Planning to use EMR in Sulaimani Hospitals supported by E-Statistical technologies

Dr. Abbas Gulmurad Beg Murad
abbas.beg@univsul.edu.iq

University of Sulaimaniyah/ Statistics & Informatic Dept.

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ABSTRUCT

Healthcare systems are highly complex, fragmented and use multiple information technology systems. With vendors incorporating different standards for similar or same systems, it is little wonder that all-round inefficiency, waste and errors in healthcare information and delivery management are all too commonplace an occurrence. Consequently, a patient's medical information often gets trapped in silos of legacy systems, to achieve the following six aims of improved care: safety, effectiveness, patient centeredness, timeliness, efficiency, and quality, unable to be shared with members of the healthcare community. These are some of the several motivations driving an effort to encourage standardization, integration and electronic information exchange amongst the various healthcare providers.

the successful implementation of Health information systems (HIS) continue to be a challenge in many developing countries (e.g. Iraq). This research examines the current state of health information systems in government hospitals in Iraq. And led to increasing interest about it. also investigates if the general public as well as medical practitioners in Iraq have interest in having web based electronic medical records systems that allow patients to access their medical reports and make online booking for their appointments, the reason for wanting to change to an electronic system is important. Many persons involved in healthcare today expect to move from a paper to a paperless environment. This is a major step and has only been successfully achieved in a few healthcare institutions to date. Shar, Farouq and Sulaimani General Hospital in Sulaimaniyah province was used as a case study to examine the information systems in a governmental hospital in Iraq.

***Keywords**: Electronic medical records (EMR), Functional data analysis (FDA), , Computer-based Patient Record (CPR), Eigen Values, Principal Components Analysis (PCA).*

Background

Health Care sector in Iraq has witnessed significant reflex during the last few years, both in quality and capacity. The relatively lower cost of health care, as compared to developed countries has positioned Iraq as a destination for health care services. This is expected to position health care as one of the largest service sectors and a significant contributor to the GDP. As the health sector is poised for major growth in next decade, use of information and communication technology (ICT) infrastructure, services and databases for policy planning and implementation, the use of international experience, best practices and open technologies may be necessary in some scenarios. [7]

Denmark is a world leader in EMR adoption. Each Danish citizen has a centralized electronic identifier that is used to track every contact with the health care system.35 In

consultation with its physicians, Denmark mandated use of EMRs in 2004 and provided financial incentives. (9)

The U.S. healthcare system is currently facing a variety of challenges, including the need to deliver high-quality patient care while minimizing costs. Due to reductions in patient medical errors, historically, paper-based charts have been "the gold standard" for medical records. (8)

France has developed a national insurance information system including a permanent sample of beneficiaries (SNIR-AM) to create a national picture of health care consumption and expenditures. (5)

Norway from 1960 to the present through the linkage of mortality and population records. The project has described socio-economic inequalities in mortality for children and adults by cause of death and also socio-economic inequality in life expectancy. (4)

This project links mortality data from the UK Office of National Statistics to hospital episode statistics from the NHS Information Centre for Health and Social Care in order to add a unique anonymised patient identifier to the mortality database. This variable will help to perform analysis of hospital patients who have subsequently died. (11)

In China, a number of hospitals have successfully introduced some form of electronic health record but as yet, as far as can be ascertained, none have been able to go paperless. The concept of a longitudinal electronic health record is envisaged by the Chinese Health Ministry but problems have arisen because some institutions are unable to share data due to the incompatibility of their systems. (2)

The Australian Government is funding the implementation of a national health information network, called Health Connect a proposed network aimed at improving the flow of information across the Australian health sector.

Other countries such as Singapore, Taiwan, Hong Kong and Thailand are also developing electronic health records in one form or another with successful implementation.

SmartCare is a portable, integrated EMR system that is currently used by three African countries (Zambia, Ethiopia, and South Africa) (13)

Research Hypotheses

The lack of ICT in health Information Systems in Iraq makes it difficult for most staff to do data entry or check records of the patient's medical history; therefore, they continue to use manual systems. The majority of the staff surveyed and interviewed has expressed a need for having IT for better records keeping and information management. There is a general shortage of qualified medical practitioners in Iraq. Manual systems lead to cumbersome paperwork and long delays in attending to the patients. The field of Health Informatics has become a significant field of study due to the various challenges faced by the medical field.

Electronic Medical Types (5)

Over the years a number of terms have been used to describe the move from a manual or paper record to one generated electronically in one form or another. Some of the better known terms include: Automated Health Records (AHR), Electronic Medical Record (EMR), Computer-based Patient Record (CPR), and Electronic Health Record (EHR).

• Automated Health Records (AHR)

The term Automated Health Records has been used to describe a collection of computer-stored images of traditional health record documents. Typically, these documents are

scanned into a computer and the images are stored on optical disks, Most of the focus in the early 1990's was on document scanning onto optical disks.

• Computer-based Patient Record (CPR)

In the USA the term Computer-based Patient Record (CPR) was introduced in the 1990's. This was defined as a collection of health information for one patient linked by a patient identifier. The CPR could include as little as a single episode of care for a patient or healthcare information over an extended period of time .

• Electronic Health Record (EHR)

The term Electronic Health Record is widely used in many countries with variation in definitions and the extent of coverage. In today's environment it is generally accepted as a longitudinal health record with entries by health care practitioners in multiple sites where care is provided. In the USA the current definition of an EHR is: The electronic health record includes all information contained in a traditional health record including a patient's health profile, behavioral and environmental information.

Electronic medical records (EMR)

EMR's are systems that store medical information in discrete, reportable data fields, Not just scanned documents, data have enormous promise as a source of information, however, careful consideration must be given to the source and quality of data, Many sources of missing data and measurement error due to conflicting clinical/administrative and research definitions and data needs and Misclassification may lead to bias or loss of precision with the severity of the problem depending on the objective of the study, prevalence of the outcome or exposure. [3] EMR data combining clinical and administrative data are uniquely valuable because Detailed clinical data can be used to create measures and obtain operating characteristic estimate These can then be applied in a larger population with administrative data only, Informatics and machine learning community have led the way in mining EMR databases, Important sound statistical thinking is employed when using data derived from these approaches as well as Problems similar to those encountered across studies of observational data. [15]

Major Stockholders [7]

The Major Stockholders of (HER) are Citizens ,Health care providers ,Payers, i.e., insurance companies including TPA ,Education, research institutions and investigators ,Government departments and institutions including law enforcement and courts of law ,Public health agencies and NGOs ,Pharmaceutical industry and medical device makers ,Telemedicine institutions ,Software and hardware vendors.

Minimum Dataset of Electronic Healthy Records (MDS)

The following MDS is recommended for an EMR to be used in Iraq:

UHID, alternative UHID, Patient's Name, P. date of birth, P. Age, Gender, P. Occupation, P. Address I (State, City, Town, Village), P. Address II, P. Country Code, P. Phone number, P. Email, Emergency contact patient's Name, Emergency contact patient relationship, Emergency contact patient's address, Emergency contact patient's Phone number, Care provider's Name, Care provider's address, Care provider's phone number, Insurance status, Organ Donor status, Episode Type, Episode number, Encounter date & time, Reason of visit, present History, past History, personal history, Family History, Menstrual Obstetric History, Socio Economic Status, Immunization History, Allergy Status, Allergy History, Clinical Exam. Observations, Investigation Results, Clinical Summary, Disease Type, Diagnosis Name/Code, Diagnosis Description, Treatment plan Investigation, Treatment plan Medication, Treatment plan Referral, Other Treatment plan

type, Other Treatment plan Detail , And Current Clinical Status. Inside above information we have some other information for physician like: Medication Name, Drug Code, Strength, Dose, Route, and Frequency.

The Uses of HER

All countries share common goals to improve the health of their populations and to improve quality in health care. Rising levels of chronic disease and multi-morbidity, health and health care data collections need to be organized in a systematic and efficient way, to be structured to support linkage across data sources, and to be accessible. At the same time, confidentiality of the data needs to be protected and privacy rights addressed, they should focus on encouraging departments and healthcare practitioners to move to an electronic system to:

• Improve the accuracy and quality of data recorded in a health record
• Enhance healthcare practitioner's access to a patient's healthcare information enabling it to be shared by all for the present and continuing care of that patient
• Improve the quality of care as a result of having health information immediately available at all times for patient care
• Improve the efficiency of the health record service
• Contain healthcare costs[5] [11]

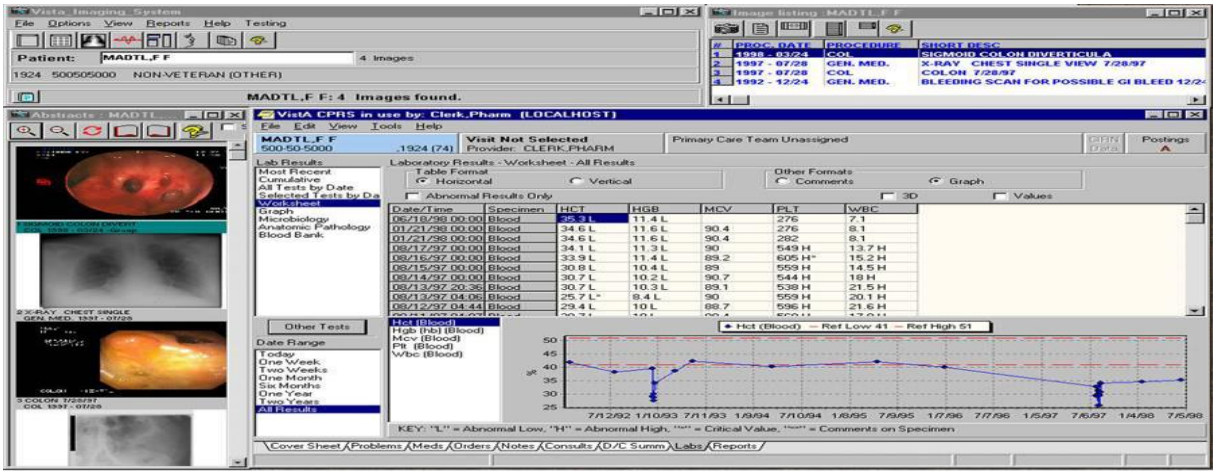


Fig. (1) represents Screenshot of Visit (EMR)

Steps of System architectures for EMR [17]

Data model

The design of the database tables and their relationships, the data is the core of any EMR system, but unfortunately its design and implementation do not always receive enough attention. Pressures to develop an EMR system quickly and according to a set of initial project requirements often contribute to this. The strength of the data model will dictate the scalability and flexibility of a system. The design of the database schem is usually driven by the functional requirements of the EMR system; if the system is primarily for reporting and health statistics; there is a tendency to represent all data items as columns, similar to a spreadsheet. This approach is suitable for simple functional systems, such as for clinical trials.

Network architectures

Local area network (LAN) systems A LAN EMR system is deployed at a single site and machines have a relatively fast connection to each other (10mb/s). these systems revolve around a database (Oracle, MySQL, MS SQL Server) deployed on a central server. Users have local client application interfaces in which they enter, query and modify data directly on the central database. Wide area network (WAN) systems These consist of a networked system that operates across multiple geographical sites. Sites could be spread across a single city, state, country or could even span multiple countries. There are many approaches to WAN EMR systems. These can be classified into three categories: a thin client approach, such as centralized web-based systems like PIH-EMR and HIV-EMR; a thick client approach.

User interfaces

A wide range of user interfaces are available to allow staff to interact with systems. The interface choice might make a significant difference to the user experience but should not tie the system to a particular data model or architecture. Ideally any interface should be usable with any data model, and most network architectures. Local Windows forms such as MS Access forms or Java forms. Generally rapid to develop and provide a very wide range of functions and flexibility. Data quality and completeness Data quality and completeness are critical to the success of any information system. It is important to design systems that are easy to use and have good instructions and training. The system should collect the minimum data necessary for the task, and data items should be structured and coded where possible to simplify data checking and optimize reuse.

Choosing appropriate system

Architecture and design The choice of system or technology to be implemented will be influenced by medical, staffing and environmental factors. Reference should be made to the design issues discussed earlier. Table 1 gives example costs for satellite internet access, and problems that can occur.

Risks associated with EMR [6]

One of the risks mentioned by participants refers to the complexity of implementing these types of systems, which are frequently underestimated by the staff of technical areas or systems management of health systems another of the risks mentioned was confidentiality. Although it was also identified as a benefit, confidentiality and violation of privacy rights of patients and their families were clearly visualized during the discussion on risks, particularly because they facilitate access to sensitive information from any location. An additional risk identified was what usually happens when trying to computerize inefficient processes, or processes which are not working properly. A further risk identified was the interference EMRs may cause during medical consultation. Although this comment was made in the context of the use of extremely lengthy lists for disease coding, the participant's comment may be used for any type of functionality in the system requiring increased attention by electronic system users.

Individuals have the legal right to access their health records except where the information may cause serious harm to the patient, or would reveal information about another person who has not consented to this disclosure. [11]

The Barriers to EMR System Adoption

The barriers to obtaining approvals were: (i) the novelty of using data from EMR for research, (ii) lack of standard procedures, (iii) bureaucracy, (iv) confidentiality, (v) technical issues and (vi) costs. (16)

To use EHR systems efficiently for clinical research, a number of features are required that unfortunately have often been lacking. In addition to structured data capture, functions are required to ensure the correctness, completeness and accuracy of the data within the EHR systems. (14)

The primary purpose of EMR systems improved healthcare will be well-served as more providers come online but it has some Significant implementation issues and challenges continue to face the widespread adoption of EMR systems and the eventual development of a comprehensive national EMR system, as well as the benefits that would derive from a national system. The challenges ahead include: (10) cost (as related to the development of a national system and to adoption by practices and health systems), security and privacy issues acceptance and training, infrastructure development and technical issues.

Issues and challenges of EHR proceeding

Accurate patient identification is the backbone of an effective and efficient health record system, whether manual or electronic. As discussed previously unique patient identification is a major issue that should be addressed before moving forward to automation. Other possible issues may include: Clinical data entry issues and lack of standard terminology, Resistance to computer technology and lack of computer literacy, Strong resistance to change by many healthcare providers, High cost of computers and computer systems and funding limitations, Concern by providers as to whether information will be available on request, Concerns raised by healthcare professionals, patients and the general community about privacy, confidentiality and the quality of electronically generated information, Quality of electronic healthcare information and accuracy of data entries, Lack of staff with adequate knowledge of disease classification systems, Manpower issues – lack of staff with adequate skills, Environmental issues – electrical wiring and supply of electricity, amount and quality of space needed for computers, etc insides Involvement of clinicians and hospital administrators. (5)

Basic' security (authentication, authorization and audit) is a fundamental requirement of each IT system. (e.g. trial protocol feasibility studies, patient recruitment and data export to registries). (14)

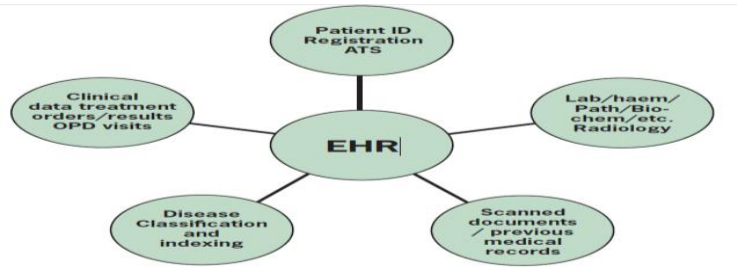


Fig. (2) represent A Simple Electronic Health Record System

Development of a Comprehensive Implementation Plan [5]

When the form of implementation has been determined, the Steering Committee and implementation team need to ensure that the institution/government are ready to move forward. The next steps would be to: Select the best system needs of the institution government, Determine that the required technological infrastructure is in place, determine what clinical data capture and data retrieval is required and what current data collection is redundant and ensure that important policies and procedures are clearly documented.

Timeline for Implementation

The timeline or project plan should be mapped out on a large board. Quite often white boards are used to enable changes to be made if or when required. Items would include a detail list of EHR project tasks with a timeframe for each task. Implementation may take days, weeks, months or even years. A realistic timeline should be prepared if possible but everyone should be prepared for changes if problems or unidentified issues arise which may cause a delay in implementation.

The plan should contain the steps previously discussed such as the:Review of current medical record system, Identification and addressing of issues and challenges to be addressed prior t implementation, Establishment of a Steering Committee, Preparation of a clearly defined statement of the type of EHR to be implemented, Identification of perceived benefits to the institution with the introduction of an EHR system, Preparation of a list of clearly stated goals and strategies for implementation, Review of current medical record policies and procedures and develop them to cover proposed changes, Appointing of an implementation co-ordinater and team, Establishment of working groups, Determine record structure and content, Determine telecommunications infrastructure required and Determine how system will be phased in addition the plan should also include (Site preparation and System testing). [5]

EHRs can support better follow-up information for patients, information for the patient can be effortlessly provided and reminder for other follow-up care can be sent easily to the patient. [7]

Functional data analysis using statistics literature[4]

The research describes opportunities and challenges of using functional data analysis (FDA) for the exploration and analysis of data originating from electronic commerce (E-Commerce). We argue that the wedding of E-Commerce with FDA leads to innovations in statistical methodology, due to the challenges and complications arise in E-Commerce data, and in online research, by being able to ask new research questions that classical statistical methods are not able to address, and also by expanding on research questions beyond the ones asked in the offline environment.

Statistical Data Analysis

This study began in March, after obtaining ethical clearance. The first step was to choose data collectors from Shar General Hospital in Sulaimaniyah Province and familiarize them with the objective and methodology of the research. Two data collectors were chosen and trained on how to collect the questionnaire and the level of support they should give to avoid bias. The questionnaires were distributed to the participants by visiting them in their offices (Physicians and Employees in Biostatistics Dept. in Shar Hospital, Farouq Hospital, Sulaymaniyah General Hospital), mostly during the afternoon. To motivate participants, to

all of the participants who fully completed the questionnaire. Data collection took place over a one-week period.

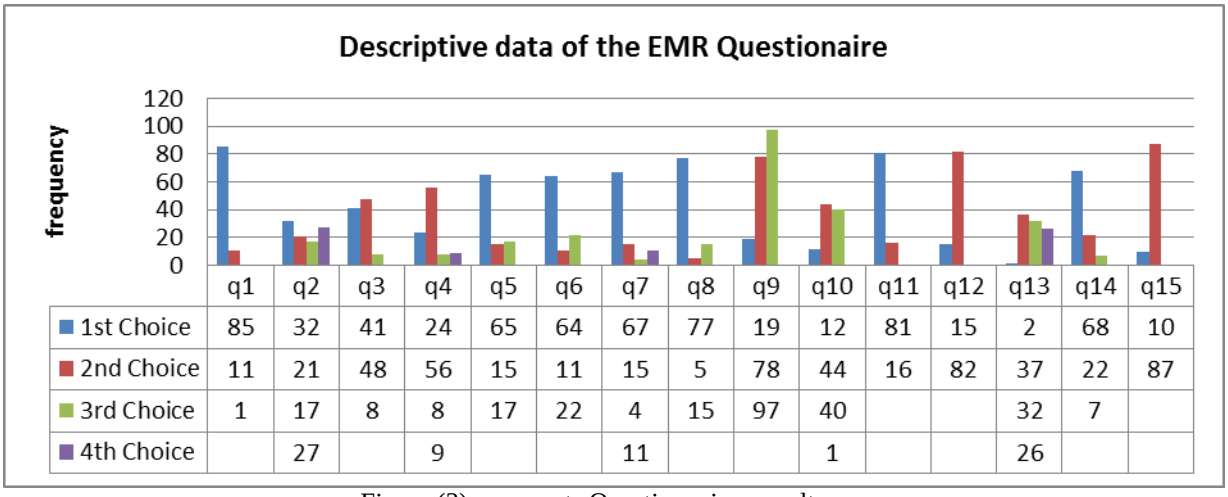
The questionnaire was conducted in a hospital that was not part of the study (sample size =97 persons, It is divided into three hospitals (Shar Hospital, 36 person), (Sulaymaniyah General Hospital, 31 person) and (Farouq Hospital, 30 person).) in which 5 physicians, 4 nurses, 2 lab/Engineers, and 7 Employees in Biostatistics Dept. staffs and 18 Employees in other Hospital Departments participated in Shar Hospital, 7 physicians, 6 nurses, 2 lab/Engineers, and 4 Employees in Biostatistics Dept. staffs and 12 Employees in other Hospital Departments participated in Sulaymaniyah General Hospital and 6 physicians, 6 nurses, 4 lab/Engineers, and 3 Employees in Biostatistics Dept. staffs and 11 Employees in other Hospital Departments participated in Farouq Hospital.

A questionnaire was developed based on standardized and previously validated instruments. had 15 questions (Variables) about general socio-demographic data, computer training, and current use of the EMR system as follow:

Q1. Do you have Internet / email access (including social networking sites like Facebook?
Yes No uncertain
Q2. Please explain why you do not use computers to do your work.
There are not enough computers do not have enough time.
I do not know how to use system aother
Q3. Please describe how to enter / store information.
The information is filled manually Manually and electronically electronically only other
Q4. What mechanisms are you currently using to complete your reports and disseminate information؟
Manual report Excel / Word programs specific program other
Q5. Do you think that tablet PCs will help you work more efficiently؟
Yes No uncertain
Q6. Do you want to be able to make online / online booking from any physical location in Iraq for patients you attend؟
Yes No uncertain
Q7. During the transfer of a patient from the hospital to another hospital, did the second government hospital have all the information about the patient? And how was it؟
The same records are manual electronic records by phone other
Q8. Many countries in the world use free and free health information system programs that can be accessed by medical practitioners (electronic medical records system) as well as patients (to view their reports and perform tests). Would you like to use this system in your city؟
Yes No uncertain
Q9. Do you have EMR programs in the hospital where you work؟
Yes No
Q10. What problems can be faced with EMR؟
Difficult to use difficult to deal with others others
Q11. Many countries have integrated the electronic medical records system, which allows the sharing of patient records among government hospital practitioners as well as private practitioners. This practice allows quick and convenient access to patient records. Do you think such an integrated system would be good in your city؟
Yes No
Q12. Are you using a nationally recognized medical card (called a national health card؟(
Yes No
Q13. How long does hospital staff take to find your information (medical records) without an electronic card؟
Less than 2 minutes between 2-10 minutes between 10-20 minutes more than 20 minutes
Q14. Would you like to make your appointments for an online scan (on the Internet or on smartphones؟
Yes No uncertain
Q15. When you are transferred from a government-owned hospital to another government hospital (such as Char-General Hospital to Sulaymaniyah General Hospital), did the second government hospital have your medical records before your visit؟
Yes No

Table (1) Questionnaire List

Descriptive statistics were performed to describe the characteristics of the participants for the quantitative description of sample data (N=97), summary measures as percentages are used to bring participants information together. Data was processed using (), which, in turn, was used to generate results and graphs as follow.



	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	q14	q15
1st Choice	85	32	41	24	65	64	67	77	19	12	81	15	2	68	10
2nd Choice	11	21	48	56	15	11	15	5	78	44	16	82	37	22	87
3rd Choice	1	17	8	8	17	22	4	15	97	40			32	7	
4th Choice		27		9			11			1			26		

Figure (3) represents Questionnaires results

In order to analyze the data and know the importance of the questionnaire questions for the target sample, we used two methods, namely the (principal component analysis) and the second method, which is (factor analysis), and they are two closely related methods using the (R i386 4.0.2) program, as in the following:

We must start with KMO and Bartlett's Tests, through which we obtain the adoption of a factor analysis method for analyzing the questionnaire data, as in the following table:

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.579
Bartlett's Test of Sphericity	Approx. Chi-Square	331.903
	Df	105
	Sig.	.000

Table (2) illustrating the KMO and Bartlett's Tests

From the above table we note Sig. = 0.000 less than (0.05), which means that the factor analysis is a suitable technique for the case study data by two statistical methods, KMO and Bartlett tests.

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
0.932	0.979	0.728	0.903	0.725	0.577	0.855	0.523	0.534	0.894	0.005	0.360	0.843	0.601	0.428

Table (3) illustrating explained variations

From above table its clear there are some questions have high commonality but the others not when the commonality was low that means the variation explained by that factor was low and verse versa.

In order to demonstrate the significant effect of the variables, the factor analysis method (the principal compounds method (PCA)) can be used and we start to obtain the total variance of the first branch of the first axis and the variance of each component of the factor

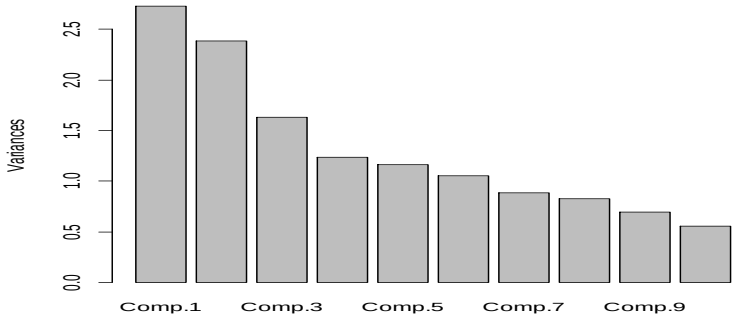
analysis. The self-vector for each component must be greater than one, as in the following table:

```
Importance of components:
                          Comp.1    Comp.2    Comp.3    Comp.4    Comp.5
Standard deviation     1.6514785 1.5445769 1.2768101 1.11081548 1.07901853
Proportion of Variance 0.1818254 0.1590479 0.1086829 0.08226074 0.07761873
Cumulative Proportion  0.1818254 0.3408733 0.4495562 0.53181694 0.60943567
                          Comp.6     Comp.7     Comp.8     Comp.9    Comp.10
Standard deviation     1.02455837 0.93967489 0.90829754 0.83467474 0.74721666
Proportion of Variance 0.06998132 0.05886593 0.05500029 0.04644546 0.03722218
Cumulative Proportion  0.67941700 0.73828292 0.79328322 0.83972868 0.87695086
                         Comp.11    Comp.12    Comp.13    Comp.14    Comp.15
Standard deviation     0.6913878 0.67362170 0.63697375 0.54001754 0.46540240
Proportion of Variance 0.0318678 0.03025108 0.02704904 0.01944126 0.01443996
Cumulative Proportion  0.9088187 0.93906974 0.96611878 0.98556004 1.00000000
```

Table (4) represents component's variance & cumulative variance

notice that the total variance of the first six components is (0.679417), that is, it explains approximately 68% of the ability to apply (EMR), while the variance of the first six components are (0.1818254), (0.1590479), (0.1086829), (0.08226074), (0.07761873) and (0.06998132), respectively.

The components that have the most effect can be shown through the Eigen values (characteristic roots) as in the following graph:



Figre (4) represent components Eigen values

Where we notice that only the first six components with their Eigen values that are greater than one of the total components, which represent the greatest weight of the disparities, but to explain which of the variables (questions) are the most significant for the questionnaire questions, we rely on the following table:

	Component					
	1	2	3	4	5	6
Q1	-.059	.059	.130	.798	-.117	.346
Q2	-.163	-.037	.102	.068	.753	-.136
Q3	-.117	-.207	.084	-.784	-.065	.334
Q4	.005	.048	.124	.021	.031	.810
Q5	-.105	.575	.309	.007	-.179	-.369
Q6	-.682	.372	-.042	.142	.180	-.005
Q7	-.081	-.026	.836	.066	-.084	.103
Q8	-.124	.724	-.201	.222	-.170	.081
Q9	.645	.176	-.393	.209	.041	-.045

Q10	.043	.114	.572	-.024	.434	.040
Q11	.119	.820	.242	.013	.001	.259
Q12	.827	-.059	.016	.016	.147	.167
Q13	.206	-.087	-.115	-.146	.651	.261
Q14	.006	.769	-.081	.068	.093	-.110
Q15	.833	.089	.011	.007	-.034	-.096

Table (5) represent rotated components matrix

Through the above table, the first component is the component most affected on (AMR) and includes the variables (questions) (sixth, ninth, twelfth and fifteenth) with a variance ratio (0.1818254) over the total variance (0.679417), which represents the largest variance compared to the other five components, the second component, it includes the variables (questions) (the fifth, eighth, eleventh and fourteenth) and comes in second rank in signifcance effect with a variance ratio (0.1590479) over the total variance, the third component it includes the variables (questions) (seventh And the tenth) and it comes in the third place in terms of effect with a variance ratio of (0.1086829) and for the fourth component the variables (questions) (the first and third) include a variance ratio of (0.08226074), the fifth component it includes the variables (questions) (the second and third A tenth) with a variance ratio of (0.07761873), and the sixth component, which includes the variables (questions) (fourth only), with a variance ratio of (0.06998132) of the total variance value, and as previously we notice that the variance ratio gradually decreases for the components.

And the program is as follows:

```
# First of all, install the foreign package
library(foreign)
#Define dataset.
dataset<-read.spss("C:\\Users\\asa\\Desktop\\health data.sav", to.data.frame=TRUE)
dataset
#Descriptive statistics.
summary(dataset)
cor(dataset)
#principal component analysis.
pcal <- princomp(dataset, scores=TRUE, cor=TRUE)
summary(pcal)
#Loadings of principal component
loadings(pcal)
#Scree plot of eigen values
plot(pcal)
screeplot(pcal, type= "line", main="scree plot")
biplot(pcal)
#Scores of the components.
pcal$scores[1:10,]
#Factorial analysis.
Factor dataset1 <- factanal(dataset, factors=6)
Factor dataset1
Factor dataset2 <- factanal(dataset, factors=6, rotation="varimax")
Factor dataset2
Factor dataset3 <- factanal(dataset, factors=6, rotation="varimax", scores= "regression" )
Factor dataset3
```

Limitations

The Research has some limitations that deserve to be described. Firstly, participation was voluntary and only members of the Shar General Hospital (physicians and Employees in Biostatistics Department) were contacted and based on survey information from a small percentage of the total physicians and Employees in Iraq. Which could have limited the diversity of opinions. Additionally, as invited participants were already members of Shar General Hospital of health information systems, many of them may have a favorable vision towards EMRs, which could bias the opinions provided in the forums and summarized in this research.

Conclusions

The results in statistical data A\analysis show that a fully integrated web based EMR system is needed to fulfill the computational and technological requirements of public hospitals in Iraq the questions data of the questionnaire were analyzed by principal components analysis (in Table (4&5)), and there were questions that have more variation than others. Organizational ICT policies and the country's legislation need to have such concerns addressed at their respective levels to support the technical measures. The case study on Shar & Sulaimani General Hospitals reveals that there are still many manual practices that is causing unnecessary delays for both patients and workers. The findings suggest that the majority of the staff at Shar, Faruk & Sulaimani General Hospitals would appreciate a complete online EMR system to handle patient records and reporting.

Shar & Sulaimani General Hospital is still operating manually that is causing unnecessary delays for patients. Most patients are served using manual records. A separate book is kept for patients who visit the hospital at nights (this includes emergencies), Most of the hospitals and health centers in Iraq as same predicaments; however it seems the non government hospital in Sulaimaniyah like Faruk Hospital, uses Med Software extensively compared to all the hospitals and health center in Sulaimaniyah Province, Most health facilities in Iraq operated manually in terms of information systems, There is a general shortage of computers in government health facilities in Iraq, Med Software was generally very few users, There are inconsistent practices in terms of information systems management across government hospitals in Iraq community.

Recommendation

This study can be extended to investigate the use of EMR systems through mobile applications in order to fully utilize the benefits of cloud computing in health sector. The use of Open Source EMR systems and prospectus for their implementation in developing nations can also be carried out. A collaborative study with Internet Service Providers in Iraq may be helpful in order to assess options for cloud infrastructure in Iraq.

Furthermore, they discussed the need of a long-term strategic plan prior to starting operative work, including a detailed analysis of the situation in organizations or units where the electronic system would be implemented, recommend Iraqi Government to introduce a comprehensive system of electronic health records in Iraq until 2025, The intention is that each patient's electronic record will include information about his/her medical history, care preferences and lifestyle.

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