–29	14 (64)	3 (13)	5 (23)	—	NS	11 (48)	5 (22)	6 (26)	1 (4)	NS
30–34	14 (56)	7 (28)	3 (12)	1 (4)		12 (48)	8 (32)	4 (16)	1 (4)	
35–39	14 (61)	5 (22)	4 (17)			13 (54)	5 (21)	5 (21)	1 (4)	
40–44	16 (64)	6 (24)	3 (12)			11 (46)	8 (33)	5 (21)	—	
45–49	7 (39)	6 (33)	5 (28)			7 (41)	3 (18)	7 (41)	—	
50 and above	5 (42)	4 (33)	2 (17)	1 (8)		5 (42)	3 (25)	3 (25)	1 (8)	
Job position										
Resident	26 (54)	14 (29)	8 (17)	—	NS	28 (58)	8 (17)	11 (23)	1 (2)	NS
Specialist	21 (73)	4 (14)	3 (10)	1 (3)		16 (55)	5 (17)	5 (17)	1 (4)	
Consultant	17 (45)	11 (29)	9 (24)	1 (2)		14 (38)	10 (27)	11 (30)	2 (5)	
Others	5 (83)	1 (17)	9 (24)	—		2 (29)	3 (43)	2 (28)	—	
Latest qualification										
MBBS	22 (56)	10 (26)	6 (15)	1 (3)	NS	21 (53)	8 (20)	9 (22)	2 (5)	NS
Diploma	11 (85)	2 (15)	—	—		10 (76)	1 (8)	1 (8)	1 (8)	
Master degree	12 (63)	5 (26)	2 (11)	—		11 (58)	6 (32)	2 (10)	—	
PhD	3 (43)	2 (29)	2 (28)	—		4 (50)	2 (25)	2 (25)	—	
Board	17 (52)	8 (24)	7 (21)	1 (3)		12 (38)	11 (34)	8 (25)	1 (3)	
Other	7 (42)	5 (29)	5 (29)	—		5 (31)	3 (19)	8 (50)	—	
Qualifications origin										
Saudi Arabia	27 (59)	10 (22)	8 (17)	1 (2)	NS	25 (53)	11 (24)	9 (19)	2 (4)	NS
Arab countries	24 (75)	5 (16)	3 (9)	—		21 (68)	8 (26)	2 (6)	—	
Europe	8 (28)	13 (45)	7 (24)	—		8 (27)	8 (27)	12 (40)	—	
North America	5 (72)	1 (14)	1 (14)	1 (3)		3 (86)	12 (40)	1 (14)	2 (6)	
Other	8 (58)	3 (21)	3 (21)	—		7 (43)	1 (14)	6 (43)	—	

Table 9: Agreement on "EMR are more secure than paper medical records" and "EMR are more confidential than paper medical records" in relation to practical demographic characteristics

	EMR are more secure than paper medical records				*p*	EMR are more confidential than paper medical records				*p*
	Strongly agree (%)	Agree (%)	Unsure (%)	Disagree (%)		Strongly agree (%)	Agree (%)	Unsure (%)	Disagree (%)	
Major department										
Medicine	9 (60)	4 (27)	2 (13)	—	NS	7 (44)	4 (25)	12 (75)	12 (75)	NS
Surgery	13 (48)	8 (30)	6 (22)	—		13 (48)	6 (22)	8 (30)	18 (67)	
OBG	7 (70)	2 (20)	—	1 (10)		7 (70)	1 (10)	1 (10)	1 (10)	
Pediatrics	6 (33)	7 (39)	5 (28)	—		3 (18)	5 (29)	8 (47)	1 (6)	
Dentistry	3 (60)	1 (20)	1 (20)	—		2 (40)	3 (60)	—	—	
Family medicine	20 (50)	8 (25)	3 (9)	1 (3)		19 (60)	8 (25)	3 (9)	2 (6)	
Radiology	2 (50)	1 (25)	1 (25)	—		2 (50)	1 (25)	1 (25)	—	
Laboratory	1 (50)	—	1 (50)	—		—	1 (50)	1 (50)	—	
Other	12 (75)	1 (6)	3 (19)	—		10 (62)	3 (19)	3 (19)	—	
Average no. of patients seen in the clinic per week										
Less than 50	25 (57)	10 (23)	9 (20)	—	NS	20 (47)	13 (30)	10 (23)	—	NS
50–100	17 (53)	6 (19)	7 (22)	2 (6)		16 (50)	6 (19)	8 (25)	2 (6)	
More than 100	16 (64)	7 (28)	2 (8)	—		14 (56)	8 (32)	3 (12)	—	
Not applicable	14 (61)	6 (26)	3 (13)	—		12 (50)	4 (17)	6 (25)	2 (8)	
Computer technology use										
Complete	57 (58)	23 (23)	17 (17)	2 (2)	NS	50 (51)	24 (25)	21 (21)	3 (3)	NS
Incomplete	15 (52)	9 (31)	5 (17)	—		12 (40)	8 (27)	9 (30)	1 (3)	

Table 10: Agreement on "I object to sharing EMR data with other physician" in relation to personal demographic characteristics

	I object to sharing EMR data with other physician					*p*
	Strongly agree (%)	**Agree (%)**	**Unsure (%)**	**Disagree (%)**	**Strongly disagree (%)**	
Sex						
Male	32 (30)	18 (17)	14 (13)	32 (30)	11 (10)	NS
Female	5 (23)	1 (4.5)	4 (18)	11 (50)	1 (4.5)	
Age group (years)						
25–29	10 (43)	3 (13)	3 (13)	5 (22)	2 (9)	NS
30–34	8 (32)	4 (16)	2 (8)	9 (36)	2 (8)	
35–39	6 (25)	3 (13)	5 (21)	9 (37)	1 (4)	
40–44	8 (32)	5 (20)	2 (8)	8 (32)	2 (8)	
45–49	2 (11)	2 (11)	5 (28)	5 (28)	4 (22)	
50 and above	3 (25)	1 (8)	6 (50)	6 (50)	1 (8)	
Job position						
Resident	14 (30)	6 (12)	6 (12)	20 (42)	2 (4)	NS
Specialist	9 (31)	4 (14)	3 (10)	9 (31)	4 (14)	
Consultant	8 (21)	6 (15)	7 (18)	12 (31)	6 (15)	
Others	5 (72)	1 (14)	—	1 (14)	—	
Latest qualification						
MBBS	14 (35)	8 (20)	4 (10)	13 (33)	1 (2)	NS
Diploma	6 (46)	—	2 (15)	5 (39)	—	
Master degree	3 (16)	2 (10)	3 (16)	8 (42)	3 (16)	
PhD	2 (25)	—	4 (50)	2 (25)	—	
Board	9 (28)	6 (18)	2 (6)	11 (33)	5 (15)	
Other	3 (18)	3 (18)	3 (18)	5 (28)	3 (18)	
Qualifications origin						
Saudi Arabia	16 (34)	11 (23)	5 (11)	12 (26)	3 (6)	NS
Arab countries	10 (31)	2 (6)	6 (19)	10 (31)	4 (13)	
Europe	6 (20)	2 (7)	6 (20)	13 (43)	3 (10)	
North America	1 (14)	1 (14)	1 (14)	3 (44)	1 (14)	
Other	4 (29)	2 (14)	—	7 (50)	1 (7)	

Table 11: Agreement on "I object to sharing EMR data with other physician" in relation to practical demographic characteristics

	I object to sharing EMR data with other physician					p
	Strongly agree (%)	**Agree (%)**	**Unsure (%)**	**Disagree (%)**	**Strongly disagree (%)**	
Major department						
Medicine	4 (25)	—	3 (19)	7 (44)	2 (12)	NS
Surgery	10 (37)	5 (19)	1 (4)	9 (33)	2 (7)	
OBG	1 (10)	—	—	8 (80)	1 (10)	
Pediatrics	4 (22)	3 (17)	3 (17)	8 (44)	—	
Dentistry	1 (20)	—	2 (40)	1 (20)	1 (20)	
Family medicine	10 (31)	8 (24)	6 (18)	6 (18)	3 (9)	
Radiology	2 (50)	1 (25)	—	—	1 (25)	
Laboratory	—	—	1 (50)	1 (50)	—	
Other	5 (31)	2 (13)	2 (13)	5 (31)	2 (13)	
Average no. of patients seen in the clinic per week						
Less than 50	13 (29)	9 (20)	6 (13)	12 (27)	5 (11)	NS
50–100	11 (34)	2 (6)	4 (13)	11 (34)	4 (13)	
More than 100	5 (20)	4 (16)	3 (12)	13 (52)	—	
Not applicable	7 (29)	2 (8)	5 (21)	7 (29)	3 (13)	
Computer technology use						
Complete	25 (25)	13 (13)	14 (14)	38 (38)	10 (10)	NS
Incomplete	12 (40)	5 (17)	4 (13)	7 (23)	2 (7)	

need for intensive training. Issues such as confidentiality, security, data entry, and time were perceived as concerns for many physicians and resembled obstacles, in varying degrees, to successful implementation of EMRs. Most of the physicians avail computer technology at work and home, which facilitates their role in implementing EMRs.

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