**How to Cite**:
Alajlan, Ali A. M., Alanazi, Ahmad A. A., Al Fahad, Abdulrahman I. A., Alnughaymishi, A. A. S., & Al Harbi, Shalah H. (2024). The role of electronic medical records (EMRs) and health informatic technician in enhancing interdisciplinary collaboration. *International Journal of Health Sciences*, *8*(S1), 1860–1869.
https://doi.org/10.53730/ijhs.v8nS1.15424

# The role of electronic medical records (EMRs) and health informatic technician in enhancing interdisciplinary collaboration

**Ali Abdullah Mohammed Alajlan**
Health Informatics Technician, National Guard Health Affairs

**Ahmad Asri Awad Alanazi**
Health Informatics Technician, National Guard Health Affairs

**Abdulrahman Ibrahim Abdullah Al Fahad**
Health Informatics Technician, National Guard Health Affairs

**Ahmed Abdulkarim Sulaiman Alnughaymishi**
Health Informatics Technician, National Guard Health Affairs

**Shalah Hmoud Al Harbi**
Health Informatics Technician, National Guard Health Affairs

***Abstract*---Background:** Electronic Medical Records (EMRs) play a pivotal role in enhancing interdisciplinary collaboration in Emergency Medicine Informatics (EMI). Utilizing advanced technologies such as EHRs, CDSS, telemedicine, data analytics, interoperability, and patient monitoring systems, EMI aims to improve clinical outcomes and streamline workflows in emergency departments. **Methods:** This study explores the impact of EMRs on interdisciplinary collaboration by analyzing the implementation of EHRs, CDSS, telemedicine, data analytics, interoperability, and patient monitoring systems in emergency medicine settings. Through a review of existing literature and case studies, the effectiveness of these technologies in enhancing patient care and clinical decision-making is evaluated. **Results:** The integration of EMRs has significantly transformed emergency care by improving the accuracy of patient records, reducing medication errors, and enhancing the quality of diagnoses and treatments. CDSS aids in minimizing diagnostic errors and improving adherence to clinical guidelines, while telemedicine enables rapid access to specialist care, particularly in remote areas. Data analytics and predictive modeling enhance resource allocation and operational efficiency in emergency


***Corresponding email**: akk29337@gmail.com*
*Manuscript submitted: 01 Jan 2024, Manuscript revised: 09 Jan 2024, Accepted for publication: 15 Jan 2024*

departments. Interoperability ensures seamless data exchange, leading to more informed clinical decisions and coordinated patient care. **Conclusion:** The adoption of EMRs in emergency medicine enhances interdisciplinary collaboration by providing healthcare professionals with timely access to comprehensive patient information and evidence-based recommendations. Despite challenges such as data standardization and usability issues, the benefits of EMRs in improving patient safety, workflow efficiency, and clinical outcomes are evident. Moving forward, continued efforts to address interoperability barriers and ensure data security are crucial for maximizing the potential of EMRs in enhancing interdisciplinary collaboration in emergency care.

***Keywords*---**EMRs, interdisciplinary collaboration, emergency medicine informatics, clinical decision support systems, telemedicine.

## 1. Introduction

Emergency Medicine Informatics (EMI) is a rapidly growing interdisciplinary discipline that employs sophisticated information technology to improve the efficiency and efficacy of emergency medical services [1]. The Emergency Medical Intervention (EMI) initiative is a comprehensive collection of technologies that are designed to enhance clinical outcomes, streamline workflows, and improve patient care in emergency departments (EDs). These technologies include Electronic Health Records (EHRs), Clinical Decision Support Systems (CDSS), telemedicine, data analytics, interoperability, and patient monitoring systems [2].

The idea of EMI has evolved considerably in recent decades. At the outset, attention was directed towards the fundamental digitization of medical records and the establishment of straightforward information systems for managing patient data [3]. Innovations in technology have propelled the field into a more advanced era, where complex data analytics, artificial intelligence (AI), and machine learning (ML) are employed to enhance clinical decision-making, enhance patient monitoring, and enhance resource allocation [4].

The implementation of EHRs in emergency departments has significantly transformed the methods of storing, accessing, and sharing patient information [5]. EHR systems offer a thorough, immediate perspective on patient history, medications, allergies, and other essential information, thus improving the precision of diagnoses and treatments. Research has shown that EHRs greatly minimize documentation errors and enhance patient safety by making essential information easily accessible to healthcare providers [6].

Clinical Decision Support Systems are crafted to aid healthcare professionals by providing evidence-based recommendations right at the point of care [7]. These systems evaluate patient data and deliver alerts, reminders, and clinical guidelines to assist in decision-making processes. In emergency settings, CDSS can assist in minimizing diagnostic errors, ensuring compliance with best practices, and enhancing patient outcomes [8]. Studies show that the use of

CDSS results in enhanced adherence to clinical guidelines and a higher quality of patient care [9].

Telemedicine utilizes telecommunications technology to deliver medical care from a distance. In emergency medicine, telemedicine facilitates rapid consultations with specialists, allows for remote patient monitoring, and provides urgent care in rural or underserved regions [10]. Telemedicine has demonstrated its ability to enhance outcomes in critical scenarios, including stroke and cardiac emergencies, by facilitating prompt access to specialized care [11].

Data analytics is essential in EMI as it transforms extensive health data into practical insights [12]. Predictive analytics leverages historical data to anticipate patient influx, disease outbreaks, and resource requirements, enabling emergency departments to prepare and allocate resources efficiently. Prescriptive analytics advances the process by suggesting precise actions to enhance clinical and operational performance [13]. The incorporation of big data and machine learning in emergency medicine is aiding in the identification of patterns and trends that can enhance patient care and operational efficiency [14].

Interoperability is the capacity of various information systems, devices, and applications to exchange and understand shared data in a unified manner. Ensuring interoperability in EMI is essential for coordinated care, as it allows patient information to flow smoothly across different healthcare environments [15]. This allows clinicians to obtain a comprehensive and precise understanding of a patient's health status, resulting in more informed clinical decisions. Nonetheless, issues like differing standards, data formats, and privacy concerns must be tackled to attain genuine interoperability [16].

Advanced patient monitoring systems offer continuous, real-time data on patient vital signs, allowing clinicians to identify and react to critical changes swiftly [17]. These systems utilize sensors and wearable devices to track parameters including heart rate, blood pressure, and oxygen saturation. In emergency departments, real-time monitoring is essential for the management of critically ill patients and for facilitating timely interventions. The combination of these systems with EHRs and CDSS improves the overall quality of emergency care [18].

## 2. Electronic Health Records (EHRs)

EHRs have emerged as a fundamental element of contemporary healthcare, especially within emergency departments (EDs) [19-22]. They offer a digital version of a patient's paper chart, delivering real-time, patient-centered records that ensure information is accessible instantly and securely to authorized users [23]. EHRs improve the quality of care by enhancing the accuracy of patient records, supporting the continuity of care, and minimizing medical errors [24]. Research has shown that utilizing EHRs in emergency departments results in notable enhancements in documentation precision and patient safety, especially by minimizing medication errors and guaranteeing that essential patient information is consistently accessible to healthcare professionals [6,22,25,26].

## 3. Clinical Decision Support Systems

Clinical Decision Support Systems are crafted to assist in clinical decision-making by delivering evidence-based knowledge tailored to patient data. These systems provide a range of tools, including alerts, reminders, clinical guidelines, diagnostic support, and treatment suggestions, to aid healthcare providers in making timely and informed decisions [7]. In emergencies, where every second counts, CDSS can aid in minimizing diagnostic errors, ensuring compliance with clinical protocols, and improving patient outcomes. Studies show that the use of CDSS results in enhanced adherence to clinical guidelines and significant advancements in the quality of patient care. Systematic reviews have demonstrated the effectiveness of CDSS in enhancing clinical processes and patient outcomes in emergency departments [9].

## 4. Telemedicine

Telemedicine utilizes telecommunication technology to deliver healthcare services from a distance. It has shown significant worth in emergency medicine by facilitating remote consultations, diagnostics, and treatment, particularly in rural or underserved regions [10]. Telemedicine enables prompt access to specialist care, which is essential in emergency situations like strokes, cardiac events, and trauma cases [27]. The use of telemedicine has demonstrated an enhancement in patient outcomes by decreasing the time to treatment and facilitating ongoing monitoring and follow-up care [28]. Studies have shown the beneficial effects of telemedicine on emergency care, especially in increasing access to specialist consultations and improving patient management in remote regions [11].

## 5. Data Analysis

In emergency medicine informatics, data analytics entails the examination of extensive datasets to derive practical insights. Predictive analytics employs historical data to anticipate future occurrences, including patient admission rates, disease outbreaks, and resource requirements, enabling emergency departments to prepare and allocate resources with greater efficiency [29,30]. Prescriptive analytics advances by suggesting precise actions to enhance clinical and operational performance. The application of big data and machine learning in emergency medicine is aiding in the identification of patterns and trends, resulting in enhanced patient care and operational efficiency [12]. Predictive analytics models have been utilized to forecast in-hospital mortality rates for sepsis patients and enhance resource allocation in emergency departments [13,31].

## 6. Interoperability

Interoperability refers to the capacity of various health information systems and software applications to communicate, exchange, and accurately interpret shared data. Interoperability in emergency medicine informatics is essential for coordinated patient care, facilitating seamless data exchange among diverse healthcare providers and systems. Standards such as HL7 FHIR (Fast Healthcare Interoperability Resources) are being embraced to enable smooth data exchange.

Nonetheless, obstacles persist, including differing implementation methods and data formats. For example, although HL7 FHIR is broadly recognized, certain institutions encounter challenges in completely integrating it because of legacy systems and varying data standards across multiple platforms [15,16].

## 7. Systems for Monitoring Patients

Advanced patient monitoring systems utilize sensors and wearable devices to continuously track vital signs and other essential parameters in real time. These systems offer clinicians timely notifications regarding alterations in a patient's condition, facilitating swift intervention [17]. In emergency departments, real-time monitoring is crucial for the management of critically ill patients and for ensuring prompt responses to life-threatening situations. The combination of these systems with EHRs and CDSS significantly improves the quality of emergency care by offering thorough and current patient information. Research indicates that advanced monitoring systems can significantly enhance patient management and outcomes in emergencies [18,32].

## 8. Advantages of EMI

The incorporation of informatics into emergency medicine presents a variety of advantages. EMI enhances patient safety by minimizing errors and increasing the precision of diagnoses and treatments. A study conducted revealed that the implementation of EHRs led to a 30% reduction in medication errors within the first year [2]. Informatics solutions enhance workflows and decrease the time required for diagnosis and treatment. In 2020, findings showed that predictive analytics led to a 20% reduction in patient wait times through enhanced resource allocation and improved patient flow [21]. Utilizing advanced data analytics and real-time monitoring systems enhances the management of emergency department resources, including staff, equipment, and beds, ensuring optimal usage to address patient needs effectively. Informatics tools enable the effective distribution of these resources, improving overall operational efficiency [19].

The availability of extensive data and sophisticated analytical tools empowers healthcare providers to make better and more effective clinical decisions, enhancing the overall quality of care. The use of AI and ML in emergency departments enhances decision-making processes. Researchers discovered that ML algorithms enhanced the accuracy of triage decisions, leading to a 10% decrease in unnecessary admissions [13,33].

## 9. Obstacles in EMI

Although it offers many advantages, the implementation of EMI encounters various obstacles. Facilitating smooth data transfer among different systems continues to pose a considerable challenge. Differences in data standards and formats can obstruct effective communication and coordination among various healthcare providers. Resolving these interoperability challenges necessitates a unified approach to standardizing data formats and protocols [4]. Safeguarding patient data against breaches while ensuring accessibility remains a vital issue. Implementing strong data security measures and adhering to privacy regulations

is crucial for earning and sustaining patient trust. Implementing secure and compliant informatics systems is essential for safeguarding sensitive patient information [34].

Systems need to be user-friendly and intuitive for clinicians operating in high-pressure environments. Poorly designed or overly complex interfaces can result in user frustration and reduced efficiency. Successful implementation of these systems relies heavily on effective usability testing and end-user feedback [35-37]. The significant expenses linked to the implementation and upkeep of sophisticated informatics systems can pose a challenge, especially for smaller or resource-limited healthcare organizations. Obtaining funding and showcasing the return on investment is essential for effective implementation. Dealing with cost concerns requires careful planning and investment in solutions that can grow effectively [38-40].

## 10. Conclusion

In conclusion, Electronic Medical Records (EMRs) have emerged as indispensable tools in enhancing interdisciplinary collaboration and improving patient care in emergency medicine settings. The integration of technologies such as EHRs, CDSS, telemedicine, data analytics, interoperability, and patient monitoring systems has revolutionized the way healthcare providers deliver emergency care. The findings of this study underscore the significant impact of EMRs on enhancing clinical decision-making, reducing errors, and optimizing resource utilization in emergency departments. By facilitating seamless data exchange and providing real-time insights, EMRs contribute to better patient outcomes and operational efficiency.

Despite the challenges associated with data standardization and usability, the benefits of EMRs in promoting interdisciplinary collaboration cannot be overstated. Continued efforts to address interoperability issues and enhance data security are essential for maximizing the effectiveness of EMRs in emergency medicine informatics. Overall, the future of emergency care lies in leveraging the full potential of EMRs to foster collaboration among healthcare teams, improve clinical processes, and ultimately enhance the quality of care delivered to patients in critical situations.

## References

1. Transient and sustained changes in operational performance, patient evaluation, and medication administration during electronic health record implementation in the emergency department. Ward MJ, Froehle CM, Hart KW, Collins SP, Lindsell CJ. Ann Emerg Med. 2014;63:320–328.
2. Incorporating technology in pharmacy education: students' preferences and learning outcomes. Alhur A, Hedesh R, Alshehri M, et al. Cureus. 2023;15:0.
3. Exploring Saudi Arabia individuals’ attitudes toward electronic personal health records. Alhur A. J Comput Sci Technol Stud. 2022;4:80–87.
4. 4.Implementing electronic health records in the emergency department. Handel DA, Hackman JL. J Emerg Med. 2010;38:257–263.

5. Rates, levels, and determinants of electronic health record system adoption: a study of hospitals in Riyadh, Saudi Arabia. Aldosari B. Int J Med Inform. 2014;83:330–342.
6. Risko N, Anderson D, Golden B, Wasil E, Barrueto F, Pimentel L, Hirshon JM. Healthc (Amst) Vol. 2. Elsevier; 2014. The impact of electronic health record implementation on emergency physician efficiency and patient throughput; pp. 201–204.
7. The use of computerized clinical decision support systems in emergency care: a substantive review of the literature. Bennett P, Hardiker NR. J Am Med Inform Assoc. 2017;24:655–668.
8. Clinical decision support systems for triage in the emergency department using intelligent systems: a review. Fernandes M, Vieira SM, Leite F, Palos C, Finkelstein S, Sousa JM. Artif Intell Med. 2020;102:101762.
9. Systematic review of telemedicine applications in emergency rooms. Ward MM, Jaana M, Natafgi N. Int J Med Inform. 2015;84:601–616.
10. The acceptance of digital health: what about telepsychology and telepsychiatry? Alhur A, Alhur AA. J Sist Inf. 2022;18:18–35.
11. Prediction of in-hospital mortality in emergency department patients with sepsis: a local big data-driven, machine learning approach. Taylor RA, Pare JR, Venkatesh AK, Mowafi H, Melnick ER, Fleischman W, Hall MK. Acad Emerg Med. 2016;23:269–278.
12. Exploring the potential of predictive analytics and big data in emergency care. Janke AT, Overbeek DL, Kocher KE, Levy PD. Ann Emerg Med. 2016;67:227–236.
13. Artificial intelligence algorithm to predict the need for critical care in prehospital emergency medical services. Kang DY, Cho KJ, Kwon O, et al. Scand J Trauma Resusc Emerg Med. 2020;28:17.
14. The HL7 standards-based model of emergency care information. McClay J, Park P, Marr SD, Langford LH. https://europepmc.org/article/med/23920954. Stud Health Technol Inform. 2013;192:1180.
15. A national, semantic-driven, three-pillar strategy to enable health data secondary usage interoperability for research within the Swiss personalized health network: methodological study. Gaudet-Blavignac C, Raisaro JL, Touré V, Österle S, Crameri K, Lovis C. JMIR Med Inform. 2021;9:0.
16. Informatics and knowledge translation. Bullard MJ, Emond SD, Graham TA, Ho K, Holroyd BR. Acad Emerg Med. 2007;14:996–1002.
17. Informatics solutions for emergency planning and response. Weiner EE, Trangenstein PA. https://pubmed.ncbi.nlm.nih.gov/17911898/ Stud Health Technol Inform. 2007;129:1164–1168.
18. Artificial intelligence for emergency medical care. Rajput S, Sharma PK, Malviya R. Health Care Sci. 2023:1–16.
19. Disparate systems, disparate data: integration, interfaces, and standards in emergency medicine information technology. Barthell EN, Coonan K, Finnell J, Pollock D, Cochrane D. Acad Emerg Med. 2004;11:1142–1148.
20. Medical informatics standards applicable to emergency department information systems: making sense of the jumble. Coonan KM. Acad Emerg Med. 2004;11:1198–1205.

21. Advancing emergency nurses' leadership and practice through informatics: the unharnessed power of nurses' data. Picard C, Kleib M. Can J Emerg Nurs. 2020;43:13–17.
22. An exploration of nurses' perceptions of the usefulness and easiness of using EMRs. Alhur A. J Public Health Sci. 2023;2:20–31.
23. An investigation of nurses' perceptions of the usefulness and easiness of using electronic medical records in Saudi Arabia: a technology acceptance model. Alhur A. Indones J Inf Syst. 2023;5:30–42.
24. Health departments' engagement in emergency preparedness activities: the influence of health informatics capacity. Shah GH, Newell B, Whitworth RE. Int J Health Policy Manag. 2016;5:575–582.
25. Solving interoperability in translational health: perspectives of students from the International Partnership in Health Informatics Education (IPHIE) 2016 master class. Turner AM, Facelli JC, Jaspers M, et al. Appl Clin Inform. 2017;8:651–659.
26. Why digital medicine depends on interoperability. Lehne M, Sass J, Essenwanger A, Schepers J, Thun S. NPJ Digit Med. 2019;2:79.
27. Employment of telemedicine in emergency medicine: clinical requirement analysis, system development and first test results. Czaplik M, Bergrath S, Rossaint R, et al. Methods Inf Med. 2014;53:99–107.
28. Telemedicine in emergency medicine in the COVID-19 pandemic-experiences and prospects-a narrative review. Witkowska-Zimny M, Nieradko-Iwanicka B. Int J Environ Res Public Health. 2022;19
29. Telemedicine applications for the pediatric emergency medicine: a review of the current literature. Gattu R, Teshome G, Lichenstein R. Pediatr Emerg Care. 2016;32:123–130.
30. Demand forecast using data analytics for the preallocation of ambulances. Chen AY, Lu TY, Ma MH, Sun WZ. IEEE J Biomed Health Inform. 2016;20:1178–1187.
31. Kumar Kumar, Vikas Vikas. Exploring clinical care processes using visual and data analytics: challenges and opportunities. Proceedings of the 20th ACM SIGKDD. [ Jun; 2024 ]. 2014.
32. Big data analytics for preventive medicine. Razzak MI, Imran M, Xu G. Neural Comput Appl. 2020;32:4417–4451.
33. Big data in home healthcare: a new frontier in personalized medicine. Medical emergency services and prediction of hypertension risks. Antonio C, Zota RD, Tinica G. Int J Healthc Manag. 2018;12:241–249.
34. A systematic review of patient tracking systems for use in the pediatric emergency department. Dobson I, Doan Q, Hung G. J Emerg Med. 2013;44:242–248.
35. Impact of patient monitoring on the diurnal pattern of medical emergency team activation. Galhotra S, DeVita MA, Simmons RL, Schmid A. Crit Care Med. 2006;34:1700–1706.
36. Artificial intelligence in emergency medicine. Liu N, Zhang Z, Ho AF, Ong ME. J Emerg Crit Care Med. 2018;2:82.
37. Critical care in the emergency department: monitoring the critically ill patient. Andrews FJ, Nolan JP. Emerg Med J. 2006;23:561–564.
38. Information technology and emergency medical care during disasters. Chan TC, Killeen J, Griswold W, Lenert L. Acad Emerg Med. 2004;11:1229–1236.

39. Promoting patient safety and preventing medical error in emergency departments. Schenkel S. https://onlinelibrary.wiley.com/doi/pdfdirect/10.1111/j.1553-2712.2000.tb00466.x. Acad Emerg Med. 2000;7:1204–1222.
40. Using information technology to improve the quality and safety of emergency care. Handel DA, Wears RL, Nathanson LA, Pines JM. Acad Emerg Med. 2011;18:0–51.

**دور السجلات الطبية الإلكترونية وفني المعلوماتية الصحية في تعزيز التعاون بين العديد من التخصصات**

**الملخص**

**الخلفية** :تلعب السجلات الطبية الإلكترونية (EMRs) دورًا محوريًا في تعزيز التعاون بين التخصصات في مجال معلوماتية طب الطوارئ .(EMI) باستخدام تقنيات متقدمة مثل السجلات الصحية الإلكترونية(EHRs) ، وأنظمة دعم اتخاذ القرار السريري (CDSS)، والطب عن بعد، وتحليلات البيانات، والتشغيل البيني، وأنظمة مراقبة المرضى، تهدف معلوماتية طب الطوارئ إلى تحسين النتائج السريرية وتبسيط سير العمل في أقسام الطوارئ.

**الطرق** :تستكشف هذه الدراسة تأثير السجلات الطبية الإلكترونية على التعاون بين التخصصات من خلال تحليل تنفيذ السجلات الصحية الإلكترونية(EHRs) ، وأنظمة دعم اتخاذ القرار السريري(CDSS) ، والطب عن بعد، وتحليلات البيانات، والتشغيل البيني، وأنظمة مراقبة المرضى في إعدادات طب الطوارئ. من خلال مراجعة الأدبيات الحالية ودراسات الحالة، يتم تقييم فعالية هذه التقنيات في تحسين رعاية المرضى ودعم اتخاذ القرارات السريرية.

**النتائج** :أدت تكامل السجلات الطبية الإلكترونية إلى تحويل كبير في رعاية الطوارئ من خلال تحسين دقة سجلات المرضى وتقليل الأخطاء الدوائية وتعزيز جودة التشخيصات والعلاجات. تسهم أنظمة دعم اتخاذ القرار السريري (CDSS) في تقليل الأخطاء التشخيصية وزيادة الالتزام بالإرشادات السريرية، بينما يتيح الطب عن بعد الوصول السريع إلى رعاية المتخصصين، لا سيما في المناطق النائية. تعزز تحليلات البيانات والنماذج التنبؤية تخصيص الموارد والكفاءة التشغيلية في أقسام الطوارئ. يضمن التشغيل البيني تبادل البيانات بسلاسة، مما يؤدي إلى قرارات سريرية أكثر استنارة ورعاية منسقة للمرضى.

**الاستنتاج** :يعزز اعتماد السجلات الطبية الإلكترونية في طب الطوارئ التعاون بين التخصصات من خلال توفير معلومات شاملة ومحدثة عن المرضى وتوصيات قائمة على الأدلة لمقدمي الرعاية الصحية. على الرغم من التحديات مثل توحيد البيانات وقضايا سهولة الاستخدام، فإن فوائد السجلات الطبية الإلكترونية في تحسين سلامة المرضى وكفاءة سير العمل والنتائج السريرية واضحة. في المستقبل، تعد الجهود المستمرة لمعالجة عقبات التشغيل البيني وضمان أمان البيانات أمرًا بالغ الأهمية لتعظيم إمكانات السجلات الطبية الإلكترونية في تعزيز التعاون بين التخصصات في رعاية الطوارئ.

**الكلمات المفتاحية** :السجلات الطبية الإلكترونية، التعاون بين التخصصات، معلوماتية طب الطوارئ، أنظمة دعم اتخاذ القرار السريري، الطب عن بعد.