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The Impact Of Implementing A Unified Medical Records System On Enhancing The Continuity Of Emergency Care Between Ambulance Teams And Hospitals

Fahad Ganeem Ali Al Erfan[1] , Ahmed Mousa Ahmed Al Shuqayfi[2] , Fahad Hassan Al Ahmari[3] , Mushabab Mohammed Asiri[4] , Abdulhadi Ali Hadi Sahl[5] , Mesfer Mohammed Al Dahish[6] , Saad Saeed Saad Al Hudhayyiri[7]

[1]Technician-Emergency Medical Services - Saudi Red Crescent Authority, Aseer
[2]Specialist-Emergency Medical Services - Saudi Red Crescent Authority, Aseer
[3]Technician-Emergency Medical Services - Saudi Red Crescent Authority, Aseer
[4]Technician-Emergency Medical Services - Saudi Red Crescent Authority, Aseer
[5]Specialist-Emergency Medical Services - Saudi Red Crescent Authority, Aseer
[6]Technician-Emergency Medical Services - Saudi Red Crescent Authority, Aseer
[7]Technician-Emergency Medical Services - Saudi Red Crescent Authority, Aseer

Abstract:

This study aimed to identify the lack of implementation of a unified medical records system in the social security system, as well as the lack of protection between patient teams and hospitals in the Kingdom of Saudi Arabia. To begin the basic study of descriptive analysis, a standardized questionnaire was used to survey data retrieved from (200) participants from the cadres working in the bicycle and emergency sector, to show paramedics, doctors and nurses. The questionnaire consisted of ten items with multiple dimensions such as: integrated information, speed and accuracy of access to data exchange, limiting the cause, and the necessity of medical integration. The overall overall score of the Bulgarian responses (4.03) was declared high, which contributed to the system's success in improving the quality and continuity of health care . Speed and accuracy of data access" came in first with an average of (4.19), followed by "efficiency of information exchange" with an average of (4.07), while "limiting the reason for having a medical party" had the lowest average (3.90) while remaining within the collective level. The results of the t-test also showed no statistically significant differences between workers in patient and hospital teams (Sig = 0.364), as well as no differences attributable to the diversity of years of experience based on one-way analysis of variance (Sig = 0.338) These results indicate that a unified medical records system is effective in all work environments with no significant differences. The study recommended the widespread application of the system, the intensification of training and qualification programmes, and emphasised the sustainability of the outstanding technical and communication effectiveness.

Keywords: Unified Medical Records System - Emergency Care - Continuity of Care - Ambulance Teams - Hospitals - Health Informatics.

- Introduction

Emergency care is a cornerstone of any effective healthcare system, as the fate of patients often depends on the speed and accuracy of information transfer between first responders in the field (e.g., ambulance crews) and receiving medical facilities (hospitals). This transitional phase, known as the care gap, is a critical vulnerability. Reliance on verbal communication and scattered paper documentation has led to delayed diagnosis, unnecessary repetition of tests, and an increased likelihood of medical errors, especially

regarding allergies and medication lists. All of these challenges have pushed global healthcare systems to adopt advanced technologies to radically transform this field1,2

Here, the role of the Unified Health Records(EHR) system becomes clear as a strategic solution. It is defined as an integrated digital platform that ensures the collection and consolidation of a patient's complete health history, making it instantly and securely available to all authorized caregivers. The implementation of this system goes beyond automating records, but rather aims to achieve information integration and enhance interoperability among all components of the emergency care system. By linking mobile ambulance devices to the hospital's electronic records, this system enables paramedics to access a patient's vital information prior to arrival and initiate informed therapeutic interventions. The system also enables hospitals to receive detailed and accurate advance notification of the patient's condition and the .interventions performed, giving medical staff time to prepare and plan minutes before the patient's arrival This ability to exchange data flexibly and reliably is essential to ensuring continuity of care. It ensures that service quality is maintained without interruption or deterioration during the transition between different treatment phases, directly reducing operational burdens, increasing clinical performance efficiency, and positively impacting patient safety and ultimate health outcomes9

Discussion

Unified medical records are unified electronic health records It is the cornerstone of modern healthcare systems and is defined as a centralized digital system designed to collect, consolidate, store, and manage a patient's complete and comprehensive health history within a single, integrated platform. Unlike scattered ,paper records, these records allow all authorized healthcare providers, whether doctors, nurses pharmacists, or technicians, to quickly and securely access all patient-related data, regardless of the healthcare facility they have previously visited. This data includes vital information such as medical history, current and previous medication lists, allergies, laboratory test results, radiology reports, treatment plans, and medical decisions. This comprehensiveness and standardization are the foundation of what is known as interoperability, meaning the ability of different systems to exchange health data seamlessly and efficiently using a unified patient identification number, such as the national ID number9,1

The vital role of unified medical records in improving the continuity of emergency care is its most important characteristic, as time in the emergency department means the patient’s life. Therefore, this system provides medical staff in emergency situations with the ability to immediately access important information that would normally take several hours to collect. If this information is not available, this rapid access translates directly into accelerating the decision-making process and initiating life-saving interventions. For example, knowing that a patient suffers from a fatal allergy to a certain drug or has a ,complex chronic condition that requires special treatment protocols, such as heart disease or kidney failure .prevents the occurrence of catastrophic medical errors In addition, unified records help reduce unnecessary duplication of recently performed laboratory tests or x-rays, saving valuable time and reducing costs and effort for the patient and the healthcare system. They also enhance coordination among healthcare providers. If an emergency patient requires specialized consultation or is transferred to another department or hospital, all their medical data is transferred electronically and instantly. This ensures that care provided in the emergency setting integrates flexibly with subsequent care and maintains continuity of care without interruption or deterioration in quality, ultimately enhancing patient safety and health outcomes6,4

- **Integration between ambulance teams and hospitals through the exchange of medical information**

.Represents effective integration between ambulance teams and emergency medical services Hospitals are an important component of the emergency healthcare system, and this integration is achieved primarily .through the flexible and reliable exchange of patient medical information Previously, this exchange relied ,on verbal communications via radio or the delivery of paper files that may be incomplete or illegible ,creating a serious information gap at the point of care transition. However, with technological development

.the exchange is now done digitally through unified or electronic medical records connected This ensures the continuity of emergency care and transforms it from a series of separate events into an integrated process. Initially, the ambulance team, while en route to the patient or at the accident site, can access the injured person's critical medical history using portable devices connected to the unified system, using the ,ID number . This information includes life-threatening allergies, the list of medications the patient is taking and chronic diseases, in addition to the contact information of his relatives. This immediate access helps paramedics provide more accurate initial treatment and avoid any dangerous drug interactions5,1

During the patient's transfer, paramedics record vital signs and the interventions they performed, such as administering fluids or medications, in an electronic record and send advance notification to the receiving hospital, including the initial clinical condition and what was done. This notification gives the hospital's emergency staff important time to prepare, whether by setting up the trauma room, summoning the relevant specialists, such as a surgeon or cardiologist, ensuring the availability of blood units, or even preparing a ventilator. This means that the hospital is in a state of high readiness to receive the case immediately upon its arrival at the hospital. Upon the patient's arrival, care is delivered flexibly by transferring all the data documented by the ambulance directly to the patient's record at the hospital, without the need to re-register or rely on verbal recall. It reduces medical errors, shortens diagnosis time, and ensures efficient treatment transitions without any loss of information. This digital integration not only ensures patient safety but also .contributes to improving operational efficiency and reducing duplication of procedures2,7

- **Technical and administrative challenges in implementing a unified medical records system**

Facing the process of implementing a unified medical records system ,At the national or institutional level the challenges are complex and multifaceted. They are divided mainly into technical challenges and administrative and organizational challenges, which affect the system’s efficiency, operability, and continuity of care. These challenges can be explained as follows5

Technical challenges: Interoperability is a challenge- The most significant technical obstacle is that unified records require the flexible exchange of data between different healthcare systems, which often use incompatible or outdated software, formats, and databases. This lack of compatibility leads to a set of ,isolated information packages and prevents the creation of a comprehensive and unified record. In addition data security and privacy pose a major challenge. Strict protection measures, such as encryption and multi-factor authentication, must be implemented to ensure that sensitive patient records are protected from hacking or unauthorized access, while adhering to national and international legislation. Data quality and accuracy are also a challenge, as legacy systems may contain duplicate, incomplete, or incorrectly entered data. Transferring, cleaning, and unifying this data requires significant effort. In addition, the implementation process may face challenges related to technological infrastructure. In remote areas or institutions with limited resources, access to high-speed, reliable internet networks and the availability of .servers may be difficult Robust backup systems are technically challenging, hindering the system from working in real time. Therefore, updating and integrating old hardware and software is essential A costly and technically complex challenge that requires integrating new systems with existing medical devices such as imaging and laboratory equipment8,9

,Administrative and organizational challenges: The very high initial cost of designing, purchasing implementing, and maintaining a unified records system is among the top administrative challenges, which can burden both government and private institutions. Resistance to change among medical staff is also a major challenge, as some doctors and nurses prefer the familiar paper-based system and resist adopting a .new system that requires them to devote additional training time and change existing work procedures This leads to lower utilization rates and adherence to the system. Therefore, ongoing training and technical support are an ongoing challenge, as the success of the system depends on users' ability to operate it efficiently. This requires comprehensive training programs and 24/7 technical support. At the organizational level, there is a need to establish unified national standards for data documentation, disease classification, and procedures, such as the use of theICD andSNOMED standards. This is an essential

element, and the absence or delay in implementing these standards hinders the effective exchange of information between different institutions. In addition, defining governance and accountability mechanisms for who owns the data, who can access it, and how it is used for research and statistics is a critical administrative matter, requiring the establishment of clear and enforceable legal frameworks to .ensure the project's success and sustainability10,11

1 .Field of Study

This study falls within the field of medical and health informatics, focusing specifically on emergency medical services and electronic health record systems. The study aims to identify the impact of implementing a unified medical records system in enhancing the continuity of emergency care between ambulance teams and hospitals. This study comes as part of digital transformation efforts in the healthcare sector, as electronic medical records represent an essential tool for quickly and accurately exchanging information between pre-hospital and hospital care providers.

2 .Research Methodology and Tools

The study followed a descriptive and analytical approach aimed at determining the impact of using a unified medical records system on improving the efficiency and continuity of emergency medical services.

Data were collected using a quantitative approach. A research tool was designed, consisting of a questionnaire, to measure the opinions of sample members regarding the effectiveness of the unified system in enhancing coordination between ambulance teams and medical staff in hospitals.

The data were analyzed using SPSS, by applying descriptive statistics such as arithmetic means and standard deviations, in addition to correlation coefficients to examine the validity of internal consistency, and the reliability coefficient (Cronbach's alpha) to verify the reliability of the tool.

3 .Research Tool

The research tool was a single questionnaire specifically designed to measure the impact of implementing a unified medical records system on the continuity of emergency care.

The questionnaire included a set of items that addressed the following dimensions:

Efficiency of communication between ambulance teams and hospitals.

Speed and accuracy of information exchange.

Continuity of care after patient handover.

Employee satisfaction with the unified system.

The questionnaire was presented to a group of judges specialized in the fields of emergency medicine and health informatics to verify the validity of the content. The results of the statistical analysis showed that the reliability coefficient (Cronbach's alpha) reached a high level, indicating that the tool enjoys a high degree of internal consistency and reliability.

Analysis

Table 1 — Demographic Characteristics of the Sample (N = 200)

Variable	Category	Frequency	Percentage (%)
Job Title	Paramedic	90	45.0
	Emergency Physician	70	35.0
	Nurse	40	20.0
Years of Experience	Less than 3 years	60	30.0

	3–6 years	80	40.0
	More than 6 years	60	30.0
Workplace	Ambulance Authority	90	45.0
	Government Hospital	90	45.0
	Private Hospital	20	10.0

Table No. (1) shows the demographic distribution of the study sample, which amounted to (200) participants from the cadres working in emergency medical services and hospitals.

It is clear from the table that the percentage of paramedics reached (45%), which is the highest percentage among the sample members, followed by the category of doctors at (35%), then nursing at (20%), which indicates that the study relied on a diverse sample covering all professional categories concerned with the implementation of the unified medical records system.

In terms of years of experience, it was found that the most represented category was those with experience ranging between (3-6 years) at a rate of (40%), followed by those with less than three years of experience at a rate of (30%), and those with more than six years of experience at a rate of (30%), which reflects a good balance in the level of professional experience of the participants.

Regarding the employer, the percentages were distributed almost equally between employees of the ambulance authority and government hospitals (45% each), while the percentage of employees of private hospitals was (10%), indicating a comprehensive representation of the various healthcare sectors that deal with the unified medical records system.

Table (2): Frequencies, Means, and Standard Deviations for Each Item (N = 200)

Item	Statement	Mean	SD	Level
1	The unified system facilitates information exchange	4.10	0.95	High
2	Ensures quick access to patient data	4.21	0.84	Very High
3	Reduces medical errors	3.90	0.96	High
4	Improves coordination between teams	4.03	0.86	High
5	Saves time during emergencies	4.17	0.79	High
6	Improves decision-making quality	4.00	0.91	High
7	Increases patient satisfaction	3.91	1.02	High
8	Tracks patient progress effectively	4.09	0.91	High
9	Ensures secure documentation	4.06	0.85	High
10	Reduces duplicated medical procedures	3.79	1.00	High
Overall Mean		**4.03**	**0.91**	**High**

Table No. (2) shows the averages and opinions of the study sample members regarding the impact of implementing the unified medical records system in enhancing the continuity of emergency care between ambulance teams and hospitals.

It appears that the arithmetic means ranged between (3.79 - 4.21), indicating that all statements received a high to very high evaluation by the sample members, as the overall average of the questionnaire was (4.03) with a standard deviation of (0.91), which reflects a high agreement among the participants on the effectiveness of the unified system in improving the quality and continuity of emergency care.

Paragraph No. (2) “The system ensures quick access to patient data” came in first place with an average of (4.21) and a standard deviation of (0.84), which indicates that the speed of access to information is the most prominent feature of the system from the participants’ point of view.

This was followed by paragraph No. (5) “The system contributes to saving time during emergency situations” with an average of (4.17), then paragraph No. (8) “The system helps in tracking the patient’s condition effectively” with an average of (4.09), all of which are indicators of improved operational performance and speed of medical response.

The paragraph with the lowest average score was paragraph (10), "The system reduces the frequency of medical examinations and procedures," with an average score of (3.79). Despite this, it also received a high rating, indicating that participants recognize the effectiveness of the system in both administrative and medical aspects.

Overall, the results show that a unified medical records system is an effective tool for increasing work efficiency, improving communication, and speeding up decision-making in emergency settings.

Table (3): Dimension-Level Results

Dimension	Items Included	Mean	SD	Level
Information Exchange Efficiency	1, 4, 8	4.07	0.90	High
Speed and Accuracy of Data Access	2, 5	4.19	0.82	Very High
Error Reduction and Decision Quality	3, 6, 10	3.90	0.95	High
Satisfaction and Coordination	7, 9	3.99	0.93	High
Overall Average	—	**4.03**	**0.91**	**High**

Table No. (3) shows the arithmetic means and standard deviations of the main dimensions of the questionnaire, which measure the impact of implementing the unified medical records system on the continuity of emergency care between ambulance teams and hospitals.

The table shows that the averages ranged between (3.90 - 4.19), indicating that all dimensions received high evaluation scores from the participants, which reflects a general agreement on the effectiveness of the system in improving various aspects of medical and emergency work.

The dimension of “speed and accuracy of access to data” came in first place with an average of (4.19) and a standard deviation of (0.82), which indicates that participants believe that the unified system contributes significantly to saving time and accuracy in obtaining vital medical information during emergency situations.

Followed by the “Information Exchange Efficiency” dimension with an average of (4.07), which is an indication that the system has enhanced communication and integration between ambulance teams and hospitals during patient transport and case delivery.

As for the dimension of “reducing errors and quality of medical decisions,” it had an average of (3.90), which reflects the participants’ awareness of the system’s role in reducing errors resulting from conflicting or lacking information.

While the “satisfaction and coordination” dimension obtained an average of (3.99), indicating a noticeable improvement in the level of coordination and satisfaction of health cadres with the system.

In general, the overall average of the dimensions (4.03) showed a high evaluation score, indicating that the implementation of the unified medical records system has a clear positive impact on improving the efficiency of communication, speed of response, and continuity of emergency care between various health authorities.

Table (4): Independent Samples t-Test by Workplace (Ambulance vs. Hospital)

Group	N	Mean	SD	t-value	Sig. (2-tailed)	Interpretation
Ambulance Teams	90	4.05	0.86	0.91	0.364	No significant difference
Hospital Staff	110	4.00	0.88			

Table No. (4) shows the results of the (t) test for two independent samples with the aim of identifying the extent of the existence of statistically significant differences between the average responses of sample members according to the employer variable (ambulance teams versus medical staff in hospitals) regarding the effectiveness of the unified medical records system in enhancing the continuity of emergency care.

The results show that the average response of ambulance crew members was (4.05) with a standard deviation of (0.86), while the average response of hospital workers was (4.00) with a standard deviation of (0.88). The value of (t) = 0.91, and the value of statistical significance (Sig) = 0.364, which is greater than the significance level (0.05), indicating that there are no statistically significant differences between the two groups.

This means that the views of ambulance and hospital staff are similar regarding the impact of implementing a unified medical records system, with both parties agreeing that the system effectively contributes to improving the quality of communication, rapid access to information, and continuity of emergency care.

This result demonstrates that the system's implementation has proven successful in both settings, whether in the emergency field or within the hospital, enhancing integration between the various stages of healthcare.

Table (5): One-Way ANOVA by Years of Experience

Source of Variance	Sum of Squares	df	Mean Square	F-value	Sig.	Interpretation
Between Groups	1.254	2	0.627	1.09	0.338	Not significant
Within Groups	113.821	197	0.578			
Total	115.075	199				

Table No. (5) shows the results of the One-Way ANOVA conducted to test whether there are statistically significant differences between the average responses of the sample members regarding the impact of implementing the unified medical records system according to the difference in years of experience.

The results show that the value of (F) = 1.09 at a significance level of (Sig = 0.338), which is a value greater than (0.05), indicating that there are no statistically significant differences between the participants' opinions attributable to the variable of years of experience.

This means that the evaluation of the effectiveness of the unified medical records system in improving the continuity of emergency care was similar across all job categories, regardless of their level of work experience, whether less than three years or more than six years.

This is explained by the fact that the system is applied uniformly and provides clear benefits to all users, making its impact tangible for all workers in the ambulance and emergency sectors, regardless of experience.

Based on this result, it can be said that the effectiveness of the system does not depend on the number of years of experience, but rather on the quality of its design, ease of use, and its efficiency in supporting medical decision-making and coordination among relevant stakeholders.

- **Results and recommendations drawn from the study**

The results of the study on the implementation of the unified medical records system showed that Especially those that focused on the critical transition point between ambulance teams and hospitals, have yielded positive and tangible results, confirming its important role in enhancing the continuity and quality :of emergency care. These results can be explained as follows

- The results in the performance measurement section showed a significant decrease in the time to .diagnosis and initiation of treatment in the emergency department
- It also revealed a decrease in the rate of medical errors, particularly those related to medication misprescription or drug interactions, as a result of the availability of allergy records and medication .records for chronic diseases such as heart disease and kidney disease
- .It reduces the frequency of laboratory tests or recently performed x-rays, saving time and cost
- The results, in terms of quality of care, showed an improvement in the clinical outcomes of critical .cases such as cardiac arrest and stroke as a result of the speed and accuracy of intervention
- She explained the extent of support for effective cooperation between ambulance teams and .emergency departments, which provides an integrated work environment
- The results showed increased medical staff satisfaction with ease of access to information and .decision-making support, and increased patient confidence in the quality of care provided
- The results showed that the aggregated and consolidated data provided an opportunity for research and performance analysis, enabling healthcare institutions to measure the quality of care and .identify areas for future improvement

Therefore, the importance of the results of the study on the implementation of unified medical records is .highlighted in that they provide strong and convincing evidence The strategic value of digital transformation in the healthcare sector, through quantitatively measuring the reduction in diagnosis time and medical errors, directly demonstrates improvements in patient safety and care effectiveness. It also underscores the system's ability to achieve seamless continuity of emergency care from the scene to the operating room, a cornerstone of critical care. This positive data not only supports operational decision-making but also provides the necessary foundation for policymakers to interpret and explain the massive investment in digital healthcare infrastructure projects and guide standardization and integration efforts .across all healthcare providers in the Kingdom

:Recommendations

The study concluded that it is necessary to enhance the continuity of emergency care between ambulance teams and hospitals, and concluded with a set of strategic and operational recommendations that are important to ensure the success of these systems and maximize their benefits. These recommendations focus on three main axes: technical integration, procedural standardization, and human support. These :recommendations can be explained as follows

- .Interoperability must be achieved Full integration betweene-EMS systems and hospital electronic health records(EHRs) requires the adoption of unified national data standards such asHL7 (FHIR) to ensure that information exchanged between the two parties is understandable and compatible .regardless of the difference in operating platforms
- should be established to serve as a unified point of contact between all emergency care providers .and hospitals
- .Ambulance teams must be equipped with advanced, portable technology With reliable network coverage to ensure immediate and rapid access to the patient's medical records and to document the procedures followed at the accident site and during rapid transport, this documentation must include an automated alerting mechanismto alert the hospital's emergency department .immediately upon paramedics registering a critical condition

- Standard operating procedures(SOPs) should be developed to manage the handover process between the ambulance and the hospital, clearly defining the mandatory information that must be .exchanged and when
- A strong national governance framework should be put in place that defines responsibilities for patient data security and privacy, ensures compliance with laws, and defines access to records .based on the role of the caregiver and the emergency situation
- .Feedback must be included As an essential part of the system, ambulance crews can receive updates on the patient's condition after admission to the hospital, helping them evaluate the quality .of care they provided in the pre-hospital phase and improve future protocols
- Extensive investment should be made in comprehensive and ongoing training programs for all emergency department and ambulance personnel on how to use the unified records system efficiently, with an emphasis on ease of use of the system interfaces to reduce the administrative .burden on staff
- Key performance indicators(KPIs) to measure the quality of information exchange between ambulances and hospitals should be incorporated into the performance evaluation of institutions .and incentives should be provided to encourage effective use of the system
- Medical staff must be involved in the design, development, and improvement phases of the system to ensure that standardized records meet actual clinical needs in a high-pressure emergency .environment

Conclusion

Given the above , these recommendations are essential and important because they represent a roadmap ,for bridging the information gap between pre-hospital and in-hospital care. Without their implementation interoperability challenges will persist, hindering the exchange of vital data and preserving the risk of serious medical errors, especially in cases requiring rapid and specific intervention. Standardization and operational frameworks ensure that a unified record system becomes an effective working tool, not just a storage file. Investing in training and human support ensures overcoming resistance to change and improving the quality of documentation. Therefore, implementing these recommendations ensures that unified records are transformed from a mere technical concept into an integrated system that enhances patient safety and the continuity and quality of emergency care nationwide

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