

'A Web Enabled (Phi) System' A Solution For Medical Services

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Abstract:

The purpose of this project is to design and develop Person health status information database systems and hospital management software which is suitable for health institutes and hospitals in Iraq, especially for the ones that use a paper based system for storing information rather than having it stored in a more efficient and safer environment like databases or programming software. Also describes an electronic medical record (EMR).The health care is experiencing an information explosion in the form of medical knowledge is increasing virtually on a daily basis. More complex data have to be tracked for person over the course of their lives. At the same time as the quantity

and complexity of medical data are increasing, there is a greater demand for data to support activities other than direct person care. Medical record information needs every day to be accessed also for administrative, economic and legal purposes. This project was conceived to serve that purpose along with controlling and managing the Hospital's administrative data.

Key words: Person health status information database systems, hospital management software, health institutes, hospitals, Iraq.

Introduction:

Person health status information database system is new generation software which converge latest technology and administrative process to manage work process with in a hospital and organization associated. The system can be viewed at two dimensions, first: hospital management system that integrates client server application which enables multiple users to work on a server in a hospital and second: person health status information system on internet for global access. In the present era of globalization and advanced technology efficient record keeping cannot be overemphasized. Imagine the scenario when the manual processes and manual modes of instruction get replaced with electronic systems. One of such replacement can be done in the area of person health database management system. Developing the health database management system software would benefit many organizations that can have effortless access to the data securely and more easily. The medical records must have all of the patient medical history. Physicians must maintain flawless records, because this document serves a number of purposes. It serves as a communication tool. As an important source of patient information, the medical record facilitates the transfer of data to other physician involved in an ongoing treatment of patient or the transfer of patient to another physician outside the office of the attending physician. It also facilitates the

transfer of data to health care establishment or to any other organization or individual such as insurance company or employer. Well kept records usually reflect the level of care given to a patient by the physician. Therefore medical records can be used as an evaluation tool. The more complete the record, the better they will serve the physician and the patient in the event of any action. Every patient's medical record must include the following specific information. Patient's identity which includes the patient's first name, last name, sex, age, address, etc [1]. person health status information are in high demand to handle increasing population needs and also aid the practicing doctors and hospital service and support staff with timely service and precision. There are varied metrics available to assess the performance of services like hospital industry, and the successful implementation and usage of Hospital information system forms a crucial role. person health status information in the most cases developed for supposition Hospital and in some cases needs to be developed as customized software based on specific hospital requirements (user requirements) [2]. Medical institutions have felt the need for a well structured Computer-based Patient Record (CPR) for at least 20 years now. this project were conceived to serve that purpose Along with controlling and managing the Hospital's administrative data, many systems have incorporated CPR. A pilot application is being developed to serve the needs of management of Inpatient and Outpatient Medical Record, the mechanism of patients' visits and bed reservation from the GP's (General Practitioners) as well as the management of the drug store. Having these needs in my mind when I used an Client-Server application. In most developing countries, provision of basic preventive, promotive and curative services is a major concern of the Government. With growing population and advancement in the medical technology and increasing expectation of the people especially for quality curative care, it has now become imperative to provide quality health care

services through the established institutions. Software application can provide solution and services for the global health care industry. By using the cutting edge technologies, this project can be improved with efficient work flow and communication. Any time any where facilities of the internet have helped the Medical fields to integrate into a single unit. Various Hospitals across the globe can be connected together. They can share information and even services. Details of the Patients, their previous visits etc. are totally not perceptible without a computer. Relevant Information are always stored in the computer and are available instantly in front of the user. person health status information database system is a simple yet effective management structure. This system acts for the hospitals to manage the affairs of the hospital and to serves various organization by designing a person health information system in internet.

Objectives:

1. To Design and develop a personal health status information database system that serves various organization that are associated with individual.
2. To Design and develop hospital management database that represent heterogeneous data formats of medical data in an optimized storage techniques that help fast retrieval.

Components:

This project is integration various medical models that enable creating a Client /Server architecture based database with platform to access it. The major components of the system include:

- Personal Health Record
- Electronic Medical Record

- Electroinic Health Record
- Hospital Management System

i) Personal Health Record PHR

Definition

A personal health record, or PHR, is a health record where health data and information related to the care of a patient which is operated by institutions (such as hospitals) and contains data entered by clinicians or billing data to support insurance claims. The intention of a PHR is to provide a summary of an individual's medical history which is accessible online. The personal health record (PHR) is proposed as an innovative solution to the problems of fragmented communication and lack of interoperability among diverse organizations and health institution . It provides a single source (the patient's PHR) for authentication and remote access of the health information data from all organizations.

Benefits of Personal Health Record

PHRs grant patients access to a wide range of health information sources, best medical practices and health knowledge. All of an individual's medical records are stored in one place instead of paper-based files in various doctors' offices. Upon encountering a medical condition, a patient's health information is only a few clicks away. Moreover, PHRs can benefit clinicians. PHRs offer patients the opportunity to submit their data to their clinicians' EHRs. This helps clinicians make better treatment decisions by providing more continuous data PHRs have the potential to help analyze an individual's health profile and identify health threats and improvement opportunities based on an analysis of drug interaction, current best medical practices, gaps in current medical care plans, and identification of medical errors. Patient illnesses can be tracked in conjunction with healthcare

providers and early interventions can be promoted upon encountering deviation of health status. PHRs also make it easier for clinicians to care for their patients by facilitating continuous communication as opposed to episodic. Eliminating communication barriers and allowing documentation flow between patients and clinicians in a timely fashion can save time consumed by face-to-face meetings and telephone communication. Additionally, in the case of an emergency a PHR can quickly provide critical information to proper diagnosis or treatment.

Architecture of Personal Health Record

PHR architecture consists of three primary components: Data, Infrastructure and Applications.

- 1- Data refers to the information that is collected, analyzed, exchanged and stored by different information technologies. Examples include medical history, list of medical problems, medication history, etc.
- 2- Infrastructure is the computing platform which processes or exchanges healthcare data, such as software packages and websites.
- 3- Applications include the data exchange, transactional, analytical and content delivery capabilities of the system, such as, patient decision support system and disease education materials.

Since no particular architecture has been unanimously agreed upon as being the most effective, researching the benefits of various architectural models is a high priority. Regardless of the PHR paradigm, interoperability of PHRs with other entities should be the key component of PHR architecture. If PHRs serve only as a repository for an individual's health information, it is unlikely that individuals who are not highly motivated will maintain their health records and find PHRs to be useful.

Personal Health Record solution types

One of the principal distinguishing features of a PHR is the platform by which it is delivered. The types of platforms include: paper, electronic device, and web.

Paper-based PHR

Personal health information is recorded and stored in paper format. Printed laboratory reports, copies of clinic notes, and health histories created by the individual may be parts of a paper-based PHR. This method is low cost, reliable, and accessible without the need for a computer or any other hardware. Paper-based PHRs may be difficult to locate, update, and share with others. Paper-based PHRs are subject to physical loss and damage, such as can occur during a natural disaster. Paper records can also be printed from most electronic PHRs.

Electronic device-based PHR

Personal health information is recorded and stored in personal computer-based software that may have the capability to print, backup, encrypt, and import data from other sources such as a hospital laboratory. The most basic form of a PC-based PHR would be a health history created in a word-processing program. The health history created in this way can be printed, copied, and shared with anyone with a compatible word processor.

PHR software can provide more sophisticated features such as data encryption, data importation, and data sharing with health care providers. Some PHR products allow the copying of health records to a mass-storage device such as a CD-ROM, DVD, smart card, or USB flash drive. PC-based PHRs are subject to physical loss and damage of the personal computer and the data that it contains. Some other methods of device solution may entail cards with embedded chips containing health information that may or may not be linked to

a personal computer application or a web solution.

Web-based PHR solutions

Web-based PHR solutions are essentially the same as electronic device PHR solutions, however, web-based solutions have the advantage of being easily integrated with other services. For example, some solutions allow for import of medical data from external sources. allow for data to be shared with other applications or specific people. A large number of companies have emerged to provide consumers the opportunity to develop online PHRs. Some have been developed by non-profit organizations, while others have been developed by commercial ventures. These web-based applications generate records that can be displayed for review or transmitted to authorized receivers. Despite the need for PHRs and the availability of various online PHR providers, there has not been wide adoption of PHR services.

ii)Electronic Medical Record EMR

Medical records, whether electronic or not, are a collection of information about a patient's healthcare that are essential for his or her present and future care As such, the medical record must contain sufficient information to identify the patient to whom it relates, as well as information relevant to the patient's treatment during current and future episodes of care, for example:

- the patient's medical history.
- the orders and results of any physical examination or tests.
- information relating to allergies.
- other factors that may need special consideration.

Secure and guaranteed access to complete information collected in the medical record is essential to ensure that healthcare professionals have the right information available when and where they need it. This maximizes the quality and efficiency of the treatments they can provide to their patients at the point of

care. An EMR replaces paper-based medical records by electronically documenting the information relevant to a patient's healthcare. the same term is used to mean different things. For example, EMR has been used to refer to clinical information in any electronic form (such as scanned records), which simply replaces paper records. The term 'mini-EMR' has been used to describe individual hospital department systems, . A more sophisticated definition of an EMR encompasses the information and capabilities required to support Health care service delivery, where the information is captured in a computer-readable form that supports interoperability and clinical decision support. In addition, it is likely that increasing numbers of consumers will have direct access to EMR systems[3].

Benefits of Electronic Medical Record

There are many potential benefits of the EMR. Unlike the paper record:-

- 1- it can potentially be used by anyone who needs it at any time.
- 2- It can also be accessed easily from remote sites. such as a clinic across town or even across the country.
- 3- It is unlikely that data will be lost or misplaced. With an appropriate back-up mechanism,
- 4- it should serve as a permanent record of an individual's interaction with the health care system. Furthermore, with the availability of all the patient's data, new views and other summaries can be generated instantaneously.
- 5- with the potential for the incorporation of reminders and decision support, the likelihood of mistakes and omissions should decrease.
- 6- In addition to benefiting the individual patient, the EMR is also likely to benefit the larger population. Clinical research will likely be enhanced and researchers
- 7- easier access to information about patients that will increase understanding of disease and its treatment.

8- Screening and other preventive measures will become easier to implement as patients of various attributes[4].

iii)Electronic Health Record

Any service, component, or combination thereof that can meet the requirements of at least one certification criterion adopted Examples of EHR include, but are not limited to, the following :

1. An interface or other software program that provides the capability to exchange electronic health information.
2. A software program that enables individual online access to certain health information maintained by EHR technology.
3. Clinical decision support rules engine.
4. A software program used to submit public health information to public.
5. Health authorities and a quality measure reporting service or software program.

Most commercial EHRs are designed to combine data from the large ancillary services, such as pharmacy, laboratory, and radiology, with various clinical care components (such as nursing plans, medication administration records, and physician orders). The number of integrated components and features involved is dependent upon the data structures and systems implemented by the technical teams. The EHR, therefore, may import data from the ancillary systems via a custom interface or may provide interfaces that allow clinicians to access the silo systems through a portal. Or, the EHR may incorporate only a few ancillaries.

Differences between EMR and EHR

Many people use the terms Electronic medical record (EMR)

and electronic health record (EHR) interchangeably. However, these terms describe different concepts, both of which are crucial to the success of local, regional, and national goals to improve patient safety, improve the quality and efficiency of patient care and reduce healthcare delivery costs. EHR are reliant on EMR being in place, and EMR will never reach their full potential without interoperable EHR in place. It's important to understand the differences and to reduce confusion, see table 3.1.

EMR	EHR
<ul style="list-style-type: none"> • The legal record of the hospitals or health institute. • Owned by the hospitals. • These systems are installed by hospitals, clinics etc. • Does not contain other hospitals information. • May have patient access to some results info through a portal but is not interactive. 	<ul style="list-style-type: none"> • Set of each information from various hospitals or clinics. • Owned by patient or stakeholder. • These systems are managed by government or big health institute • Community, City, or regional or nationwide in the future. • Provides interactive patient access as well as the ability for the patient to append information.

Table 3.1 differences between EMR and EHR

iv)Hospital Management System

Need for Hospital Management system

Hospital Services are needed on an emergency and daily basis and Hospital information system plays a crucial role. Hospital services are customer and society sensitive and the quality of Hospital information system and service of hospital staff needs to be precise and of highest standards. Today's hi-tech Hospital services are predominantly provided by private players in the market at increased costs despite low cost competition by public sector hospitals. Hospital Management System provides the benefits of streamlined operations, enhanced administration &

control, superior patient care, strict cost control and improved profitability. Due to business and legal demands—like the Healthcare Insurance Portability and the Global norm—healthcare organizations are fully realizing the urgency to integrate their businesses. Unfortunately, most of the health information systems are still proprietary and often only serve one specific department within a healthcare system.[2].see diagrams 1.1

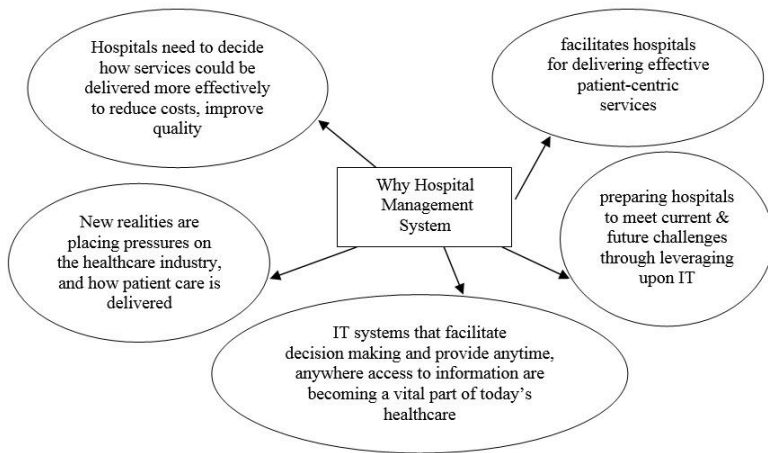


Diagram 1.1 why hospital management system

Traditional System in use:

The procedure involved in the current system is that, when a patient visit the hospital for medication, the patient will first of all buy the identification card which contains name, and other relevant information needed, and card identification number. The patient will then waits for the card to be processed together with a file jacket that holds the card that has column for diagnosis made by physician, drugs prescribed, and date at the waiting room for the arrival of the card. When the file arrived, the patient joints the queue to see a doctor. In this current system, file cabinets are used for keeping individual patient card enclosed in a file. This system is so tedious in tracing a

record files slow in processing of records, space occupied by the file time waiting while waiting for the patient file to be retrieve by the receptionist. [1].

Problems with traditional system

1. Lack of immediate retrievals: -The information is very difficult to retrieve and to find particular information like- E.g. - To find out about the patient's history, the user has to go through various registers. This results in inconvenience and wastage of time.
2. Lack of immediate information storage: - The information generated by various transactions takes time and efforts to be stored at right place.
3. Lack of prompt updating: - Various changes to information like patient details or immunization details of child are difficult to make as paper work is involved.
4. Error prone manual calculation: - Manual calculations are error prone and take a lot of time this may result in incorrect information. For example calculation of patient's bill based on various treatments.
5. Preparation of accurate and prompt reports: - This becomes a difficult task as information is difficult to collect from various registers. [11].

Proposed System:

This new system is design to keep track of all patient's medical record/information such as admission and discharged, inpatient, outpatient, drug prescribed, and captures complete relevant patient information this will improve the efficiency of the management in a daily work as it can provide required records on time.

The new system provides an effective solution to hospitals that plan to reduce the defect of administrative and

clinical transactions, and at the same time, provide better service to their consumers. [1].

Record / procedure

Patient's record and procedure vary greatly according to patient data received and the extension of automation in processing data. These are some fundamental step which is common to patient record in all clinics and hospitals, some of these steps taken at each treatment of patient and assessment in clinical procedure include:

- **Assessment:** To get the information and the assessment of patient's symptom and signs.
- **Data entry:** recording of data into a patient's record (which may be a complex electronic data written records results etc)
- **Data retrieval:** extracting data for interpretation.
- **Information interpretation:** governance of interpretation of individual patient data utilization of existing knowledge and guidelines. Therefore, when these fields are put together they produce a medical record. [1].

Advantage of the new system

1. It aids hospital administrators by significantly improving operational control and streamlining operations.
2. It enables improved response to demands of patient care because it automates the process of collecting, collating and retrieving patient information
3. It provides doctors and hospital staff with the decision support system that they require for delivering patient care, which is comparable to global standards.
4. By enabling an automated and intelligent flow of patient information, the new system enables hospitals and doctors to better serve their patients.
5. Additionally, the new system provides a host of direct

benefits such as easier patient record management, reduced paperwork, faster information flow between various departments, greater organizational flexibility, reliable and timely information, minimal inventory levels, reduced wastage, reduced waiting time at the counters for patients and reduced registration time for patients.

6. The indirect benefits would be an improved image of the hospital and increased competitive advantage. [12].

Design Issues

Database Design

The database and table are very essential of this software because the tables hold the information or records that needed to be stored in the database. Therefore, the script is written in Microsoft SQL server management studio and the tables are generated automatically as the script runs successfully.

Design Hospital Management Database

The diagram 4.1 shows Entity relationship diagram in abstract form.

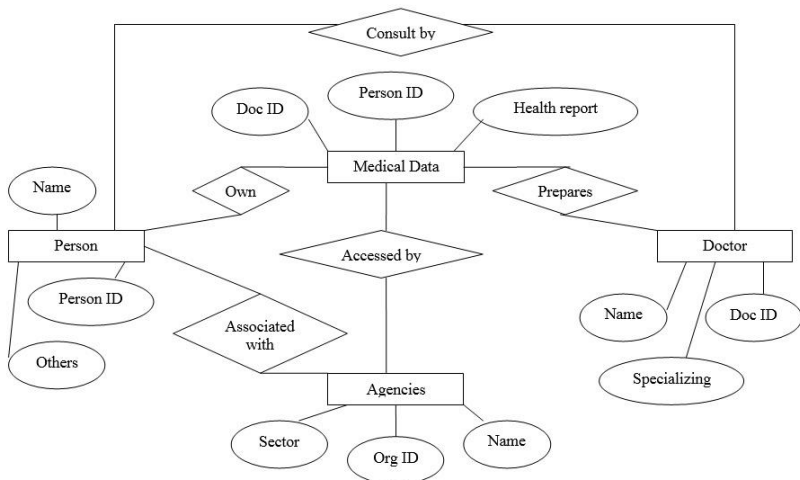


Diagram 4.1 shows Entity relationship

4.3 Design the web Personal Health Information System.

The diagram 4.2 shows the Personal Health Information System. The diagram depicts major components of the system & their integration. Common Database usage with the help of internet makes these components access relevant data with simple interfacing application utilities.

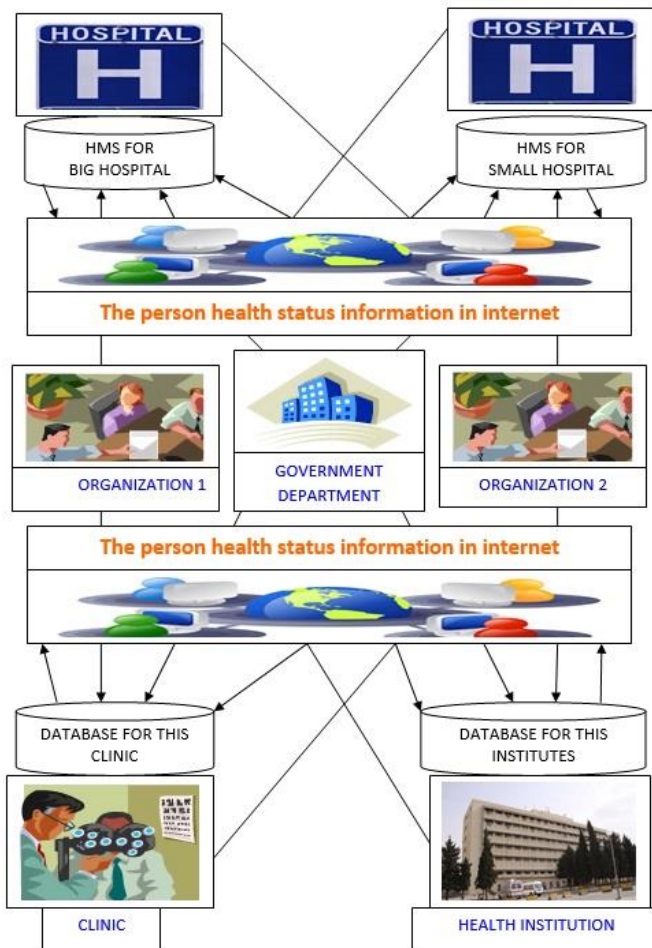


Diagram 4.2 Personal Health Information Systems.

Results:

- Through the Internet organizations or health institute or any other beneficiary can receive information on the status of the health of any person through the use of the name or identification number of each person. The project provides support for students of various medical specialties, where every researcher can choose the type of specialization and this project will provide a variety of data about this specialty (diseases, diagnosis, treatment, type of medication etc. ...)
- This project includes registration of Personal health information, storing the details into the system and also computerized billing This software has the facility to give a unique id for every patient and stores the details of every Person and the staff automatically It includes a search facility to know the current status of each room User can search availability of a doctor and the details of a patient using the id.
- This project supports the concept of an Electronic Medical Record through the interconnection between administrative and medical information for the patient, put medical results for patient such as Operation, treatment, Prescription medicine with administrative information about same patient.
- The System can be entered using a username and password It is accessible by an administrator or doctor or receptionist Only they can add data into the database The data can be retrieved easily.
- The interface is very user-friendly The data are well protected for personal use and makes the data processing very fast The Graphical user interface is designed to be as friendly as possible, making it clear to the user what steps he must perform in order to correctly use the system Each

user is unique by his password and username.

- The project is improving health system efficiency and reduces waiting times. The doctor and other health providers will be able to make the best treatment decisions and provide patient with the best care when they can see all the information about the Personal health .The health providers will be able to function as a coordinated 'team', bringing a more collaborative approach to patient care The Person likely not needs to have tests repeated or procedures delayed until background information can be collected.
- It is a faster and more secure, private way of sharing patient's personal health information among the health providers that need it. This project reduces distance as a barrier to quality care by removing the need to move physical files because they will be available electronically.

Conclusion:

The project support a personal health record, or PHR, where health data and information related to the care of a person which is operated by institutions (such as hospitals) contains data entered by clinicians and design the web for this personal health information. it is for computerizing the working in a hospital. The project also describes the concept of an Electronic Medical Record. The software takes care of all the requirements of a hospital and is capable to provide easy and effective storage of information related to patients that come up to the hospital. It has flexible report generating mechanism for preparing reports of various treatments, equipment details, and medicines prescribed to patient.. It can be used in any Hospital, Clinic or Dispensary to storage patient details and their treatment results. The system provides the facility of backup as per the requirement.

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