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Managing with intelligent Dashboards; A case study of EMR using Open Source tools

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Managing with intelligent Dashboards; A case study of EMR using Open Source tools

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Dedication

Every challenging work needs self-effort and guidance from elders, especially those very close to our hearts. I dedicate my humble effort to my parents, whose affection, love, encouragement, and endless support make me able to get such success and honor

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Abstract

The study aimed to find solution of some of the problems facing the electronic medical record system (EMR) management in Palestinian hospitals, and to achieve this, questionnaires were distributed to the employees of Al- Ahly Hospital and Hebron Governmental Hospital, and the questionnaires were supported by conducting interviews with employees of the computer department in the mentioned hospitals, in addition to Al-Yamamah Hospital in Bethlehem In order to achieve the objectives of the study, the descriptive approach was used in both its quantitative and qualitative branches, the study found that the electronic medical record system (EMR) faces many problems, such as the lack of response of the human staff, in addition to the lack of training on the system, and the unwillingness of the old and large medical staff to age to use it. Like any electronic system, it needs continuous maintenance and continuous support, and this requires huge financial costs.

Among the most important problems facing doctors and hospital management is that they found a weakness in the flexibility of the medical records system used with the large number of patients that the hospital takes care of and serves in its large departments, and the provision of tremendous services in terms of medicines, treatments, examinations, pictures and operations, there was difficulty in not keeping track of the course of events and details of information about patients by management as well as doctors. An open source Dashboard was proposed to be support EMR to help easing such problem, helping hospital administration keep track of work, helping solve some problem that faced doctors like data exchange.

الملخص

هدفت الدراسة إلى معرفة حلول بعض المشاكل التي تواجه إدارة نظام السجلات الطبية الإلكتروني (EMR) في المشافي الفلسطينية، ولتحقيق هدف الدراسة تم توزيع استبانات على موظفي مشفى الاهلي، ومشفى الخليل الحكومي وتم تدعيم الاستبانات بعمل مقابلات مع موظفي قسم الحاسوب في المشافي المذكورة بالإضافة الى مشفى اليمامة في بيت لحم، تم استخدام المنهج الوصفي بفرعيه الكمي والنوعي، وتوصلت الدراسة إلى أن نظام السجلات الطبية الإلكتروني (EMR) يواجه العديد من المشاكل، مثل عدم استجابة الكادر البشري، بالإضافة إلى قلة التدريب على النظام، وعدم رغبة الكادر الطبي القديم والكبير في العمر في استخدامه. ومثل أي نظام إلكتروني فهو يحتاج إلى صيانة مستمرة ودعم مستمر، وهذا يحتاج إلى تكاليف مالية باهظة .

ومن أهم المشاكل التي تواجه أطباء وإدارة المشفى أنهم وجدوا ضعف في مرونة نظام السجلات الطبية المستخدم مع كثرة المرضى الذين يعتني بهم المستشفى ويخدمهم بأقسامه الكبيرة، وتقديم الخدمات الهائلة من حيث الأدوية والعلاجات والفحوصات والصور والعمليات، كانت هناك صعوبة في عدم تتبع مجريات الامور وتفاصيل المعلومات عن المرضى من قبل الادارة وكذلك الاطباء. نظام لوحة المعلومات الذكية (الداشبورد) كان هو النظام المقترح لشبكه مع النظام المفتوح المصدر (openEMR)لحل بعض المشاكل الادارية التي تواجه إدارة المشفى والاطباء، مثل جمع التقارير بسهولة، وتسهيل

Chapter I

1.1 INTRODUCTION

In the age of evolution that is based on knowledge and information which is changing dramatically in a blink of an eye, and rapidly spreading all over its sources, especially the internet, the learning process became a necessity for the survival of institutions and organizations. It is the strongest organization that keeps pace with the knowledge and the needs of the customer. One of the strengths that an organization can have is the presence of highly capable, experienced, and educated individuals to compete in the market.

The best learning is group learning for the organization as a whole and not just at the individual level. Where organizations and institutions are now facing many terms that are changing rapidly due to the emergence of the industrial revolution, they are forced to hire individuals who are familiar with these terms to be able to keep up with the changing environments and competition in the market (Burma, 2015).

The process of obtaining the correct information from all sources at the right time is not easy, it was necessary to use tools that help in the process of collecting information from its places such as the tools used in the Extract, Transform, Load(ETL) process, which is defined as a process in which data is extracted from different sources then transferred, then it is placed in the data warehouse (Ramesh Sharda, Dursun Delen, 2013).

The data is extracted from the data warehouse by a search engine (engine query), which is developed using unique algorithms that extract the desired such as the JTSA algorithm (Dagliati et al., 2018).

For the organization to be efficient and effective in using such tools, and developing such software and algorithms, it is necessary to have a knowledgeable organization, all of its members are trained and can deal with such technological tools easily and quickly to reach both high performance

and quality and achieve compatibility between workers and the desire to work and reduce the turnover of workers (Burma, 2015).

Learning at the individual level is not feasible; it must be within all members of the organization so that all of them can accept the change and achieve affection and cooperation among themselves, there will be leaders to take risks, experiment, and decentralize decision-making. There will also be a shared vision and methodological thinking led by a knowledgeable team (Burma, 2015).

Here an organization can prove itself in the market and compete strongly with a solid vision and goals and with individuals who have the competitiveness, continuity, and survival of belonging to an educated organization, which is defined as a type of organization that renews itself by learning (Burma, 2015).

In a learning organization managers need to make an immediate and quick decisions from a huge amount of information. They need a system that helps them in the decision-making process. The so- called Decision Support Systems (DSS) help managers in the process of making the right decision by collecting and analyzing information and then displaying it on an interactive screen to assist in making the most appropriate decision, different types and forms of decisions support systems, different needs, and multiple areas have emerged, including the Dashboard (Dagliati et al., 2018; Noraziani et al., 2013).

The Dashboard defined as "a visual display of the most important information required to achieve one or more goals, which is combined and arranged on a screen. One can even observe the information in a jiffy." (Ramesh Sharda, Dursun Delen, 2013).

The Dashboard tools has many features like, Flexibility, dill-down feature, data filtering capabilities, etc. These feature are shown the following Table (1.1)

Table (1.1): BI Dashboard Features

Feature	Explanation of the feature
Presentation Flexibility	Easy to navigate information
Drill-Down Feature	The feature of having an arrow that enables you to go up and down on the page easily
Data filtering capabilities	Search and filter feature (search by a specific thing, for example: gender)
Timely data	Get the data at the required time
Accessibility Integration	Obtaining all patient information, medication, pharmacy, etc.
Data visualization	Throw drawings and diagrams.
Customization	You can customize a page for a specific thing.
One integrated screen	View all required information and reports on one screen.

(Ramesh Sharda, Dursun Delen, 2013)

Companies that created the idea of visualizing information, intelligence, and visual analysis, such as the American company (SAS), helped to spread the Dashboard faster, because of its close association with the presentation of data visually. What distinguishes it is mainly the presentation of information using drawings and diagrams in an interactive way which enables one to display all the required information and interact with it simply without dispersing it in an orderly manner on the screen (Ramesh Sharda, Dursun Delen, 2013).

Dashboard is characterized by its use of symbols, signs, and colors that facilitate the presentation of information in an exciting and fast manner, for example, red color may indicate danger while green color indicates stability in the patient's condition (Dagliati et al., 2018).

The advent of the internet in 2000 as a means of visualizing information helped to spread the means of visualizing information, in which the Dashboard is considered the most important.

Its presentation of data is distinguished by (1. Clarity, 2. Brevity, 3. Completeness, 4. Correctness), providing transparency to the user. It requires only minimal training and is easy to use. Add to this the ability to navigate to the underlying data sources to provide a realistic view promptly (Ramesh Sharda, Dursun Delen, 2013).

Consequently, organizations have resorted to the use of electronic and computerized means in light of this huge amount of information and decisions and have reduced the use of paper-based means and systems without disposing of them (Noraziani et al., 2013).

Hospitals are examples of institutions that have replaced paper systems with Electronic, replacing paper medical records system with electronic medical records system (EMR). Where "EMR" is the hospital's legal record and the source of e-health records data (Dagliati et al., 2018; Noraziani et al., 2013; Wang et al., 2020) where it represents the ability to easily exchange medical information between stakeholders (Noraziani et al., 2013).

A good hospital employs electronic records systems in its work because they provide accuracy, and less time and effort in diagnosis and treatment so that you can make the decision in diagnostic or therapeutic processes faster than the paper system, and thus improve the health care process (Breton et al., 2021; Brundin- Mather et al., 2018).

The Department of Quality of Governmental Services in Palestine showed that the medical records were linked electronically to the HIS system (Ibn Sina computerized program). The system helped to link hospitals and some health directorates to know the patient's medical history. It showed the

importance of the system by saving time and effort, and explained that this system was not applied in all hospitals and all health directorates in Palestine due to poor infrastructure and high cost.

But there is a large flow of information on the electronic medical records system because of the large number of patients, who come to hospitals, as indicated in the report of the evaluation of government hospitals for the year 2018 in Palestine, which was published on the Ministry's website, and it may be difficult to make a decision administratively without the presence of an auxiliary means that displays the most important information needed by the decision-maker in time, here lies the importance of this research.

1.2 Problem Statement

There are some problems in managing the electronic medical records system in Palestine, such as a weakness in the infrastructure, in addition to the weakness of determining the appropriate department to transfer the patient for treatment with poor diagnosis and drug identification, lack of equipment, high cost As the Palestinian Center for Strategic Studies and Policy Research indicated to Science 2020: "The global and local emergency has raised the level of immediate spending on the health system and its precautionary and curative measures taken to confront the Coronavirus.

To solve the problem of poor oversight, there must be a system in Palestinian hospitals that enables the administration to follow up on patients in terms of their illnesses, their treatment procedures, and the procedures for entry and exit of the patient from the hospital.

1.3 Research Questions

- What are the problems that could be encountered in managing EMR?
- What are the potentials of Dashboards use in EMR?

- How could a model be developed to integrate intelligent Dashboard into EMR?

1.4 Research Objectives

- Identify problems in managing EMR.

- Explore Dashboards potential in EMR.

- Develop prototyping to integrate intelligent Dashboard into EMR, using open source tools

1.5 Relevance and Importance of the Research

Solving the problem of the difficulty of following up the management of patients entering and leaving the hospital, receiving treatment and leaving or to sleep, while following up on their health conditions, diseases, medicines, treatments, and examinations, as well as following up the hospital departments such as the pharmacy and the laboratory, by providing a Dashboard system that enables the administration to follow all the mentioned matters without stress button.

Chapter II

Literature review

2.1 introduction

In this chapter, there has reviewed previous studies, scientific papers, letters, and references that cover our research.

Some studies have shown the role of electronic health records in improving health care (e.g., diabetes and liver disease) (Wang et al., 2003).The proportions and statistics show the extent to which electronic health records play in accelerating and increasing the number of recoveries and reducing the effort on both the healthcare provider and the patient, regulating and saving time by facilitating the access of the authorized person to the data (Wang et al., 2020); facilitating the exchange of information between the patient and the care provider, in addition to the role they play in improving clinical situations by discovering the appropriate medicine for the patient as a result of improved diagnosis, the organization of periodical visits and reviews, and contributing to reducing the high costs that are spent by the patient on doses of drugs, which are often only to ensure their efficiency without a guarantee of its effectiveness in achieving recovery (Wang et al., 2003).The EMR has also played a major role in improving health care in developing countries and regions, through a system provided by developed countries in support of poor countries (Wang et al., 2003). However, this does not eliminate the presence of some problems and threats that threaten the use of electronic health records (for example the problem of patient information security, sometimes the cost) (Ngui et al., n.d.; Z. Wang et al., 2020; Zhang et al., 2020) and some of the papers showed ways of overcoming these problems using data synchronization.

Some studies have also shown the importance of a Dashboard in making it easier to present data in a visual, simple, and interactive way so that the

manager can easily make decisions in a timely manner (Llacuna, 2020). They have pointed to the crucial role of a Dashboard in collecting and analyzing the huge amount of data from a data warehouse to access it when needed (Breton et al., 2021).

Some papers and books have mentioned good Dashboard specifications (such as those that take into account the suitability of diagrams and drawings with the information presented, and that do not take into account the undistracted color proportionality) (Few, 2009; Stirrup, 2023). Some have addressed common errors in designing a Dashboard, such as having a lot of information on the screen that does not make you focus on what is required (Ngui et al., n.d.; Z. Wang et al., 2020).

Studies have shown how the concepts of visualization of information, visual intelligence, and visual analysis play a role in the spread of Dashboards, what the components of the Dashboard, what information they provide for data mining, what tools and algorithms you use to analyze data, and then show them through signals, images, and graphics to help managers make decisions and overcome the problem of decision making in an age of knowledge, massive information and changing environments (Dagliati et al., 2018; Llacuna, 2020), studies have come into play in overcoming decentralization in decision-making, and they've played a big role in decentralizing decision-making using the Dashboard and the great role to use some Dashboards of the blockchain to apply a system of EMR (Llacuna, 2020) .

Patients and the hospital were entrusted with the provision of an agreement for exorbitant costs that are not needed (Dagliati et al., 2018).

The dashboard was to apply a system to some treatments and medications, organize visits and follow up the diagnosis of treatments and cases, and its role in increasing the number of patients on the same day, lessening the effort

on the patient and monitoring patient condition better through medical signs (Dong et al., 2020).

The condition is displayed on a visual screen in front of the patient and the doctor. This helps activate the best decision and the most appropriate treatment after extracting all necessary information about the patient's condition from the EMR system (Dagliati et al., 2018).

Previous studies have shown that all of this can only be done within an educated organization. Other studies have pointed out what an educational organization and the need to be in an age of knowledge and permanent competition in rapidly changing environments (Burma, 2015).

This studies have made it clear that it is necessary to have educated individuals who can accept and keep up with change so that they can compete in the market effectively and be able to achieve cooperation and job satisfaction of employees to reduce staff turnover and empower them (Llacuna, 2020).

1. This is the case of institutions in our country, Palestine, as indicated by the studies carried out to study the status and level of education and education among Palestinian institutions, especially non- governmental ones, as (Abu Shanab, 2017) indicated that there is a role for information technology in making Palestinian institutions educated organizations, but there is a relative weakness that recommended its improvement and strengthening.

2. The study by Abu Al-Kass, (2019), applied to the Palestinian Red Crescent Society, indicated that this organization affiliated with the medical sector in Gaza is a well-educated organization and that its members have the awareness to work in a cooperative and humane manner. But the study found that the organization needs more collective

learning and education to achieve decentralization and the development of its services in the Strip and the West Bank.

3. An overview and Electronic Medical Record Implementation in Health Care System: lesson to learn (2013)

This study was approved for its scientific purpose to be compatible with the purpose of the research are doing.

In the first place, it compared paper and electronic records systemsby adopting the research method and conducting studies in Malaysian hospitals, and this in turn helped us reveal the advantages of the electronic system compared to its paper counterpart and the importance of its application in hospitals, such as: reducing medical errors resulting from the pharmacist's understanding of the doctor's handwriting and thus dispensing the inappropriate medication, in addition to reviewing previous studies related to the subject of the study to benefit from them. The result of all this knowledge is that the use of medical records improves the provision of health services.

4. A cost-benefit analysis of electronic medical records in primary Care (2003)

In this scientific paper, the approved research method was a comparison strategy with paper records to study the financial feasibility of using electronic medical records, and this study was taken advantage of that if the electronic medical records system is applied in the hospital, this is due to achieving profit and abundant financial return in the long term when the regulation of use by hospital departments is controlled and the indiscriminate use of rays and other departments is abolished, thus reducing spending on medicines and x-rays and the consequent costs. This reinforces the positive aspects that prompt us to clarify the importance and role of implementing this system in hospitals in Palestine.

5. New Management Approaches in Business learning Organization concept (2015)

The need for educational organizations in the present era is due to the changing environments and the changing markets.

Organizations need to keep abreast of this change to ensure survival in the market and obtain a competitive advantage. An area that does not renew itself through innovation and learning cannot survive in volatile markets. It has become necessary for every institution to educate its members, not only at the individual level but also at the group level, so that it would achieve collective intelligence and innovation through dialog and discussion among members of its groups, which enhances its ability to compete in the market and easily achieve its goals. The better and closer the institution performs to meeting the needs of the market, the more it can survive. Organizations must educate their members about this. This paper concludes that knowledge is the most important asset of the institutions that affect their success. The educational organization regenerates itself through learning and knowledge.

This is what prompted us to go in the path of this approach and urge the use of the concept of modern management to manage our organizations, and singled out hospitals and medical centers in our research.

6. The role of the electronic Medical record (EMR) in care delivery development in developing countries: a systematic review.

This study illustrates the role electronic medical record systems (EMR) have played in developing countries. It has strengthened their healthcare delivery, increased the number of recoveries, improved health, and service delivery, and facilitated decision- making processes.

EMR is provided by developed countries to these developing countries and some of the benefits offered by the EMR are:

1- clear medical prescriptions and pursuits.

2- immediately available charts.

3- lists of micro drugs.

7. Using a Diabetes Electronic Medical Record (EMR.) Dashboard to Improve Diabetes Care (2017)

The purpose of this study was to overcome diabetes by developing a CAD board the result is improved primary diabetes care, as well as overcoming the challenges of diabetes by involving patients in the system, organizing their medicines, supplements, visits, and regularly monitoring their health condition.

This would enhance the clarification of the role and importance of the Dashboard in helping the electronic medical records system to reduce time and obtain the correct information at the right time, and this is what prompts us to use this tool in our research.

8. Utilization of An Electronic Medical Record (EMR) Integrated Dashboard Improves the Identification and Treatment and Iron Deficiency in Pediatric Inflammatory Bowel Disease (2020)

This study used the Dashboard for electronic medical records for patients suffering from bowel disease due to iron deficiency and anemia, especially children, as doctors could not properly diagnose   and treat children. So, the solution was putting a specialized Dashboard team, as well as increasing the treatment rates from 38.2% to 49.9% ID, i.e. improving the blood test rates. Electronic medical records and the prevalence of anemia have decreased, thus is further the number of patients and concluded that it has improved the use of mechanical technology to help doctors provide better, evidence-based care for children.

9. Ensuring electronic medical record simulation thorny better training modeling and evaluation. (2020)

The objective of this study was to solve the problem of the security of patient data when using EMR. The study led to the solution by simulating electronic medical records through a specialized team collaborating in training, modeling, and evaluation.

It concluded by establishing a system that perfectly simulates the system of medical records, which preserves the privacy of patient information and protects their exposure to theft or hacking, the system is called GAN.

GAN is a system through which patient data is protected by taking the patient's number, as when the patient enters the hospital, a number is recorded for him and the patient who obtained numbers less than 5 and more than 100 is excluded, and the number is entered into an algorithm that adds random numbers to give a new number for the patient, thus protecting the main patient number and thus his information.

10. Secondary EMR data for quality improvement and research:

A comparison of manual and electronic data collection from an integrated critical care electronic medical record system.

The purpose of the study was to improve the quality of research and to improve care by measuring the quality of data extracted from the electronic system of the clinical information system. The study was conducted by comparing the collection of manual and electronic data from critical care records. The study concluded that the electronic system works to improve quality and research more than the manual system.

11. The people smart city Dashboard [PscD] delivering on community – Led governance with blockchain [2020].

This paper reviewed the study of the state of smart cities and the government's control over decision-making and control of aspects of life such as political life and air pollution and energy. It used the information board [Mayor] to present performance using effects, as the Dashboard enables visual display through plans and other means of using effects (a

quantitative method) to display the performance of the state. It clarified that the population is not satisfied with most decisions and performance, and concluded any use of the blockchain technique as a means to enable the distribution of participation in a decentralized way through the series of linked blocks so it is difficult to identify the people in it.

12. Analysis of hospitalized covid-19 patients in the Mount Sinai health system using electronic medial (EMR) reveals important prognostic factors for improved clinical outcomes. [2020]

The importance of this study lies in the identification of signs of the disease Covid-19 Certainly, but also the signs of serious injury and death. Using the clinical study, extracted the data from the EMR system and then came up with a determination of race's role in the disease, and it turns out that there are areas with higher incidence. Hispanic (29%) and African American (25%) had the same type of injury, but there was no difference in mortality rates. Risk factors for death were observed: (Age, oxygen saturation, asthma, and heart rate) extracting results from the EMR has helped to apply the clinical study faster and more accurately identifying the signs of serious infection and the most prevalent ethnic areas of infection applied in the study.

13. A Dashboard-based system for supporting diabetes care (2018)

Objective: describe the development, as part of the European Union MOSAIC (Models and Simulation Techniques for Discovering Diabetes Influence Factors) project, of a Dashboard-based system for the management of type 2 diabetes and assess its impact on clinical practice.

Conclusion: the decision support tools based on the integration of multiple source data and visual and predictive analytics to improve the management of a chronic disease such as type 2 diabetes by enacting a successful implementation of the learning health care system cycle.

This system is very similar to the system that proposed, which is a system that collects hospital information (disease and treatment, images that were used in diagnosing disease, medicines, examinations), and displays the necessary ones when needed, and when there is a new disease similar to the diseases stored in the warehouse of hospitals system it helps in detecting it very quickly to give a suitable treatment.

Business Intelligence and Analytics: Systems for Decision Support Global Edition (10th Edition) ch4: Business Reporting Visual Analytics, and Business Performance Management.

14. Information Dashboard Design: The Effective Visual Communication of Data (2006).

15.Electronic Medical Records vs. Electronic Health Records:

Yes, there is a difference (2006). Although some believe that EMR and EHR are a package deal, there is a difference between them. This paper explains the difference between them. The main difference between EHR and EMR is that EHR can be accessed by the patient, its information can be modified, and data can be added by the patient, unlike the EMR.

14. The Impact of Electronic Record Application on Registration and Admission Office Performance in Jordanian Private Universities.

This study showed the importance of electronic records in accelerating the registration process for university students and serving them faster and more accurately.

Electronic medical records play the same role in serving patients.

2.2 Key Debates and Controversies

(Burma, 2015; Dagliati et al., 2018) showed that the system based on centralized decision-making makes employees less satisfied and less innovative due to a lack of opportunities to brainstorm and create good ideas.(Burma, 2015) showed that the solution to this problem is by creating educated organizations whose members can cooperate and accept

the idea of change and create pioneering ideas in a way that leads to achieving the goals of the institution efficiently and effectively and thus achieving competitive advantage in the market. (Dagliati et al., 2018)showed that the solution to this problem is to involve decision-making and not be limited to the managers only, using blockchain technology. The residents of smart cities objected to political decisions related to their cities and their participation in creating new lives through blockchain technology. believed that it is necessary to apply both solutions in innovative institutions capable of staying in the market and effectively achieving their strategic goals.

The hospital needs cooperative individuals who are able to take decisions according to their status and role, and a trust that reinforces their love of work, passion to give, and service the patient and the hospital with ideas and capabilities that improve the health care and system. Just as the hospital's responsibility is to provide and provide care and treatment for the patient, it is its responsibility to provide security for the patient's data and preserve his privacy, so it is necessary to use blockchain (Zhang et al., 2020).

To ensure the security and privacy of information, with this technology, data is transmitted through continuous chains of blocks without disclosing the identity of the patient or employee, without the need for intermediate intervention, and in a decentralized manner (Zhang et al., 2020). The hospital may use an electronic medical record simulation system to protect the exposure of patients' information from the risk of hackers and the theft of their data (Zhang et al., 2020). As (Noraziani et al., 2013)mentioned the problems the hospital faces are not only securing the protection of data extracted from the EMR system, but there are other problems and shortcomings faced by the EMR system that pose a danger in using this system and generate some fears of its use, including:

1. High-Reliability Cost: The cost of building and maintenance, and the need for technical information requests, make the institution sacrifice the security measures necessary to protect information (Wang et al., 2003) . Since the cost of establishing an information system is very high, which necessitates sacrificing some of the security aspects for them, especially if citizens refrain from paying taxes, the resources spent on establishing the system will be reduced, although the implementation of this system brings financial benefits for them after a while compared to paper systems.

2. "Interoperability Restrictions: Data exchange between providers using different HIT systems is very limited without the technical specifications that allow interoperability (Noraziani et al., 2013)."

3. Leads to a medical error: Relying on electronic medical records alone in health care often leads to a medical error (Noraziani et al., 2013).

4. Requires comprehensive personnel training: Implementing electronic medical records requires comprehensive training of all hospital staff, including planning and coordination (Noraziani et al., 2013).

5. Vulnerable to threats: Widespread use of IT makes them vulnerable to threats (Noraziani et al., 2013).

Among the threats they pose are (Noraziani et al., 2013).**:**

1. The relationship between the caregiver and the patient is at risk: Using the EMR system reduces social contact and human touch between the patient and the healthcare provider.

2. Patient Perception of Privacy.

3. Potential system failure .

As there are threats and deficiencies in the use of this system, using it has many positive effects for both the patient and the hospital (Noraziani et al., 2013).

1. Reduces the Possibility of lost records.

2. Improve quality and originality of documentation: Sometimes a doctor's handwriting line is irreversible and this leads to mistakes. One of the reasons for improving the standard of health service offered in developing countries according to the study by (Ms et al., 2008) was that the EMR system built for poor developing countries by developed countries enabled clear prescriptions to be provided.

3. Improve Service Provided: This is confirmed by (Breton et al., 2021), as the electronic medical record system has enhanced the health service for citizens in developing regions by saving time and strengthening the service by providing accurate lists of medicines and other services. The Ministry of Health has also provided the necessary services to citizens in developing regions.

4. Accessibility to the Information: Enable access to information at any time and provide healthcare providers with information during the care process to improve patient care. The study (Ngui et al., n.d.) of diabetes patients confirmed this, as care providers can access renewable information at any time, and patients themselves can participate in the system, monitor their health conditions and organize their medicines.

5. Improve Communication between providers: It is also known that the patient is not treated by a single doctor, but through a comprehensive treatment process in which several doctors, nurses, and specialists participate. The EMR system provides multiple access to information and documentation by all of these people, and by every authorized person from the hospital departments; gives a comprehensive picture of the patient's condition and saves more time to treat him. Studies (Breton et al., 2021; Ngui et al., n.d.; Wang et al., 2020) and (Dagliati et al., 2018) have shown this.

6. Restraint Medical Errors (If Linkage System Available): System errors can be restricted, especially if they are linked to the decision support system. Prior to the diagnosis of treatment and medication, the doctor can review the associated health databases and thus produce a better diagnosis, as well as reduce the probability of diagnosing an inappropriate drug. (Garets & Mike, 2006) detailed this by building the MOSAIC system, a system that connects the EMR system to a Dashboard that displays results on the screen interactively (GUI). The EMR system stores its results (Administrative Data, T2DM dedicated EHR) in the data warehouse (DW), using search engines that employ search algorithms and data mining technology (Algorithms, Temporal Abstractions). The appropriate data is extracted from the format of the data that is interacted on the screen (Garets & Mike, 2006).

The system includes the appropriate instructions to follow up on citizens' public health, as well as data to follow up on cases of diabetes patients in the hospital or the center, from the dates of visits, medicines, the type of disease, complications, as well as similar cases, treatments, and medicines that were prescribed for them, so that doctors can help diagnose the treatment and provide the appropriate medicine (Ramesh Sharda, Dursun Delen, 2013).

This is consistent with our research objective, which is to administratively restrict the errors of the electronic medical records system by employing a decision support system (Ramesh Sharda, Dursun Delen, 2013).

By (Ms et al., 2008)confirmed the role of the Dashboard in terms of updating the data for the first time, as well as updating the data on an ongoing basis, determining the suitability of everyone to use, the measures used and the variables of the presentation process.

These feature are shown the following Table2.1

Table (2.1): Main characteristics of performance Dashboard [Source: (Soest, 2013) adapted from (W. W. Eckerson, 2011)]

	Operational	Tactical	Strategic
Purpose	**Control operations**	**Optimize processes**	**Manage strategy**
Scope	**Operational**	**Departmental**	**Enterprise**
Users	**Staff +**	**Managers +**	**Executives +**
Primary activity	**Act**	**Analyze**	**Review**
Focus	**Current**	**Past**	**Future**
Data refresh	**Daily/Intraday**	**Daily/Weekly**	**Monthly/Quarterly**
Information	**Detailed**	**Detailed/Summary**	**Summary**
Architecture	**Core systems**	**Data warehouse**	**Excel or data mart**
Metrics	**Drivers**	**Drivers/Outcomes**	**Outcomes**
" Looks like a … "	**Dashboard**	**Metrics Portal**	**Scorecard**

7**.** Improvement in Data Storage: Data is stored in a small space, and the stronger record is the one whose storage space is smaller in memory. This improved the process of storing data instead of keeping it on paper in safes, and the amount of these papers is increasing almost daily at a tremendous rate, and this may require wasting a lot of money.

Table (2.2): Comparing previous studies

Previous study	the summery	Compare with other studies, Advantages & Comment Standards (Easy access to information, security, and accuracy)
A Visual Dashboard to Monitor Restraint Use in Hospitalized Psychiatry Patients (2021)	Displays the importance of the Dashboard in displaying accurate data and accessing It in real time, appropriate and effectively, using measures that enable the presentation of data in a summary and detailed form.	Emphasizing the importance of integratingthe Dashboard with the electronic medical records system, as it enhances access to patient information in real time and in an accurate form, thus avoiding the possibility of wrong diagnosis or delay in treatment.
An assessment of data quality in a multi-site electronic	Electronic medical record systems can achieve quality on tuberculosis patient data,	Emphasis on the call to use the smart Dashboard in electronic medical records

medical record system in Haiti (2016)	but it shows that it will work better if an interactive smart Dashboard that displays data in a stimulating Systematic and detailed manner is better used	systems. This would be very impressive if it was implemented in our hospitals (the Dashboard application along with the electronic medical records system in hospitals that use the electronic medical records system), due to the large number of patients in hospitals, which facilitates access to the necessary information in Actual time and no delay in providing treatment or providing the wrong treatment, and will contribute to improving clinical studies effectively.
Piloting electronic medical record–based early detection of inpatient deterioration in community hospitals (2016)	It showed the role of the electronic medical records system in improving the results and knowing the degrees of risk and estimating them through equations built in the Java language that appear in the EMR system.	The electronic medicalrecords system is one of the best systems that serve hospitals by evaluating risks and ccessing patient information faster and more accurately, but there remains a lack of using this system alone, such as the difficulty of accessing data in a detailed, updated and real-time manner, emphasized the use of the Dashboard to address this it's up
Ensuring electronic Medical record simulation through better training, modeling, and Evaluation (2020)	This study showed a solution to one of the most serious problems facing the Electronic medical records system, which is the "safety" problem. Explained that the solution is through a system that simulates the same system of electronic medical records used in the hospital by using a technology called GAN.	believed that it is important to use such technology in hospitals in Palestine to protect the security of patient data from danger and theft. believed that it is the best technology used in data protection among the other technologies used and mentioned by other studies, such as: blockchain technology, as study The people smart city

	Gan works by taking the patient's number and inserting it into an algorithm that works with special equations to generate random numbers so that the random number becomes the patient's number instead of his real number, thus protecting the patient's information. Note: A patient's number is recorded at each admission to the hospital, and the patients who have less than five numbers or more than 11 numbers are ignored.	Dashboard [PscD] delivering on community – Led governance with blockchain
The impact of electronic management and the role of human resources development in improving the performance of the organization an application study from the point of view of employees of Rafidain Bank(case study) (2014)	This study showed the importance of electronic management in reducing employee turnover and increasing their motivation and thought for each person to carry out his responsibilities	Emphasizing the importance of using modern management in the management of hospital systems and health institutions
The Relationship between Decision Support Systems And Re-Engineering in Palestinian Universities in Gaza Strip	This study emphasized the importance of using decision support systems to help evelop institutions, re-engineering and infrastructure, and take the appropriate decision in a goodmanagerial manner	We stress the need to use decision support systems, of which the Dashboard is one of the most important forms, as mentioned by the study :"A Dashboard-based system for supporting diabetes care." Because of its effective role in updating information and accessing actual information in real time
The role of the Dashboard in	. This study helped to clarify the effective	Emphasis on the use of the Dashboard for its role in

improving the management of human resources Case study of Sonelgaz East Distribution Corporation-Constantine – (2011)	role played by the dashboard in managing human resources well, in order to follow up the training of employees and evaluate their Performance. This enhances the development of the work of institutions, better achieving their goals and sustainability in the labor market, as well as reducing employee turnover and creating an employee with creative ideas for himself and the organization.	achieving The goals of the organization in a modern management style.
Organizational Effectiveness Using Dashboard Case study of the cement company in Sur El Ghazlan -SEG SC – (2012)	Increasing the achievement of the organization's goals more accurately, faster and in real time due to its use of the Dashboard.	----
The impact of the Dashboard On Improving th performance of the economic institution Case study of the Naftal Corporation, Directorate of GPL No. 704 - Um El (2021)	Increasing economic performance and institutional income for using the Dashboard, and this was confirmed by the previous study" Organizational Effectiveness Using	----
The Role of Implementing Business Intelligence Dashboard Features indecision Making:An Empirical Study at Paltel Company (2016)	The Dashboard helps the decision- making in Paltel in a more accurate and timely manner, and enhances the functionality in it, because it displays the customer's transactions, subscriptions, paymen and services in which the customer subscribeswith a continuous updated subscription in real time.	----
Use of an	Contributed to	The problem of this study was

electronic medical Record Dashboard to identify gaps osteoporosis care (2021)	determining the risks of osteoporosis and the deficiency in osteoporosis care by applying algorithms in the EMR system, presenting its results in an initial and updated manner, and comparing it with the required and conditional Percentages according to the Canadian system	the refusal of a number of doctors to respond to it, which led to the continuation of problems in detecting osteoporosis treatment gaps in some hospitals.
An informatics based approach to reducing heart failure all- cause readmissions: The Stanford heart failure Dashboard (2017)	The application of an improved program that was introduced into the EMR system to follow up the diagnosis, identifies the hepatitis C patient, the number of times of admission, and displays the results through the Dashboard، contributed to reducing the number of admissions in the heart failure department and reducing the examination times from one hour to a quarter of an hour.	The important role that the Dashboard plays in reducing treatment time, better diagnosis, and reducing waste of time and money for the patient and the hospital, and this is what was shown by the other studies mentioned that were applied to liver disease, iron deficiency, diabetes، and others. Some of examples of that studies : the study that applied MOSAIC system for diabetes disease (A Dashboard- based system for supporting diabetes care).
4000 Clicks: A productivity analysis of electronic medical records in a community hospital ED (2013)	This study analyzed the time that the emergency doctor takes to enter patient data on the computer, and Found that he spends more than 40% of his time entering the data and thus spends more time entering data than the time he spends on treating the patient, following up on his condition, reviewing his reports and examinations. The study emphasizes the need to find a solution to this problem.	The proposed solution to this problem is to use a Dashboard that enables the patient's data to be displayed as soon as it is identified with graphs and shapes, instead of referring to and searching records, as well as making the hospital (a learning organization) practice modern management, by appointing a nurse or data entry to enter patient data instead From making all the tasks assigned to the doctor
Beyond the focus group: Understanding physicians' barriers	This study showed some administrative problems that limit The use of the medical records system in some	----

toElectronic medical records (2012)	important of which is the high financial cost, in addition to safety problems، problems of patient non-interaction, the problem of influencing the doctor, and technical and technical problems.	
Medical students' experience With accessing medical records SaudiIn Arabia: A descriptive study (2021)	This study was designed to find out the impact of dealing with medical records on students' learning, and confirmed that access to medical records benefits students and enhances their information about diseases, diagnosis and treatment more than indoctrination information, and confirmed that electronic medical records enhance their information and experiences at a higher rate than paper medical records	Emphasizing the importance of electronic medical records at the level of Students(medical students), not only at the level of patients and doctors.
An interactive web-based Dashboard to track COVID-19 in Real Time (2020)	The interactive Dashboard in China and America helped to display the number and locations of corona cases, deaths, and cases of recovery, and this helped health in dealing with the matter, and helped the residents of the places to take caution	This is what were needed today in light of the Corona pandemic crisis in our hospitals

In addition to these studies, there have also reviewed 9 studies with the same objectives as the above studies: Tableau Dashboard cookbook, research methods, Primary Outcome Measure: Number of Hypoglycemic Events Over a 3-Year Period, with Rapid Prototyping, The Role of Implementing Business Intelligence Dashboard Features in Decision Making: An Empirical Study at Paltel Company, The impact of the Dashboard on improving the performance of the economic institution Case study of the Naftal Corporation,

Directorate of GPL No. 704- Oum El Bouaghi -, Organizational Effectiveness Using Dashboard, Case study of the cement company in Sur El Ghazlan -SEG SC -, The role of the Dashboard in improving the management of human resources Case study of the Sonelgaz Corporation for Distribution of the East - Constantine-, The impact of electronic management and the role of human resources development in improving the performance of the organization.

2.3 Gaps in Existing Knowledge

The gap lies in the problem of the research, as indicated by the reports of the Palestinian Ministry of Health published on its official websites, as shown by previous studies (Dagliati et al., 2018 ; Dagliati et al., 2018; Noraziani et al., 2013; Wang et al., 2020; Breton et al., 2021), and as indicated by the staff of the computer department in Palestinian hospitals that there is difficulty in dealing with this huge number of patients coming to Palestinian hospitals, as the electronic medical system The user's staff did not receive sufficient training on its use, in addition to the difficulty of dealing with it by some employees, and the lack of clarity of the system to deal with it adequately. Electronic medical records system in hospitals.

In addition, the administration suffers from the problem of following up all the information of patients arriving in hospitals for their huge daily number, the difficulty of collecting reports from all hospital departments, in addition to the difficulty of reviewing and tracking the information of an individual patient.

Chapter III
Research Methodology

3.1 Introduction

In this chapter, illustrated the methodology the researcher followed in the research, and it included a description of the research methodology, the study population, the study tool, the tool's validity, the tool's reliability, the study procedures, and the statistical analysis.

3.2 Methodology

Based on the nature of the study and to achieve the objectives of the study, the researcher adopted the descriptive approach "which is one of the forms of decomposition and organized scientific interpretation to describe a specific phenomenon or problem and depict it quantitatively by collecting data and codified information about the phenomenon or problem, categorizing, analyzing and subjecting it to accurate studies (Melhem, 2000). In this study, the researcher relied on the mixed method for its relevance to the subject of the study, as Allam (2010) defined it as the method through which the researcher collects and analyzes data, and makes agreement and integration between the results, and the conclusions he obtained from quantitative and qualitative methods and tools, in the same study, and used The researcher used this method to reach a better understanding of the problem of the study and some parts of the study before doing the basic study. The qualitative methods consisted of semi-regular interviews with workers at Al-Yamamah Hospital in Bethlehem, Hebron Governmental Hospital, and Al-Ahly Hospital in Hebron and some parts of the study before doing the basic study. The qualitative methods consisted of semi-regular interviews with workers at Al-Yamamah Hospital in Bethlehem, Hebron Governmental Hospital, and Al-Ahly Hospital in Hebron.

3.3 Data Collection

Data was collected from primary and secondary sources, Secondary sources: These sources included theoretical literature and previous studies related to the subject of the study.

Primary sources:

Semi-structured Interviews: A type of interview, which gives the researcher the freedom to ask the question in another way and ask the respondent for more clarification (Gay & Airasian, 2003**)**

Questionnaire: The questionnaire is one of the most important tools of scientific research, where the questionnaire is used to collect data related to the subject of the research, and the questionnaire is used in studies that aim to explore facts about current practices, public opinion polls and individuals' tendencies, so that the data is collected in a specific time and at lower costs (Qasim, 2016).

3.4The Population

The study population included workers in Hebron and Bethlehem hospitals **.**

3.4.1 The Sample

The sample of the study is defined as being part of the study community. The sample represents an aspect of the determinants of the original community concerned with the research that is representative of it so that it bears its common characteristics. This model dispenses with the study of all units and vocabulary of the original community in the event of the difficulty of the study and the researcher resorts to it when using the questionnaire and interview as tools for data collection (Al Damen, 2007**)**

The study sample its random sampling, this sample of hospitals was divided into two layers (the northern West Bank layer, the southern West Bank layer),

the northern hospitals (Hebron Governmental Hospital and Al-Ahly Hospital), and the southern hospital (Al-Yamamah Hospital)

These hospitals were targeted for easy access to information through these hospitals.

The sample consists of workers in all department of Hebron Governmental Hospital and Al-Ahly Hospital in Hebron, and their number is (1670) male and female employees, including (770) employees in Hebron government hospital and (900) employees in Al-Ahly Hospital, according to the statistics of those hospitals, because the hospitals apply the EMR system, in all departments of the entire hospital.

In addition to Al-Yamamah Hospital in Bethlehem, which applies the electronic medical record system in some of its departments

Al-Ahly Hospital and Hebron Governmental Hospital were targeted through interviews and questionnaires, while Al-Yamamah Hospital was targeted through interviews only; because part of the medical records system in Al-Yamamah Hospital is electronic and not the entire system.

3.4.1.1 Quantitative methods

The quantitative method is based on collecting data through the use of quantitative measurement tools that are developed so that they have validity and reliability, and are applied to a sample of individuals representing the original community, and then processing quantitative data with statistical methods that ultimately lead to results that can be generalized to the original community within a certain extent. From Trust (Allam, 2010)

The study sample was chosen by the stratified intentional method, where the hospitals were divided into two layers, the north of the West Bank and the south of the West Bank) in the hospitals under study.

Stratified sampling: It means choosing a sample that represents the subgroups in the study population with the same proportions in that community. It can also be used to select equal samples from all subgroups. The intended sample is a sampling technique in which the researcher selects samples based on the researcher's autonomy rather than random selection (Etikan, 2017**)**

The study sample was selected in a non-probability way by targeting 100 members of the study community in each of the targeted hospitals, Where the questionnaires were handed over to the heads of departments and distributed by the heads of departments to the employees in a non-probable way, in order to facilitate access to the sample members, and 11.1% of the study community members were recovered, according to the following equation:

The number of the study sample = the size of the study population x 11.1/100. The following table shows the size of the study population and the study sample:

Hospital	Population	sample
The Hebron Governmental Hospital	770	86
Al-Ahly Hospital	900	100
Total	1670	186

The number of the sample members was (200) male and female employees, who were selected through the intentional sample. The Hebron Governmental Hospital and Al-Ahly Hospital were selected due to the availability of the (EMR) system in all departments, while Al-Yamamah Hospital was chosen for ease of access, 200 questionnaires were distributed and (186) questionnaires were retrieved. Where the questionnaires were distributed through the heads of departments to their employees manually**.**

Thus the recovery rate was (93%). Below is a presentation of the personal and demographic information of the respondents.

Table (3.1): demographic characteristics according to the gender variable

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	96	51.6	51.6	51.6
Female	90	48.4	48.4	100.0
Total	186	100.0	100.0	

The data in Table (3.1) indicate that (51.6%) of the sample members are males compared to (48.4%) of them are females.

Table (3.2): demographic characteristics according to the Age variable

	Frequency	Percent	Valid Percent	Cumulative Percent
<25	58	31.2	31.2	31.2
25-34	64	34.4	34.4	65.6
44-35	64	34.4	34.4	100.0
Total	186	100.0	100.0	

It is clear from the data contained in Table (3.2) that (31.2%) of the sample members are less than (25) years old, and (34.4%) of the sample members are from 25-34 years old, and (34.4%) of the sample members are from 35- 44 years old**.**

Table (3.3): demographic characteristics according to Highest educational stage

	Frequency	Percent	Valid Percent	Cumulative Percent
Community college	30	16.1	16.1	16.1
BA	128	68.8	68.8	84.9
Master's	28	15.1	15.1	100.0
Total	186	100.0	100.0	

It was found in Table (3.3) that (16.1%) of the workers have a degree in Community College, and (68.8%) of the workers hold a degree of B.A, while (15.1%) have the degree of Masters.

Table (3.4): demographic characteristics according to Basic IT Related skills

	Frequency	Percent	Valid Percent	Cumulative Percent
No skills	28	15.1	15.1	15.1
Fair	100	53.7	53.8	68.8
Good	28	15.1	15.1	83.9
very good	30	16.1	16.1	100.0
Total	186	100.0	100.0	

Table (3.4) shows that (15.1%) of workers do not have skills related to information technology, (53.7%) of workers have fair skills, and (15.1%) have good skills, while (16.1%) have very good skills.

Table (3.5): demographic characteristics according to Job Title

	Frequency	Percent	Valid Percent	Cumulative Percent
Doctor	60	32.3	32.3	32.3
Nurse	10	5.4	5.4	37.6
Medical Technical (labs)	68	36.5	36.6	98.9
Physiotherapist	2	1.1	1.1	100.0
Total	186	100.0	100.0	

Table (3.5) shows that (32.3%) of the sample members are Doctor, (5.4%) of the sample members are nurse, (24.7%) of the sample members are technical, while (36.5%) of the sample members are medical technical (labs), and (1.1%) of the sample were Physiotherapist.

Table (3.6): demographic characteristics according to the Number of years working in the medical sector

	Frequency	Percent	Valid Percent	Cumulative Percent
<5	90	48.4	48.4	48.4
5-9	68	36.6	36.6	84.9
10-14	28	15.1	15.1	100.0
Total	186	100.0	100.0	

Table (3.6) shows that (48.4%) of the sample members have experience in medical work for less than 5 years, and (36.6%) of the sample members have experience ranging between (5-9), and (15.1%) of the sample members. They have 10-14 years of experience

3.4.1.2 Qualitative methods:

It is a type of research that arrives at results in non-statistical or quantitative ways and seeks insight, understanding, and application to similar situations, and then qualitative analysis results in a kind of knowledge that differs from quantitative research (Allam, 2010). As for the qualitative approach, the researcher used the interview method that targeted workers in the computer department at Al Yamamah Hospital in Bethlehem, Hebron Governmental Hospital, and Al Ahli Hospital in Hebron

3.5 Study tools
3.5.1 Build a study tool
3.5.1.1 Qualitative methods

After collecting data and information from secondary sources on the subject of the study, using the integrated smart Dashboard technology for building the theoretical framework, a prototype was designed for semi-regular interviews. And smart compact to take their notes and opinions on the topic of designing a study tool.

3.5.1.2 Quantitative method

After reviewing the study literature, including books, university theses, and specialized research, and benefiting from the questionnaires prepared from

some studies related to the subject of the study, the questionnaire was formulated according to the following steps:

1. Determining the main areas of the questionnaire.
2. Drafting the paragraphs that fall under each field.
3. Presenting the questionnaire to the supervisor to test its suitability for data collection.
4. Initially modifying the questionnaire as deemed appropriate by the supervisor.
5. Preparing the questionnaire in its initial form, which included **(32)** items distributed over three axes.
6. Presenting the questionnaire to a group of reviewers with expertise in the field of management and computers.
7. After making the amendments recommended by the reviewers, some paragraphs were deleted within the axes, the wording of other paragraphs was modified, and the number of the questionnaire's paragraphs in its final form was (26) paragraphs distributed on three axes.

The questionnaire consisted of three parts:

Part one: a general introduction to familiarize the respondents with the objectives of the study and their role in enriching it.

Part Two: Personal information about the respondents and includes the following demographic variables (Gender, Age, Highest educational stage, Basic IT- Related skills, Job Title, Number of years working in the medical sector)

The third part contains the content of the questionnaire, which are three axes: (The speed and accuracy of the employee's use of the electronic system (EMR), flexibility in dealing with system, cost) The researcher also used

point Likert scale 5 and gave an answer (5 point: Strongly agree, 4 point: Agree, 3 point: Indifferent, 2 point: Disagree, 1 point: Strongly Disagree)

The higher the score, the higher the level of verification of the paragraphs, and consequently, the greater the respondents' satisfaction with the paragraphs. The questionnaire was distributed to Hebron Governmental Hospital and Al-Ahli Hospital.

3.5.2 Validity & Reliability
3.5.2.1 Qualitative method (semi-structured interviews)
To verify the validity and reliability of the qualitative study tool (regular interviews), the researcher used Content Validity by presenting the interview model to a number of specialized reviewers.

3.5.2.2 Quantitative method (Questionnaire)
The validity of the questionnaire means the extent to which the tool achieves the purpose for which it was prepared, so it measures what it was designed to measure only (Al-Agha, 2002)

consistency Inner

Reliability expresses the extent of naturalization and consistency of the respondents' answers to the paragraphs and phrases of the study tool and the accuracy of their answers, and thus the study tool gives the same results if it is re-applied to another similar sample in the same conditions.

The stability of the study tool is used to express the extent of homogeneity and consistency (consistency) of the respondents' answers to the paragraphs and phrases of the study tool and the accuracy of their answers, and thus that the study tool gives the same results if it is re-applied again in the same conditions, so to measure the stability of the study tool, the stability of the study tool fields was measured And the paragraphs in addition to the total

score of the study tool using Cronbach's alpha stability coefficients on the tools of the study sample, As follows:

Table (3.7): Cronbach's alpha stability coefficients

Field	Item	Cronbach's Alpha Stability Coefficients
The speed of the employee's use of the electronic system(EMR)	5	0.804
The accuracy of the employee's use of the electronic system(EMR)	6	0.812
flexible to deal with system	10	0.788
Cost	5	0.853
Total	26	0.908

As it can be seen from the previous table, the values of the stability coefficients for the fields of study ranged (0.78-0.85), and the value of the total stability coefficient of the study tool was (0.90), which indicates that the study tool can produce (90%) of the current results if the remeasurement was done. Research and use again in the same conditions and these values were considered appropriate for the purposes of the study. On the other hand, Pearson's correlation coefficients were calculated between each field or dimension of the study tool and the total degree of the tool, and the study tool is considered to have a high degree of validity when all or most of the correlation coefficients are statistically significant (their significance level is less or equal to 0.05), which indicates the correlation of these areas with the study tool, and thus indicates an increase in the internal consistency of the paragraphs within these areas, and it is clear from the table below that all correlation coefficients are statistically significant, which indicates that the study tool has high validity and that the study tool used is highly capable of achieving the goals that were set from and the table shows the results of the Pearson correlation coefficients.

Table (3.8): Matrix values of the correlation coefficients between the items of the study tool and its total score

No	Items	Pearson correlation	Sig
1.	I find the structure of the system clear*	0.594**	0.000
2.	I find the rate completion task I perform through the system is minimal *	0.684**	0.000
3.	I find the system flexible while using it * meaning that it is adaptable to changes	0.890**	0.000
4.	I find the number of errors resulting from using the system is very small *	0.825**	0.000
5.	It will be easy for me to become skilled in using this system *	0.826**	0.000
6.	The system is easy to use (icons, screens, etc.)*	0.871**	0.000
7.	The system facilitates scheduling of appointments for patients*	0.577**	0.000
8.	The system reminds patients of their appointments*	0.554**	0.000
9.	I can manage the amount of work generated by the system *	0.856**	0.000
10.	Using EMR makes fair distribution of work among employee / NA system*	0.622**	0.000
11.	Using EMR helps me to done more work in the same time I was used it in the paper system*	0.664**	0.000
12.	Using EMR helps me to done the work more accuracy *	0.776**	0.000
13.	I can use this system to get things done more quickly *	0.467**	0.000
14.	The electronic medical record system improves my performance *	0.720**	0.000
15.	The electronic medical records system makes it easy for me to do my job	0.865**	0.000
16.	The system facilitates data exchange between hospitals departments *	0.461**	0.000
17.	The system improves patient safety by authentication and password *	0.454**	0.000
18.	Availability of resources to use the electronic medical records system *	0.662**	0.000
19.	Availability of knowledge to use an electronic medical record system*	0.697**	0.000
20.	Infrastructure to implement the system (electricity, computers, internet connection...etc) *	0.609**	0.000
21.	The financial resources to operate and maintain the system *	0.548**	0.000
22.	Interdepartmental cooperation*	0.405**	0.000
23.	Allow the senior management of each department	0.155*	0.035

No	Items	Pearson correlation	Sig
	to carry out its tasks directly*		
24.	I received adequate training in order to use the system *	0.447**	0.000
25.	There is periodic maintenance of the system*	0.279**	0.000
26.	System improvement in light of feedback*	0.693**	0.000

3.6 Study Procedures:

After preparing the interview form and questionnaire, the following actions were taken:

1. Obtaining official letters from the Graduate Studies Committee to facilitate the researcher's task in collecting data.

2. The study population, the study sample, and the division of the community into strata were identified, representing each hospital included in the study.

3. Design the semi-regular interview and then verify its authenticity.

4. Coordination was made with hospital administrations in order to schedule interviews, which took more than a month to conduct. Manual registration was relied upon. The researcher used the interview form approved by her to ask questions to the respondents and made some modifications to the questions asked to some of them in line with the nature of the interview, their work, and their answers.

5. The interviews were analyzed.

6. The questionnaire was designed based on previous studies and research published on the subject of the study.

7. An intentional sample was selected from the study population, and the questionnaire was distributed personally by the researcher. The researcher personally followed up on the questionnaire in hospitals, and the data collection took about a month.

8.   (200)questionnaires were distributed and (186) questionnaires valid for analysis were retrieved**.**

9.   Entering the questionnaires into the computer ready to analyze the results using the statistical analysis program.

3.7 Statistical processing and data analysis

The necessary statistical treatment of the data was carried out by extracting the numbers and percentages of the respondents' personal characteristics. The study questions were also answered by calculating the arithmetic means and standard deviations of the questionnaire items and the total scores of the domains because the total scores are quantitative variables as they are made up of a sum (or an arithmetic mean). For the paragraphs' scores, which are ordinal variables, numbers were assigned to express their order (with a very low degree = 1 to a very high degree = 5). Therefore, it is appropriate to use the arithmetic means, standard deviations, and the rest of the statistical methods for quantitative data in analyzing the questionnaire items, as the arithmetic mean of the paragraph gives a clear, easy, and concise description of the degree to which the respondent wants to express more than percentages, which need to use more than one ratio to express the degree paragraph and its level**.**

The arithmetic means, standard deviations, t-test; which is used to compare between two things, and one-way analysis; which is used to compare between three things of variance were used**.**

The stability equation - Cronbach's alpha was used to check the stability of the study tool and the method of analyzing Pearson's correlation coefficients, using the SPSS statistical package**.**

3.8 Correction key

After giving the trends of the sample members numbers representing weights for their trends from (1-5) the difference of the lowest value was calculated

which is 1 from the highest value which is 5 and thus the result becomes (5-1 = 4) which is called the range, then the value of the range was divided by a number The fields required to judge the results are 5 so that the result becomes (5/4 = 0.8), and therefore continued to increase this value starting from the lowest value (1) in order to give the periods for determining the trend based on the arithmetic mean and the following table shows this:

Table (3.9): Five-point correction key

Degree	Mean
Very low	1.80-1.00
Low	2.60-1.81
Medium	3.34-2.61
High	4.20-3.35
Very high	5.00-4.21

Chapter IV
Results

This chapter includes a presentation of the results of the study that were reached after conducting the statistical analysis of the study data.

4.1 Analysis of the results according to demographic characteristic

To answer the question, arithmetic means and standard deviations were extracted to measure managing with intelligent Dashboards using EMR Open Source tools.

table (4.1): Arithmetic means and standard deviations to measure Managing with intelligent dashboards using EMR Open Source tools, Sorted by importance

Items Students	Mean	Std. Deviation	Degree
Using EMR helps me to do the work more accurately	3.69	0.46	**High**
I received adequate training in order to use the system	3.10	0.91	**Medium**
I can use this system to get things done more quickly	2.81	0.90	**Medium**
I find the rate completion task I perform through the system is minimal	2.74	0.89	**Medium**
The electronic medical records system makes it easy for me to do my job	2.66	0.76	**Medium**
It will be easy for me to become skilled in using this system	2.52	0.73	**Low**
I find the system flexible while using it meaning that it is adaptable to changes	2.49	0.74	**Low**
I find the number of errors resulting from using the system is very small	2.44	0.76	**Low**
Using EMR makes fair distribution of work among employee / NA system	2.43	0.52	**Low**
Availability of knowledge to use an electronic	2.43	0.66	**Low**

medical record system			
The electronic medical record system improves my performance	2.39	0.57	**Low**
System improvement in light of feedback	2.38	0.55	**Low**
Infrastructure to implement the system (electricity, computers, internet connection...etc)	2.37	0.75	**Low**
I can manage the amount of work generated by the system	2.35	0.50	**Low**
Allow the senior management of each department to carry out its tasks directly	2.33	0.75	**Low**
The system reminds patients of their appointments	2.32	0.59	**Low**
Using EMR helps me to done more work in the same time I was used it in the paper system	2.32	0.55	**Low**
The system is easy to use (icons, screens, etc.)	2.30	0.53	**Low**
Availability of resources to use the electronic medical records system	2.28	0.71	**Low**
I find the structure of the system clear	2.27	0.71	**Low**
I can use this system to get things done more quickly	2.24	0.52	**Low**
There is periodic maintenance of the system	2.23	0.49	**Low**
The financial resources to operate and maintain the system	2.21	0.50	**Low**
The system improves patient safety by authentication and password	2.20	0.43	**Low**
The system facilitates data exchange between hospitals departments	2.14	0.43	**Low**
Interdepartmental cooperation	2.01	0.58	**Low**
Total marks	2.44	0.35	**Low**

The previous table (4.1) shows the arithmetic averages and standard deviations of each domain of the study tool that measures managing with

intelligent Dashboards using EMR Open Source tools with a low score. Whereas the arithmetic mean of the total score is (2.44) and the overall standard deviation is (0.35**)**

It came at the forefront of these paragraphs: the paragraph (Using EMR helps me to do the work more accurately) with an arithmetic mean of (3.69) and a standard deviation of (0.46) at a high degree, followed by the paragraph (I received adequate training in order to use the system) with an arithmetic average of (3.10) and a standard deviation of (0.91) with a medium degree, followed by the paragraph (I can use this system to get things done more quickly) with an arithmetic mean of (2.81) and a standard deviation of (0.90) with a medium degree, followed by the paragraph (I find the rate completion task I perform through the system is minimal) with an arithmetic mean of (2.74) and a standard deviation of (0.89) in a medium degree, followed by the paragraph (The electronic medical records system makes it easy for me to do my job) with an arithmetic mean of (2.66) and a standard deviation of (0.76), moderately**.**

The least important items were (Interdepartmental cooperation) with mean of (2.01) and standard deviation of (0.58) in low degree, followed by the item (The system facilitates data exchange between hospitals departments) with mean of (2.14) and standard deviation of (0.43) at low degree. , followed by the item (The system improves patient safety by authentication and password) with a mean of (2.20) and a standard deviation of (0.43) with a low degree, followed by the item (The financial resources to operate and maintain the system) with a mean of (2.21) and a standard deviation of 2. (0.50) at a low degree, followed by the item (There is periodic maintenance of the system) with an arithmetic mean of (2.23) and a standard deviation of (0.49) at a low degree.

4.2 Analysis of the results related to the study:
1. For the average responses of the study sample individuals about the variable of gender.

The Independent Sample T-Test was used to find differences in the average responses of the study sample's responses to managing with intelligent Dashboards using EMR Open Source tools due to the variable of gender.

Table (4.2): Independent Sample T-Test results to identify differences in the average responses of the study sample individuals about the variable of gender.

	N	Mean	Std. Deviation	T	Sig. (2-tailed)
Male	96	2.48	0.29	1.636	0.104
Female	90	2.40	0.40		

*Statistical function at the level of significance (0.05), degrees of freedom = 184

The results in Table (4.2) indicate that there are no statistically significant differences in the averages of the responses of the study sample about managing with intelligent Dashboards using EMR Open Source tools due to the variable of gender, as the statistical significance reached (0.104), which is greater than the level of (0.05), which is not statistically significant.

2. For the average responses of the study sample individuals about the variable of Age.

The One Way Anova test was used to find the differences in the average responses of the study sample individuals about Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Age, as shown in Tables (4.3) (4.4)

Table (4.3): The Numbers, Arithmetic Means, And Standard Deviations Of The Average Responses Of The Study Sample Individuals The Variable Of Age

Age	Mean	N	Std. Deviation
<25	2.58	58	0.40
25-34	2.29	64	0.19
35-44	2.47	64	0.38
Total	2.44	186	0.35

Table (4.4): Results of the One Way Anova test to identify differences in the mean responses of the study sample individuals about the variable of Age

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	2.584	2	1.292	11.248	0.000
Within Groups	21.024	183	.115		
Total	23.608	185			

It is evident from the tables (4.3) (4.4) that there are statistically significant differences in the average responses of the study sample individuals about Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Age, where the statistical significance was (0.000), which is less than (0.05), which is statistically significant.

To find out the source of the differences, the LSD (Least Significant Difference) test was used to reveal the source of the differences between the responses of Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Age, as shown in Table (4.5)

Table (4.5): LSD test results for differences between respondents' responses to the variable of Age

(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
<25	25-34	.28656*	.06145	.000	.1653	.4078
	35-44	.10506	.06145	.089	-.0162-	.2263
25-34	<25	-.28656-*	.06145	.000	-.4078-	-.1653-
	44-35	-.18149-*	.05992	.003	-.2997-	-.0633-

| 35-44 | <25 | -.10506- | .06145 | .089 | -.2263- | .0162 |
| | 25-34 | .18149[*] | .05992 | .003 | .0633 | .2997 |

*. The mean difference is significant at the 0.05 level.

Through the previous table, there noted that the differences were in favor of those aged less than 25 years versus those aged more than 25 years because the arithmetic mean of the sample members with ages less than 25 years is greater.

3. For the average responses of the study sample individuals about the variable of the Highest educational stage.

The One Way Anova test was used to find the differences in the average responses of the study sample individuals about Managing with intelligent Dashboards using EMR Open Source tools due to the variable of the Highest educational stage, as shown in Tables (4.6) (4.7)

Table (4.6): The Numbers, Arithmetic Means, And Standard Deviations Of The Average Responses Of The Study Sample Individuals The Variable Of Highest Educational Stage

Highest educational stage	Mean	N	Std. Deviation
Community college BA Master's Total	2.9513	30	0.14246
	2.3347	128	0.32747
	2.4231	28	0.07252
	2.4475	186	0.35723

Table (4.7): Results of the One Way Anova test to identify differences in the mean responses of the study sample individuals about the variable of Highest educational stage

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9.258	2	4.629	59.033	.000
Within Groups	14.350	183	.078		
Total	23.608	185			

It is evident from the tables (4.6) (4.7) that there are statistically significant differences in the average responses of the study sample individuals about Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Highest educational stage, where the statistical significance was (0.000), which is less than (0.05), which is statistically significant.

To find out the source of the differences, the LSD test was used to reveal the source of the differences between the responses of Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Highest educational stage, as shown in Table (4.8**)**

Table (4.8): LSD test results for differences between respondents 'responses the variable of Highest educational stage

(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Community college	BA	.61655[*]	.05680	.000	.5045	.7286
	Master's	.52821[*]	.07358	.000	.3830	.6734
BA	Community college	-.61655-[*]	.05680	.000	-.7286-	-.5045-
	Master's	-.08834-	.05842	.132	-.2036-	.0269
Master's	Community college	-.52821-[*]	.07358	.000	-.6734-	-.3830-
	BA	.08834	.05842	.132	-.0269-	.2036

*. The mean difference is significant at the 0.05 level.

Through the previous table, there noted that the differences were in favor of those with scientific qualifications (Community college) versus (BA, Master's) because the arithmetic mean of the sample members with scientific qualifications (Community college) is greater.

4. For the average responses of the study sample individuals about the variable of Basic IT- Related skills.

The One Way Anova test was used to find the differences in the average responses of the study sample individuals about Managing with intelligent

Dashboards using EMR Open Source tools due to the variable of Basic IT Related skills, as shown in Tables (4.9) (4.10**)**

Table (4.9): The Numbers, Arithmetic Means, And Standard Deviations Of The Average Responses Of The Study Sample Individuals The Variable Of Basic IT Related Skills

Basic IT-Related skills	Mean	N	Std. Deviation
No skills	2.4231	28	0.07252
Fair	2.1738	100	0.13306
Good	2.9093	28	0.03505
very good	2.9513	30	0.14246
Total	2.4475	186	0.35723

Table (4.10): Results of the One Way Anova test to identify differences in the mean responses of the study sample individuals about Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Basic IT- Related skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.092	3	7.031	508.435	0.000
Within Groups	2.517	182	.014		
Total	23.608	185			

It is evident from the tables (4.9) (4.10) that there are statistically significant differences in the average responses of the study sample individuals about Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Basic IT- Related skills, where the statistical significance was (0.000), which is less than (0.05), which is statistically significant**.**

To find out the source of the differences, the LSD test was used to reveal the source of the differences between the responses of Managing with intelligent

Dashboards using EMR Open Source tools due to the variable of Basic IT Related skills, as shown in Table (4.11)

Table (4.11): LSD test results for differences between respondents 'responses to Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Basic IT- Related skills

(I) (J)		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
No skills	fair .24923*		.02514	.000	.1996	.2988
	good -.48626-*		.03143	.000	-.5483-	-.4243-
	very good-.52821-*		.03090	.000	-.5892-	-.4672-
fair	No skills-.24923-*		.02514	.000	-.2988-	-.1996-
	good -.73549-*		.02514	.000	-.7851-	-.6859-
	very good-.77744-*		.02448	.000	-.8257-	-.7291-
good	No skills.48626*		.03143	.000	.4243	.5483
	fair .73549*		.02514	.000	.6859	.7851
	very good-.04194-		.03090	.176	-.1029-	.0190
very good	No skills.52821*		.03090	.000	.4672	.5892
	fair .77744*		.02448	.000	.7291	.8257
	good .04194		.03090	.176	-.0190-	.1029

*. The mean difference is significant at the 0.05 level.

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Through the previous table, there noted that the differences were in favor of these with the skill level (very good, good) versus each of (No skills fair,) because the arithmetic mean of the sample members with the skill level (very good, good) is greater.

5. For the average responses of the study sample individuals about the variable of Job Title.

The One Way Anova test was used to find the differences in the average responses of the study sample individuals about Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Job Title, as shown in Tables (4.12) (4.13)

Table (4.12): The Numbers, Arithmetic Means, And Standard Deviations Of The Average Responses Of The Study Sample Individuals The Variable Of Job Title

Job Title	Mean	N	Std. Deviation
Doctor	2.3423	60	.19735
Nurse	3.0769	10	.09931
Technical	2.3612	46	.35948
Medical Technical (labs)	2.4910	68	.38209
Physiotherapist	2.9615	2	.00000
Total	2.4475	186	.35723

Table (4.13): Results of the One Way Anova test to identify differences in the mean responses of the study sample individuals about the variable of Job Title

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.625	4	1.406	14.154	0.000
Within Groups	17.983	181	.099		
Total	23.608	185			

It is evident from the tables (4.12) (4.13) that there are statistically significant differences in the average responses of the study sample individuals about

Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Job Title, where the statistical significance was (0.000), which is less than (0.05), which is statistically significant.

To find out the source of the differences, the LSD test was used to reveal the source of the differences between the responses of Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Job Title, as shown in Table (4.14)

Table (4.14): LSD test results for differences between respondents 'responses the variable of Job Title

(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Doctor	nurse	-.73462-*	.10766	.000	-.9471-	-.5222-
	Technical	-.01890-	.06177	.760	-.1408-	.1030
	Medical	-.14864-*	.05583	.008	-.2588-	-.0385-
	Physiotherapist	-.61923-*	.22657	.007	-1.0663-	-.1722-
Nurse	Doctor	.73462*	.10766	.000	.5222	.9471
	Technical	.71572*	.10998	.000	.4987	.9327
	Medical	.58597*	.10675	.000	.3753	.7966
	Physiotherapist	.11538	.24416	.637	-.3664-	.5971
Technical	Doctor	.01890	.06177	.760	-.1030-	.1408
	nurse	-.71572-*	.10998	.000	-.9327-	-.4987-
	Medical	-.12975-*	.06017	.032	-.2485-	-.0110-
	Physiotherapist	-.60033-*	.22768	.009	-1.0496-	-.1511-
Medical	Doctor	.14864*	.05583	.008	.0385	.2588
	nurse	-.58597-*	.10675	.000	-.7966-	-.3753-
	Technical					
	Physiotherapist					
	Doctor					
	Nurse					
	Technical					
	Medical					

* The mean difference is significant at the 0.05 level.

Through the previous table, there noted that the differences were in favor of those with Job Title (nurse) versus (Doctor, Technical Medical,) because the arithmetic mean of the sample members with Job Title (nurse) is greater.

For the average responses of the study sample individuals about Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Number of years working in the medical sector.

The One Way Anova test was used to find the differences in the average responses of the study sample individuals about Managing with intelligent Dashboards using EMR Open Source tools due to the variable of the Number of years working in the medical sector, as shown in Tables (4.15) (4.16)

Table (4.15): The Numbers, Arithmetic Means, And Standard Deviations Of The Average Responses Of The Study Sample Individuals The Variable Of Number Of Years Working In The Medical Sector

Number of years working in the medical sector	Mean	N	Std. Deviation
<5	2.5393	90	.33515
5-9	2.1357	68	.05961
10-14	2.9093	28	.03505
Total	2.4475	186	.35723

Table (4.16): Results of the One Way Anova test to identify differences in the mean responses of the study sample individuals about the variable of Number of years working in the medical sector

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.340	2	6.670	118.872	0.000
Within Groups	10.268	183	.056		
Total	23.608	185			

It is evident from the tables (4.15) (4.16) that there are statistically significant differences in the average responses of the study sample individuals about Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Number of years working in the medical sector , where the

statistical significance was (0.000), which is less than (0.05), which is statistically significant.

To find out the source of the differences, the LSD test was used to reveal the source of the differences between the responses of Managing with intelligent Dashboards using EMR Open Source tools due to the variable of Number of years working in the medical sector, as shown in Table (4.17)

Table (4.17): LSD test results for differences between respondents 'responses to the variable of Number of years working in the medical sector

(I)	(J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
<5	5-9	.40357	.03806	.000	.3285	.4787
	10-14	-.37002-*	.05126	.000	-.4712-	-.2689-
5-9	<5	-.40357	.03806	.000	-.4787-	-.3285-
10-14		-.77359-*	.05319	.000	-.8785-	-.6687-
10-14	<5	.37002*	.05126	.000	.2689	.4712
5-9		.77359*	.05319	.000	.6687	.8785

Through the previous table, there noted that the differences were in favor of the experienced (10-14) years versus each of the experienced (<5, 5-9) years because the arithmetic mean of the sample members with experience (10-14) years is greater.

The first dimension of the questionnaire: What is the level of the employee's speed of use of the electronic system (EMR) in Palestinian hospitals from the employees' point of view.

To answer the question, the arithmetic means, standard deviations, and percentages were extracted to measure the level of employee speed problems using the electronic system (EMR) in Palestinian hospitals from the employees' point of view.

Table (4.18): Arithmetic means, standard deviations, and percentages to measure the level of employee speed problems using the electronic system (EMR) in Palestinian hospitals from the workers' point of view, arranged in order of importance

The speed of the employee's use of the electronic system(EMR)	Mean	Std. Deviation	Strongly agree	agree	Indifferent	Disagree	Strongly Disagree
I received adequate training in order to use the system	3.10	0.91	1.1%	%70.9	%29.0	%0;.0	%0.0
It will be easy for me to become skilled in using this system	2.52	0.73	3.2%	%83.6	%33.3	%0.0	%0.0
I find the system flexible while using it meaning that it is adaptable to changes	2.49	0.74	3.2%	%96.0	%02.7	%2.2	%0.0
I can use this system to get things done more quickly	2.39	0.57	4.3%	%7;.2	%38.8	%0.0	%0.0
Infrastructure to implement the system (electricity, computers, internet connection...etc)	2.37	0.75	0.0%	%86.7	%33.3	%2.2	%2.2
Total marks	2.60	0.34	2.37%	62.8%	28.38%	6.25%	0.22%

It is noted from the previous table that the arithmetic averages and standard deviations for each paragraph of the study tool, which measures the level of employee speed problems using the electronic system (EMR), are arranged in descending order according to the arithmetic

mean scores. The overall score is (2.60) and the total standard deviation is (0.34), which indicates that the level of employee speed problems using the electronic system (EMR) is of a medium degree according to the five-point correction key. See table (9**)**

The paragraphs of the tool were arranged in descending order according to the scores of the arithmetic means. At the forefront of these paragraphs came: the paragraph (I received adequate training in order to use the system) with an arithmetic mean of (3.10) and a standard deviation (0.91), then the paragraph (It will be easy for me to become skilled in using this system with an arithmetic mean of (2.52) and a standard deviation (0.73), then the paragraph (I find the system flexible while using it meaning that it is adaptable to

changes) with an arithmetic mean of (2.49) and a standard deviation (0.74), while the lowest item was (Infrastructure to implement the system (electricity, computers, internet connection...etc)) with a mean of (2.37) and a standard deviation of (0.75**)**

Among the respondents' opinions and low attitudes, the above can be summarized: that the most administrative problems in the speed of employee use of the electronic system (EMR) were represented in (I received adequate training in order to use the system) and (It will be easy for me to become skilled in using this system) and (I find the system flexible while using it meaning that it is adaptable to changes**)**

The second dimension of the questionnaire: What is the level of accuracy problems of employee use of the electronic system (EMR) in Palestinian hospitals from the point of view of employees**.**

To answer the question, the arithmetic means, standard deviations, and percentages were extracted to measure the level of employee accuracy problems using the electronic system (EMR) in Palestinian hospitals from the employees' point of view**.**

Table (4.19): Arithmetic means, standard deviations, and percentages for measuring the level of employee accuracy problems using the electronic system (EMR) in Palestinian hospitals from the workers' point of view, arranged in order of importance

The accuracy of the employee's use of the electronic system(EMR)	Mean	Std. Deviation	Strongly agree	Agree	Indifferent	Disagree	Strongly Disagree
The system reminds patients of their appointments	3.69	0.46	2.2%	:2.9%	3.0%	20.;%	0.0%

I find the rate completion task I perform through the system is minimal	2.74	0.89	%3.2	80.6%	02.7%	20.;%	0.0%
Availability of knowledge to use an electronic medical record system	2.43	0.66	%1.1	76.:%	66.2%	0.0%	0.0%
System improvement in light of feedback	2.38	0.55	%2.2	89.9%	07.:%	6.3%	0.0%
Using EMR helps me to done more work in the same time I was used it in the paper System	2.32	0.55	%1.1	99.6%	02.7%	0.0%	0.0%
Availability of resources to use the electronic medical records system	2.28	0.71	%63.4	33.3%	3.0%	0.0%	0.0%
Total marks	2.36	0.46	12.20%	62.88%	19.88%	5.02%	0.00%

It is noted from the previous table that the arithmetic averages and standard deviations for each paragraph of the study tool, which measures the level of accuracy problems of the employee's use of the electronic system (EMR), are arranged in descending order according to the arithmetic mean scores. The overall score is (2.36) and the total standard deviation is (0.46), which indicates that the level of employee accuracy problems using the electronic system (EMR) is of a medium degree according to the five-point correction key. See table (9).

The paragraphs of the tool were arranged in descending order according to the degrees of the arithmetic means. At the forefront of these paragraphs came the paragraph: (The system reminds patients of their appointments) with an arithmetic mean of (3.69) and a standard deviation (0.46), then paragraph () with an arithmetic mean of (2.74) and a deviation standard (0.89), then the item (Availability of knowledge to use an electronic medical record system) with a mean of (2.43) and a standard deviation of (0.66), while the lowest

item was (Availability of resources to use the electronic medical records system) with an average of My calculation is (2.28) and standard deviation (0.71).

Among the respondents' opinions and their low attitudes, the above can be summarized: The most administrative problems in the accuracy of the employee's use of the electronic system (EMR) were represented in (The system reminds patients of their appointments) and (I find the completion rate task I perform through the system is minimal). and (Availability of knowledge to use an electronic medical record system).

The third dimension of the questionnaire: What is the level of employee flexibility problems in using the electronic system (EMR) in Palestinian hospitals from the point of view of employees.

To answer the question, the arithmetic means, standard deviations and percentages were extracted to measure the level of employee flexibility problems using the electronic system (EMR) in Palestinian hospitals from the workers' point of view**.**

Table (4.20): Arithmetic means, standard deviations, and percentages to measure the level of employee flexibility problems using the electronic system (EMR) in Palestinian hospitals from the workers' point of view, arranged in order of importance

flexible to deal with system	Mean	Std. Deviation	Strongly agree	Agree	Indifferent	Disagree	Strongly Disagree
The electronic medical record system improves my Performance	2.81	0.90	0.0%	87.8%	2;.6%	27.2%	0.0%
The electronic medical records system makes it easy for me to do my Job	2.66	0.76	0.0%	80.3%	03.9%	26.0%	0.0%
I find the number of							

errors resulting from using the system is very small	2.44	0.76	0.0%	0.0%	32.0%	:..8:%	0.0%
Using EMR makes fair distribution of work among employee / NA System	2.43	0.52	1.1%	80.6%	38.7%	0.0%	0.0%
I can manage the amount of work generated by the System	2.35	0.50	1.1%	6:.6%	2;.6%	32.0%	0.0%
Allow the senior management of each department to carry out its tasks directly	2.33	0.75	1.1%	6:.6%	36.6%	28.2%	0.0%
Using EMR helps me to done the work more Accuracy	2.32	0.59	3.2%	9;.8%	29.0%	0.0%	0.0%
The financial resources to operate and maintain the System	2.23	0.49	16.1%	88.9%	29.0%	0.0%	0.0%
The system facilitates scheduling of appointments for Patients	2.21	0.50	1.1%	98.3%	27.2%	3.0%	6.3%
The system improves patient safety by authentication and Password	2.20	0.43	0.0%	36.6%	29.0%	68.0%	%0.0
Total marks	2.61	0.40	2.37%	54.63%	23.13%	13.98%	0.43%

It is noted from the previous table that the arithmetic averages and standard deviations for each paragraph of the study tool that measure the level of employee flexibility problems of the electronic system (EMR) are arranged in descending order according to the arithmetic mean scores. For the total score (2.60) and the total standard deviation of (0.34), which indicates that the level of employee flexibility problems using the electronic system (EMR) is at a medium degree according to the five-point correction key. See table (9).

The items of the tool were arranged in descending order according to the scores of the arithmetic means. At the forefront of these items came the item: (The electronic medical record system improves my performance) with an arithmetic mean of (2.81) and a standard deviation of (0.90), then the item

(The electronic medical records system makes it easy for me to do my job) with an average of (2.66) and a standard deviation (0.76), then the paragraph (I find the number of errors resulting from using the system is very small) with an average of (2.44) and a standard deviation (0.76), While the lowest item was (The system improves patient safety by authentication and password) with a mean of (2.20) and a standard deviation of (0.43)

Among the respondents' opinions and their low attitudes, the above can be summarized: that the most administrative problems in the speed of employee use of the electronic system (EMR) were represented in (The electronic medical record system improves my performance) and (The electronic medical records system makes it easy for me to do my job) and (I find the number of errors resulting from using the system is very small)

The fourth dimension of the questionnaire: What is the level of employee cost problems of using the electronic system (EMR) in Palestinian hospitals from the employees' point of view.

To answer the question, the arithmetic means, standard deviations, and percentages were extracted to measure the level of employee cost problems using the electronic system (EMR) in Palestinian hospitals from the employees' point of view.

Table (4.21): Arithmetic means, standard deviations, and percentages for measuring the level of employee cost problems using the electronic system (EMR) in Palestinian hospitals from the workers' point of view, arranged in order of importance

Cost	Mean	Std. Deviation	Strongly agree	agree	Indifferent	Disagree	Strongly Disagree
The system is easy to use (icons, screens, etc.)	2.30	0.53	2.2%	98.3%	29.0%	0.0%	6.3%
I find the structure of the system clear	2.27	0.71	0.0%	74.2%	00.6%	7.6%	0.0%
There is periodic maintenance of the system	2.24	0.52	0.0%	9;.8%	2;.6%	0.0%	2.2%
The system facilitates data exchange between hospitals departments	2.14	0.43	2.2%	96.0%	02.7%	0.0%	0.0%
Interdepartmental Cooperation	2.01	0.58	1.1%	80.6%	86.6%	0.0%	0.0%
Total marks	2.39	0.30	1.10%	%73.34	28.58%	1.96%	1.08%

It is noted from the previous table that the arithmetic averages and standard deviations for each paragraph of the study tool, which measures the level of problems of the employee's use of the electronic system (EMR), are arranged in descending order according to the arithmetic mean scores. The overall score is (2.39) and the overall standard deviation is (0.30), which indicates that the level of employee use cost problems of the electronic system (EMR) is of a medium degree according to the five-point correction key. See table (9)

The paragraphs of the tool were arranged in descending order according to the degrees of the arithmetic means, and it came at the forefront of these paragraphs: the paragraph (The system is easy to use (icons, screens, etc.)) with an arithmetic mean of (2.30) and a standard deviation of (0.53), then paragraph

(I). find the structure of the system clear) with a mean of (2.27) and a standard deviation (0.71), then the paragraph (There is periodic maintenance of the system) with a mean of (2.24) and a standard deviation (0.52), while the lowest paragraphs was the paragraph (Interdepartmental cooperation) with a mean of (2.01) and a standard deviation of (0.58)

Among the respondents' opinions and their low attitudes, the above can be summarized: The most administrative problems in the speed of employee use of the electronic system (EMR) were represented in (The system is easy to use (icons, screens, etc.)) and (I find the structure of the system clear) and (There is periodic maintenance of the system).

4.3 Interviews

In order to understand the general situation in Palestinian hospitals, interviews were conducted with some officials in the computer department in the hospitals under study (Al-Yamamah Hospital, Al-Ahly Hospital, Hebron Governmental Hospital), in order to identify the current conditions of hospitals and explore the general situation and the systems in force.

In order to identify the electronic medical record systems in hospitals

4.3.1 The current status of the hospitals in Palestine

Ibrahim Hasanat was interviewed and the information was obtained through him. He also added that all Palestinian governmental hospitals are operating according to the established system in the Hebron Governmental Hospital, called the Ibn Sina system, in addition, visiting the Al-Yamamah Hospital (a private hospital) in Bethlehem and meeting with the person responsible for managing the electronic medical records system there, as well as meeting with the computer engineering officer at the Al Ahli Hospital, engineer Marwan Shehadeh, and obtaining full information on the establishment and use of the system and its importance for the hospital and staff, the administrative problems facing their medical records system were identified, the extent of the information technology department's knowledge of the concept of the Dashboard, and their acceptance and satisfaction with the idea of a system that combines electronic medical records with the Dashboard.

All hospitals under study used (HIS), which is the Hospital Information System, its electronic records system. These hospitals differ from each other at the start date of the system and the way it works. Found there was confusion among some staff that the EMR system is thought to be the same as the EHR system and they think they are two sides of the same coin, and they

don't know the difference. In fact, there is a significant difference between them: the EHR system can participate in the system by

entering information in its various forms (names of diseases, medications, radiology, imaging, locations of visits, appointments, and tests) while the EMR system can't study and modify it (Garets & Mike, 2006).

In Hebron Governmental Hospital, the technologists explained that the use of the electronic system is much better than the use of the paper system, especially since this hospital is the only government hospital in the Hebron region (as is well known, the costs of spending on treatment in the government hospital are much lower than those in private hospitals), as patients coming to this hospital for treatment are many times more than they are going to private hospitals offering the same treatment, so there is a great work pressure on the staff, the likelihood of medical errors was much greater than they are currently happening using electronic systems, in addition to the fact that they were unable to serve a very large number of patients and reviewers on the same day, as it was very difficult for the employee to search for the paper patient's record among the thousands of patients, considering that this process takes time, and the great effort to use the electronic systems that were used to solve the problem between patients.

The most serious problem that caused many patients to be harmed or die as a result of not being given the wrong medication due to a confused doctor's line, which is sometimes understood in the wrong sense, is the negative effect on the patient's treatment and life, as confirmed by (Noraziani et al., 2013**)**

explained that the system is used easily by employees and that they do not find it difficult to use, which made it easier for them to work and boosted their productivity**.**

Flexibility in the use of the electronic system has saved a lot of time for medical staff to view patient data and speed up the task of treating them (Breton et al., 2021)

The pharmacy department receives the prescription through the system, and the medication is given to the patient or one of his companions. This provides a list of the patient's precise medications, which was shown in Study 6, as well as the radiology department, where the radiologist or technician receives the name of the X-ray image to be performed. This speeds up the delivery of the required service and improves the use of radiology tests (Wang et al., 2003), thus improving the level of health services and promoting and increasing healing (Breton et al., 2021; Noraziani et al., 2013), in addition to its role in supporting scientific research and clinical research (based on the word bed, i.e., research done on the patient while in the hospital bed, often through a comparison between a patient and another patient who is not receiving treatment for the same reason and information, where the patient receives the same treatment and the same results are improved because it is easy to access information in electronic records and to collect it using a process of searching the wanted person and then store it in lists or tables. Clinical research has spread widely with the proliferation of electronic systems because it is easy to get to an accurate and reliable source of comparison. Collecting information from the paper system is very difficult and takes a lot of time and effort, in addition to the difficulty of obtaining the same information and the difficulty of organizing it, and this is consistent with studies (Breton et al., 2021; Brundin-Mather et al., 2018; Z. Wang et al., 2020)

The mechanism of dealing with the patient according to the use of the electronic medical records system for each hospital:

- In Hebron Government Hospital, when the patient arrives at the hospital:

- he or she goes to the Department of Registration and Accounting, which checks for the presence of the patient's previous file through the ID number.
- The patient then pays the registration fee of ten shekels to the insured person (the person who holds the health insurance), twenty shekels to the uninsured person.
- then transport the patient to the emergency room, which is called the reagent, where there is a nurse who takes the vital signs (pressure, heartbeat, temperature) and according to the patient's health condition, which he or she refers to the other emergency room, in which the necessary treatment is provided.
- The patient is then transferred to the registration and accounting department, which entails the patient's exit or transfer to the emergency room's specialist, who determines the patient's access to the emergency room (the patient's name and the location of the emergency room's treatment) Endoscopy, Blood, Nerves, Internal) or Children's Section, Section of Surgery (urology, ENT nose, ear and throat, general surgery, orthopedic surgery, vascular surgery, neurosurgery), which in turn serves and discharges the patient or gives medication and then leaves or orders the necessary tests and radiology, called the order of the physician (pre diagnosis) where the physician sends the name of the imaging or examination (the order) to register and there the patient or his or her companion goes to register and account to pay the required amount at the minimum and type of insurance, unless the patient is a child under five years or a disabled insurance or a student who has been involved in this case or order of the patient's registration, then the doctor submits the application or order to the laboratory. The situation is somewhat different, as the patient or his companion visits the pharmacy first before accounting until the order appears. The availability of the medication or not is

determined, and the appropriate dosage, where the patient has a piece of paper with the patient's file number on it, through which the pharmacist enters the system electronically and obtains the information he is allowed to access as everyone who has authority according to his location is known, the right to register is limited to general information about the patient, such as the identification number, the things mentioned previously, the authority of the treating physician to allow him to see the previous illnesses, previous and current procedures, the previous and current treatments, and every physician whose competence is different from the other physician. The same is also the case for the pharmacist, whose powers include reviewing the medication that was prescribed by the doctor for the patient to be dispensed, after which the patient goes to the accountant who will charge for the medication, and then he returns to the pharmacy to take the medicine that was allocated for him unless the patient (a kidney or blood patient is in this case exempted and does not pay for the medication). Or the patient is referred to the departments, in which case the patient is referred to make a file based on the patient's section in which he will be divided, or to the patient's section in which is to be referred to another room, or to the patient's hospital for transfer to be referred to a doctor, or clinic. In either case, if the patient receives treatment or medication and leaves the required official sum only, then leaves the hospital. In the case of the patient's admission to the departments, all the treatment, tests, radiology images, surgeries, and medical services provided to the patient, are free of charge, if the patient is insured.

If the patient comes to the hospital with a referral from (Doctor, Health Clinic), the doctor who told the patient to the Emergency Department if the patient is in a hurry, such as a person suffering a stroke, or the Outpatient

Department, then in turn at the hospital they do the necessary as previously mentioned.

Al-Ahli Hospital is a private hospital established in Hebron in 1988. The system was based on paper and in 2000 the whole system was converted to an electronic system. The hospital system works in Palestine according to HIS (hospital Information System) which means the information system for hospitals, but the electronic hospital system is considered a financial administrate system more than the medical aspect. In the end, it goes to the hospitals' interests

When the patient arrives at the hospital:

• patient goes to the reception and accounting department. This department transfers the patient to the emergency department. In the emergency department, there is a doctor who decides the condition of the patient, who is required by the clinic or the Manama department.

• The patient is then sent to the reception and accounting department again to pay the amount due for the treatment process. The reception department has been designated the

department to which the patient is going after the patient accounts the reception and accounting department for the amount that he must pay. The receiving and accounting department turns the patient into the department that was designated for him to begin the treatment he needs. Before transferring him to the necessary department, it enters the necessary data about the patient electronically through the electronic records of his system, which are known as any type of information that was created and stored on any computer system or similar device, as it involves a lot of assistance and help in the organization. (Electronic Records Management, 2012).

A patient's record is created containing the following information (the patient's file number, the patient's name, the disease in general, not detailed, the date of admission, the department, and the amount paid.(

When the patient is transferred to the department in which he will be treated, the patient's condition is accurately diagnosed on paper files, not electronic files. For example, if the patient enters the hospital with a diagnosis of pneumonia, the type of inflammation is not detailed in electronic records, but it is detailed in paper according to the interests of the hospital. The hospital endeavors to develop the system to make the medical diagnosis fully detailed in the electronic record and link the medical diagnosis to the treatment plan.

In the treatment department, whether it is the clinics or the Manama department, the doctor electronically accesses the patient's record,

which was created according to his powers, and adds the medicines prescribed for him, the necessary radiology, an informal and unclear diagnosis (the disease in general, as mentioned previously), and the tests. The doctor then sends the rays, if radiographs are required, to the radiology department electronically, with the name of the required images. If the patient needs to perform certain tests, the doctor also sends the tests electronically to the laboratory.

The results are provided immediately to the doctor electronically via the system, as well as for surgical operations, or medical procedures. In the case the patient has been transferred to the Manama department before the patient leaves the hospital, he is referred to his special reception department (Manama accounting) accounting for the amount paid for the completion of the medical procedures, and the payment of the medical procedures.

Figure (4.1): Hebron Governmental- Chart
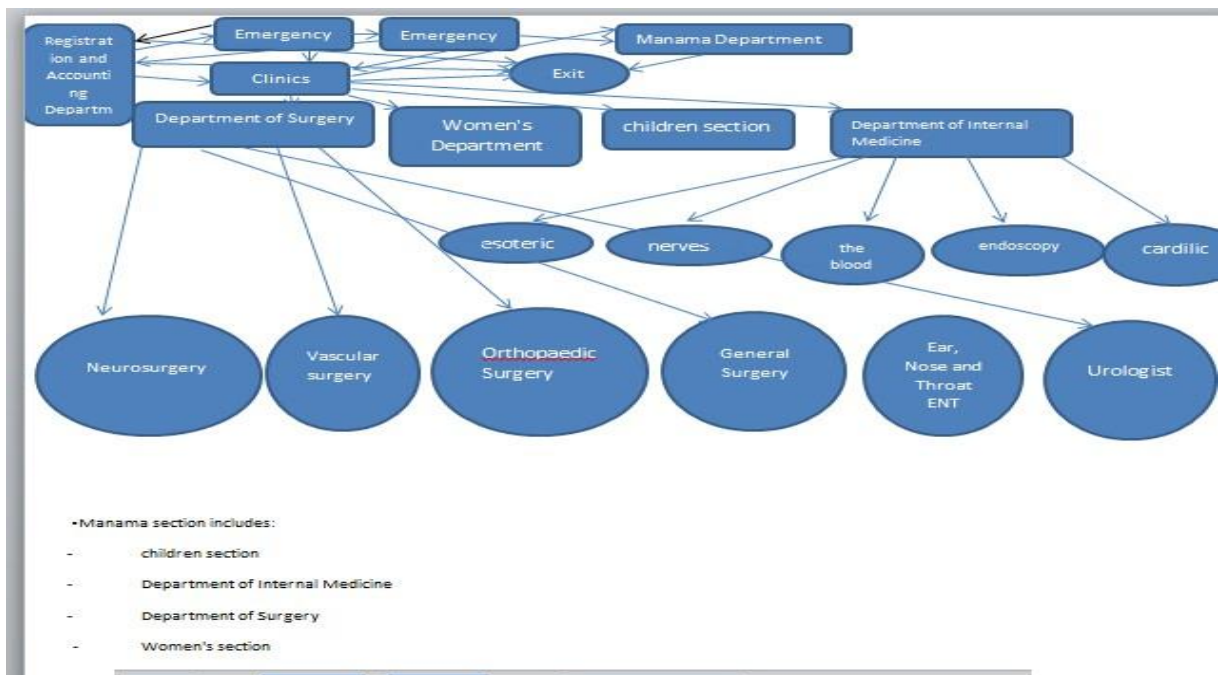
Figure (4.2): Al Ahli- Chart
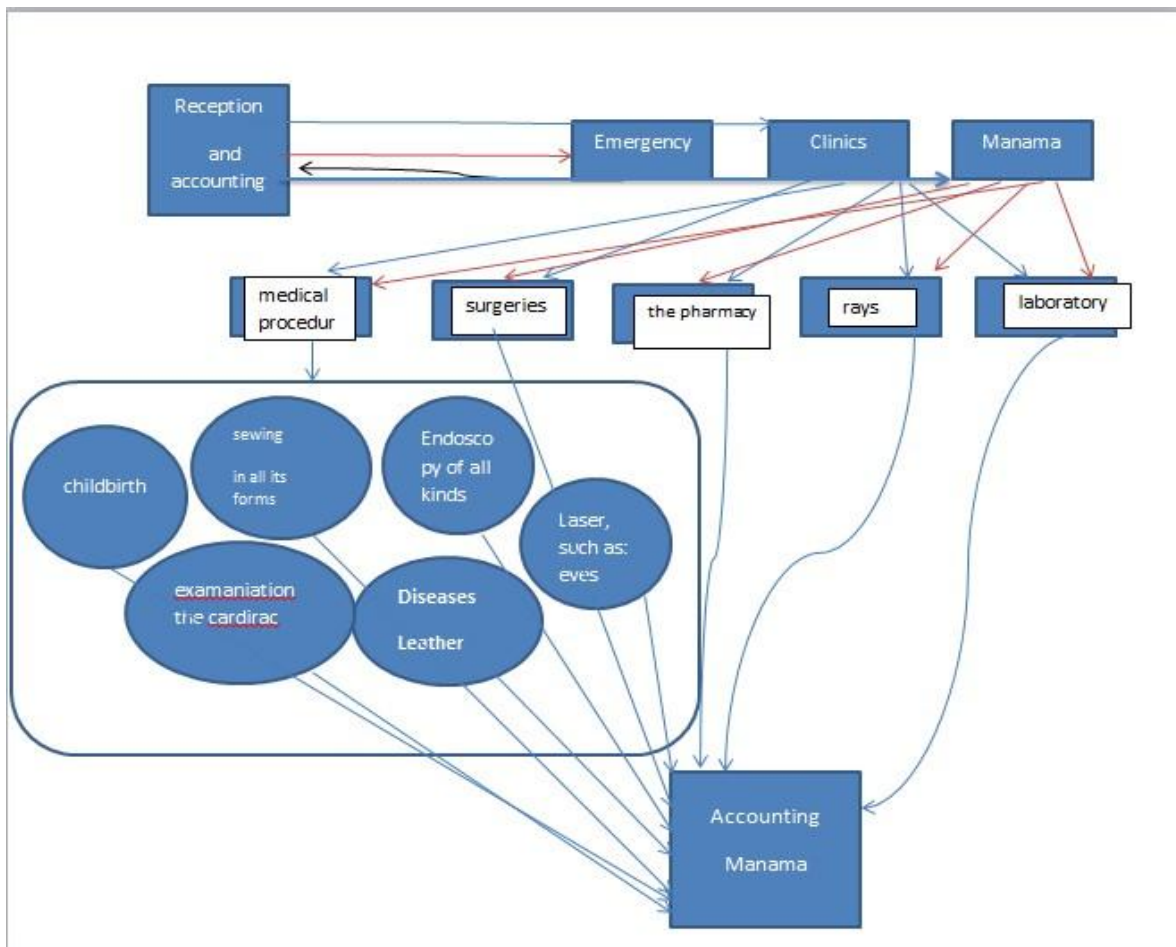
Through the interviews, there was a special part questions to identify the problems facing the electronic medical records system in the Palestinian hospitals under study accurately; as the questionnaire maybe not cover all the administrative problems in the hospital, in addition that some of the staff's answers to the questionnaire may be inaccurate. The other aim from this questions is to know capabilities of the hospitals to implement the dashboard with its system.

Q1: As it is known, despite the many advantages offered by any electronic system, there must be problems related to its use. What problems did you encounter while using and managing the electronic medical records system in the hospital?

Q2: A modern term called the smart Dashboard has appeared. What is your definition of this term and what is the importance of its application in hospital systems?

Q3: If we assume the existence of a system that combines the electronic medical records system and the interactive Dashboard, what are your suggestions that would enable the hospital to implement a system that combines the electronic medical records system and the smart Dashboard?

Table (4.22): The results of the interview analysis

Interviews	Q1	Q2	Q3

Interview 1	• The human element does not respond to data entry
	  ❖ Work pressure
	  ❖ The elderly are not aware of using the system
	  ❖ Insufficient training to use the system
	  ❖ Difficulty exchanging data between doctors; due to work pressure.
		the definition: A panel that gives direct statistics and direct statistical figures to see the flow of data in the system directly. (For a quicker view of the existing situation).
		
		Importance:
		
		• Very important
			The hospital database that is durable, strong, and secure, and it needs support, because the Movement of patients is very, very large.
			
			Its increase qualitative leap and a qualitative

	• Administration
	  ❖ High cost of software
	  ❖ Development and maintenance costs
	  ❖ Infrastructure is very expensive
	  ❖ Limited number of devices
	
	If necessary, the staff is increased, for example, in the outpatient clinics, there is a computer assistant who enters the data while the doctor treats.
		in the process of planning and increasing productivity and improving performance for management, for the doctor, for the entrance, for the secretary (putting the entered data directly).
		• There is immediate intervention by the administration to solve any problem and for development, forexample: medicine are provided faster.
			improvement in the development of these services;
			
			Because it reduces distraction, and provides
			
			the display of huge information in an easy and fast manner.

Interview 2	• Most of the devices are old, the hospital was supported by a limited number of modern devices. • System difficulty, • Because the programmers are Turkish and the language of the system is Arabic, and the health system in Turkey is different from the system in Palestine, which required many modifications. It takes a long time to practice using it. • Difficulty learning for older employees to use the system. • slowness of work; Because all the added hospitals (Dura Hospital, Halhoul Hospital Military Hospital)are connected to the same servers and hardware's.	Never heard of this term before, but The electronic hospital system (HIS) was connected toDashboard-like system called (backs), which provides the administration with information on a regular basis.	The existing System meets the needs of the hospital.

By answering the first question, noted the agreed-upon ideas:

- The difficulty of the elderly learning the electronic system and the difficulty of dealing with it.

- The system needs modern equipment with high specifications and servers, and there is a shortage of them in hospitals because of their high cost.

- Insufficient training of staff to use the system.

- Difficulty exchanging data between doctors; due to work pressure.

By answering the second question, noted the agreed-upon idea:

- The necessity of applying the Dashboard in hospital systems, for its role in displaying the flow of information directly, which significantly improves the planning, development, and administrative control process in the hospital in light of the work pressure in it

Through the foregoing, concluded the hospitals succeeded in facing the obstacles until they converted their systems into electronic systems, through patience for their employees to learn the systems and help them accept the idea, and this is the basis for the success of any institution and to ensure its survival in the market in light of the existing market competition, and this is one of the objectives of the administration modernity that seek to enhance.

In order for hospitals to be able to face the work pressure on them, to save time and effort for both administrators and medical staff, and to improve the planning, development, and production process, they must enter the Dashboard and link it to their electronic systems.

The results of the interviews and questionnaires were concluded in Al-Ahly and Hebron Governmental Hospitals; There are many problems facing the electronic system, the elderly are not aware of using the system, Insufficient training to use the system, high cost of software, development and maintenance costs, infrastructure is very expensive, limited number of devices.

But the benefits are much greater than those problems. As these hospitals were described as large-sized institutions, the electronic medical record system came as a solution to paper-based problems in those hospitals, and it also helped serve a larger number of patients, saving the time and effort of the treating physician and contributing in improving health care for the patient by providing more accurate data, as it facilitates the process of displaying and retrieving patient data and information, and this is consistent with the results of the previous studies that were mentioned.

Whereas, at Al-Yamamah hospital, the system used in this hospital is a paper-based system, and the electronic system in this hospital is restricted to the reception department, which consists of: (records containing the patient's name, date of admission, the section to which he entered, date of discharge, the amount due, and the remaining amount of the account if the account is not paid in full at admission), and the radiology department, where there is an internal network through which images are transmitted to clinics and departments such as the intensive care section (ICU); because the size of this hospital is small compared to government hospitals, and the patient's demand for it is described at an acceptable rate (as it is met by individuals with relatively high incomes, transfers from the government hospitals, in cases of emergency treatment), so that the hospital system is based only on these cases, so on the extent, and their economic, so if the hospital system will electronic system, its is very expensive and requires a good technological infrastructure. This structure needs expensive high costs to build, and the hospital may have to sacrifice some security and protection measures if it wants to build a computerized system within its limited financial means. This is what was confirmed in Study (Noraziani et al., 2013; S. J. Wang etal.,2003).

The results of the questionnaires and interviews were a set of problems that were mentioned, most notably:

- Staff not receiving adequate training on the system, this was evident by answering the first question of the interview**.**
- The system requires maintenance and infrastructure costs, this was evident by answering the first question of the interview, In addition to the questions of the fourth dimension of the questionnaire (cost**.(**
- Some employees are not sufficiently knowledgeable about technology, especially the elderly, this was evident by answering the first question of the interview, In addition to analyzing the demographic variables in the questionnaire**.**
- The system does not adequately enhance the speed of work completion by employees, by analyzing the responses to the speed dimension in the questionnaire**.**
- The system is not flexible enough, and does not achieve the process of exchanging information between departments, this was evident by answering the first question of the interview, In addition to the questions of the dimension(accuracy) of the questionnaire

In this research, we are still going to solve all the problems and leave some of them for further studies. A solution will be presented to the problem of exchanging information between departments and to the problems of flexibility in the system and ease of use in a way that makes it display icons and charts in a way that enables display of information in a larger, easier and faster way**.**

This is done using the dashboard.

Chapter V
Integration of Dashboard with EMR

5.1   Introduction

In this section, an overview of the Dashboards will be discussed in general, and the Dashboard that was chosen to solve some of the problems obtained from the questionnaires distributed to the hospitals under study, as well as the interviews, will be talked about.

Using the Dashboard to solve the problem of the difficulty of exchanging data between doctors and departments in the hospital, and to display the huge information required as quickly, more accurately, and with less effort. Request reports from departments permanently and immediately.

As for other problems, such as the difficulty of the elderly accepting and learning the electronic medical system, their solution is entrusted to other studies.

5.2   A glimpse of some of the Dashboards and the open EMR

Almost all Dashboard tools are paid. They may give you a trial for just 30 days like Dashboard builder, Falcon, ColorLib, Ubiq, etc.

Even the free version of it does not enable you to make charts and analyses, or it may enable you to make only one table from the database tables.

Concerning open source Electronic Medical Record programs, almost all of them give you a trial for just 14 days like kareo

kareo is an integrated system for EMR system, it provides you almost services need to your patient, and the patient can use this system but surely not all the permissions that are available to the admin or doctors.

And when you request a demo (trial) an option shows you this massage (Someone from Kareo will be in touch soon to schedule a meeting. looked forward to helping you build a customized solution for your practice(.

The Kareo Platform mission

Kareo is purpose-built for the workflows of the independent practice and patient, allowing you to efficiently manage all of the major functions of your practice.

Products of kareo platform (Kareo Clinical, Kareo Billing, Kareo Engage, Kareo for Billing Companies, Managed Billing, Telehealth Care for patients using HIPAA-Compliant video, Patient Payments, Streamline the patient self-pay process, Patient Statements, Analytics, Kareo Cloud, Mobile Apps, Marketplace gives Applications and services from partners.

You can download it but you must pay by visa card every month. It's easy to use and written by the simplest language c++.

Problems you faced it when you use it:

Not free.

Doesn't give you charts for all of your needs, just for the services it offered.

Users in this platform can manage some records, and that conflicts with our search goals.

5.3   System used

Used Power BI Desktop application to make the Dashboard. This application enables us to connect to any database in the required programming language, and it helps us achieve the required results through the three icons provided with it, as it displays the required charts and data clearly in front of you, without the need to press a button, which makes it easy for you to view all the required information in the least time.

The three icons of application Power BI Desktop :

Report View: Which displays in front of you all the required charts and information.

application mechanism

Where the user can create all the details you want (lists, text box, matrex, charts, headings) with the required characteristics and appearance in terms of font size, type, colors, transparency and background color, in addition to specifying the size of text boxes and charts in a way that enables them to be displayed on the screen clearly.

And through it you apply the filter feature.

Data View: This displays the selected database tables with all their data.

Model View: This enables you to create relationships and links between the tables whose data is required to be displayed on the report screen.

The Dashboard(Power BI Desktop) is linked with the program (open electronic medical record) through the database of the software being used. When powerBI Desktop is running, a list appears from which to choose the type of data to work on, the data is selected from the type of database (mysql database in this search) the data language in the Dashboard must be compatible with the database language of the open source program.

 Then a list appears to specify the name of the database, the host, and the port.

After that, all database tables appear on the Power BI Desktop application, and you choose the tables that you want to work on, and then you start forming relationships between them through Model View.

After making the relationship, work is done on the report view to specify the data to be shown on the dashboard screen and in the required format.

The first page was made to display the names of the patients with the ability to search for a patient by gender. When clicking on the name of any patient, all information related to this patient is displayed (his name, date of birth, city, the amount required for payment and the method of payment, the medicine prescribed to him and his dose, the clinic to which he belongs**)**

You can also view the information related to the drug (its required quantity, its available quantity, the patients it was dispensed to, the clinic it was dispensed to, the name of the duty pharmacist who dispensed the drug**)**

And you can view the information related to the clinics (the patients they belong to and the medicine dispensed to them**)**

This facilitated the exchange of data between clinics and doctors.

The open source electronic medical record software that was linked with the Dashboard tools (Power BI Desktop), it was named openEMR**.**

The OpenEMR platform**.**

OpenEMR is an open source program available free for anyone. All people can use demo version. It gives us a download feature. And it's easy to use**.**

Displays the user's Dashboard (Power BI Desktop)

Patients' names and patient information, gender, date of birth and the clinic to which the patient belongs, the amount paid and method of payment, the medication dispensed to the patient and the quantity of the dose dispensed, as the system displays the information of the medication dispensed to the patient (the amount available in the hospital pharmacy, Reorder, In order)**.**

This information was displayed at the request of users and according to the capabilities of the system used (openemr).

Expert Evolution of The Proposed Dashboard

The system was presented to a group of experts for evaluation. The evaluation model was built on the basis of designing the dashboard (Few, 2009.(

The system has been modified based on evaluations and appraisal forms attached to some experts before and after the amendment.

All comments were agreed: The line is not clear, the filtering feature must be activated, and some diagrams should be deleted.

Modifications have been made:

- The filter feature has been activated
- Screen and line illustration
- Remove unnecessary charts

The system received an evaluation rate of (4/5); thus it was finally approved

Concluded and Recommendations

conclusion

Through interviews and questionnaires, it was concluded that the general situation of the infrastructure in Palestinian hospitals needs development, as well as there is a general weakness in employing technology and lack of interest in it.

If they are better employed technology, this contributes to solving many administrative problems facing the Palestinian governmental and private hospitals alike.

5.5 Recommendations

- Use a Dashboard with clear titles, consistent colors, and good designs that are far from distraction, We suggest using the dashboard that was addressed in our study (Power BI Desktop); For several reasons, including: open source, easy linking with the medical system database, and supports several programming languages, in addition to ease of use..

  - Linking the huge database of EMR of hospitals with an appropriate Dashboard to save time and effort in searching for data and presenting it more accurately.

  - Using the Dashboard to display all kinds of medicines available in the hospital's pharmacy, their existing quantities, and any related information in the medicine table, to ensure that the medicine is available before it runs out and that no unnecessary medicine is dispensed.

Linking electronic medical records of government hospitals in Palestine with each other, and linking their database to a common Dashboard; To facilitate the transfer of patients and to obtain adequate and appropriate medicines in addition to treatments

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APPENDICES
APPENDIX A

Interview Questions

Q1: As it is known, despite many advantages and advantages offered by any electronic system, there must be problems related to its use. What problems did you encounter while using and managing the electronic medical records system in the hospital?

Q2: A modern term called the smart Dashboard has appeared. What is your definition of this term and what is the importance of its application in hospital systems?

Q3: If we assume the existence of a system that combines the electronic medical records system and the interactive Dashboard, what are your suggestions that would enable the hospital to implement a system that combines the electronic medical records system and the smart Dashboard?

QUESTIONNAIRE

Dear Sir/Madam/Ms

alsalam alaykum warahmat allah wabarakatuh

The researcher is conducting a study about Managing with intelligent Dashboards; A case study of EMR using Open Source tools, as a part of a Master's degree in information technology and systems management. This study aims to facilitate access to patient information for specialists to take the appropriate decision, provide the necessary information to the authorized person in the appropriate manner using smart Dashboard technology, incorporated in the electronic medical records system.

Therefore, the researcher developed a questionnaire to measure the success factors of using the EMR system in Palestinian hospitals, and the willingness of the hospital management and staff to use it. The questionnaire is directed to the employees of Hebron Governmental Hospital (doctors, nursing staff, laboratory, radiology, pharmacy, registration, computer department.(

Please spear a few minutes of your precious time to fill this questionnaire. Information collected from the participants will be treated strictly confidentially, and will be used only for research purposes. Only group data will be referred to in the result of this research.

Thank you in advance for participating in this study. Your participation and help is highly appreciated.

Administrative problems in the EMR

Researcher: Amal Issa Suleibe Supervisor: Dr. Ghassan Shahin

Gender *

Male ☐   Female ☐

1. Age*

   <25 ☐   25-34 ☐   35-44 ☐   45-54 ☐   >55 ☐

2. Highest educational stage*

   Community college ☐   BA ☐   Master's ☐   PHD ☐

3. Basic IT- Related skills *

   No skills ☐   fair ☐   good ☐   very good ☐

4. Job Tittle *

   Doctor ☐   nurse ☐   Technical ☐
   Medical Technical (labs) ☐   pharmacist ☐   ☐
   Physiotherapist ☐   Interim Student

5. Number of years working in the medical sector *

   <5 ☐   5-9 ☐   10-14 ☐   15-19 ☐   >19 ☐

Your personal opinion about the ease of use of the electronic medical records(EMR) system

(SA: Strongly agree, A: Agree, I: Indifferent, D: Disagree, SD: Strongly Disagree)

Question	SA	A	I	D	SD
I find the structure of the system clear*					
I find the rate completion task I perform through the system is minimal *					
I find the system flexible while using it * meaning that it is adaptable to changes					
I find the number of errors resulting from usingthe system is very small *					
It will be easy for me to become skilled in using this system *					
The system is easy to use (icons, screens,etc.)*					
The system facilitates scheduling of appointments for patients*					
The system reminds patients of their appointments*					
I can manage the amount of work generatedby the system *					
Using EMR makes fair distribution of work among employee / NA system*					
Using EMR helps me to done more work in the same time I was used it in the paper system*					
Using EMR helps me to done the work more accuracy *					
I can use this system to get things done more quickly *					
The electronic medical record system improves my performance *					
The electronic medical records system makes it easy for me to do my job*					
The system facilitates data exchange between hospitals departments *					
The system improves patient safety by authentication and password *					
Availability of resources to use the electronic medical records system *					
Availability of knowledge to use an electronic medical record system*					
Infrastructure to implement the system (electricity, computers, internet connection...etc) *					
The financial resources to operate and maintain the system *					
Interdepartmental cooperation*					
Allow the senior management of each					

department to carry out its tasks directly*					
I received adequate training in order to usethe system *					
There is periodic maintenance of the system*					
System improvement in light of feedback*					
Any comments /suggestions are welcome…………………………………………………………					

Thank you for sharing some of your time with us in this survey. The study team really appreciates the information you provided, which will contribute to developing appropriate plans for the problems of the electronic medical records system in Palestine. For more information about this study and how the information and results will be used, feel free to reach out at suleibeamal@gmail.com

APPENDIX C

APPENDIX C

State of Palestine
Ministry of Health
General Directorate of Education in
Health and Scientific Research

Ref. ....
Date ....

To:02222722S

دولة فلسطين
وزارة الصحة
الإدارة العامة للتعليم الصحي
والبحث العلمي

الرقـم: ....
التاريخ: ....

الأخ مدير عام الإدارة العامة للمستشفيات المحترم،،،
تحية واحترام،،،

الموضوع: تسهيل مهمة بحث

يرجى التكرم بتسهيل مهمة الطالبة: امل عيسى صليبي، ماجستير تكنولوجيا المعلومات
وإدارة الانظمة– جامعة الخليل، لعمل بحث بعنوان:

" الإدارة باستخدام لوحة المعلومات الذكية – حالة دراسية للسجلات الطبية الالكترونية

بالاعتماد على الادوات مفتوحة المصدر "

حيث ستقوم الطالبة بجمع معلومات من طريق تعبئة استبانة من قبل الموظفين وذلك في :
مستشفى عالية/التحليل الحكومي. مع العلم ان مشرف الدراسة د. جواد ايوب ابو صبيح،

على أن يتم الالتزام بجميع تعليمات وإجراءات الوقاية الصادرة عن وزارة الصحة بخصوص
جائحة كورونا، وتحت طائلة المسؤولية،

على أن يتم تزويدنا بنسخة من نتائج البحث والتعهد بعدم النشر.

مع الاحترام،،،

89

APPENDIX D

بسم الله الرحمن الرحيم

جامعة الخليل

كلية الدراسات العليا

ماجستير

نموذج رقم (19)

تدقيق لغويّ(عربي، إنجليزي)

قبل مناقشة الرسالة

اسم الطالب/الطالبة : آمال عيسى حاج مليص

رقم الهاتف: ...0598982433

الرقم الجامعي: 21819069

التوقيع: .... آمال

البرنامج : تكنولوجيا المعلومات وإدارة الأزمة

التاريخ : 2023/4/2

أفيد سيادتكم علما بان الرسالة الموسومة بـ :

عنوان الرسالة باللغة العربية :ـ

الادارة باستخدام لوحة المعلومات الذكية ـــ حالة دراسية للسجلات الطبية الالكترونية بالاعتماد على الادوات مفتوحة المصدر

عنوان الرسالة باللغة الإنجليزية :ـ

Managing with intelligent dashboards

A case study of EMR using Open Source tools

تم تدقيقها لغويًا من حيث : (الصَياغة اللغوية السليمة، والتشكيل، والترقيم)، وهي صالحة بصورتها اللغويةِ الحالية.

اسم المدقق والتوقيع: عبد الله حافظ أبو سنينة

الرتبة العلمية: ماجستير لغويات وأساليب تدريس لغة إنجليزية

عنوان العمل: مدرسة سيدنا إبراهيم الخليل

رقم الجوال: 0569330520

الإيميل: abdullah-snaineh@hotmail.com

التاريخ: April/2/2023

APPENDIX E

<div align="center">

Evolution paper

Thesis Subject : Managing with intelligent dashboards

A case study of EMR using Open Source tools

</div>

Criterion	Evaluation				
	1	2	3	4	5
• Do you meet the design standards of the dashboard in terms of color consistency?				✓	
• Does the dashboard design standards are met in terms of not distracting the user?			✓		
• Does the dashboard meet the criteria for designing the dashboard in terms of simplicity and ease of use?			✓		
• Does the dashboard display the data clearly and orderly?		✓			
• Does the dashboard contribute to reducing work pressure in the process of searching for the required flowing data?			✓		
• Does the dashboard contribute to facilitating the presentation of electronic medical system data to the hospital director or the medical staff?				✓	
• Does the dashboard provide the ability to display the required medical system information at any time required?			✓		
• Does the dashboard contribute to saving the time and effort of the pharmacy department, by displaying the drugs that have been sold out, and the remaining drugs?				✓	
• Does the dashboard contribute to facilitating faster data exchange between hospital departments?				✓	
Does the use of the dashboard enhance the feedback process?				✓	

Any additional notes are welcome: .... amount by from ....

more readable .... filters

....

Student : amal suleibe   Supervisor : Dr.Ghassan shaheen

Evolution paper

Thesis Subject : Managing with intelligent dashboards

A case study of EMR using Open Source tools

Criterion	Evaluation				
	1	2	3	4	5
• Do you meet the design standards of the dashboard in terms of color consistency?				✓	
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• Does the dashboard contribute to facilitating faster data exchange between hospital departments?				✓	
Does the use of the dashboard enhance the feedback process?				✓	

Any additional notes are welcome: 1) need to be Auto Refres
....
2) the header is has clear
3) first page have all needed
Securl page have specialized
their good idea

Student : amal suleibe   Supervisor : Dr.Ghassan shaheen

المهندس مروان مصطفى شحاده
رئيس دائرة الحاسوب والتكنولوجيا
المستشفى الأهلي

٨/٤/٢١

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Evolution paper

Thesis Subject :Managing with intelligent dashboards

A case study of EMR using Open Source tools

Criterion	Evaluation				
	1	2	3	4	5
• Do you meet the design standards of the dashboard in terms of color consistency?				✓	
• Does the dashboard design standards are met in terms of not distracting the user?			✓		
• Does the dashboard meet the criteria for designing the dashboard in terms of simplicity and ease of use?			✓		
• Does the dashboard display the data clearly and orderly?		✓			
• Does the dashboard contribute to reducing work pressure in the process of searching for the required flowing data?			✓		
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• Does the dashboard contribute to facilitating faster data exchange between hospital departments?				✓	
Does the use of the dashboard enhance the feedback process?				✓	

Any additional notes are welcome: .... amount by fram تكون و اضحة

more readable الاحصائيات [المخطط البياني] و ترتيب

filters لكل وحدة و حسب عمل التقارير (احتياج الادارة) غير منطقية

المعلومات التي يتم عرضها تكون مختلطة من قبل اشخاص مستخدمين (المدير التنفيذي)

Student : amal suleibe   Supervisor : Dr.Ghassan shaheen

Evolution paper

Thesis Subject :Managing with intelligent dashboards

A case study of EMR using Open Source tools

Criterion	Evaluation				
	1	2	3	4	5
• Do you meet the design standards of the dashboard in terms of color consistency?			✓		
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• Does the dashboard contribute to saving the time and effort of the pharmacy department, by displaying the drugs that have been sold out, and the remaining drugs?					✓
• Does the dashboard contribute to facilitating faster data exchange between hospital departments?				✓	
Does the use of the dashboard enhance the feedback process?				✓	

Any additional notes are welcome: .... طلب المشترك الذي اعمل عنه أو حرفي ....
....

Student : amal suleibe Supervisor : Dr.Ghassan shaheen

3 - 4 - 23

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Evolution paper

Thesis Subject :Managing with intelligent dashboards

A case study of EMR using Open Source tools

Criterion	Evaluation				
	1	2	3	4	5
• Do you meet the design standards of the dashboard in terms of color consistency?				✓	
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• Does the dashboard contribute to facilitating faster data exchange between hospital departments?					✓
Does the use of the dashboard enhance the feedback process?					✓

Any additional notes are welcome: .... حول تعميم فكرة هذا الـ dashboard

.... على كامل انظمة الاخرى في المشفى لما لها من اهمية

تحسن عمل المشفى وتطوير المعلومات

ن الراي

19/4/2023

Student : amal suleibe   Supervisor : Dr.Ghassan shaheen

APPENDIX F

Questionnaire Reviewers

Dr. Nancy Al-Rajei - Palestine Polytechnic University Dr. Hamza Mujahid - Al-Quds Open University

Dr. Bilal Amr - Hebron University

Dr. Manal Al-Sharbati & Dr. Fadi Al-Shrouf - Palestine Technical University (Arroub Branch)

APPENDICE G

Evaluation Experts

Dr. Nancy Al-Rajei - Palestine Polytechnic University ENG.

Marwan Shehadeh- AL-Ahli hospital

Dr. mohannad aljabari & Dr. Ibraheem Ahmaro- Hebron University

APPENDICE H