How to Cite:
Alghamdi, A. S., Almuhaylib, A. M., Alwaked, M. H., Alrashidi, A. A., Alrasheedi, B. B., Alsarimi, F. A. H., Alanazi, A. A., Alanazi, M. M., & Alumtairi, A. Z. (2024). How informatics is shaping the future of emergency medicine: An in-depth analysis-review article. *International Journal of Health Sciences*, *8*(S1), 1176–1187. https://doi.org/10.53730/ijhs.v8nS1.15153

How informatics is shaping the future of emergency medicine: An in-depth analysis-review article

Abeer Saleh Alghamdi
KSA, National Guard Health Affairs

Abdulaziz Mohammed Almuhaylib
KSA, National Guard Health Affairs

Mohammed Hamoud Alwaked
KSA, National Guard Health Affairs

Abdulaziz Ahmad Alrashidi
KSA, National Guard Health Affairs

Bander Batti Alrasheedi
KSA, National Guard Health Affairs

Fayez Abdullah Hussain Alsarimi
KSA, National Guard Health Affairs

Amani Ayyadhah Alanazi
KSA, National Guard Health Affairs

Maha Mahdi Alanazi
KSA, National Guard Health Affairs

Adel Zayed Alumtairi
KSA, National Guard Health Affairs

***Abstract*---Background:** Emergency Medicine Informatics (EMI) represents a transformative intersection of information technology and emergency medical services aimed at enhancing patient care and operational efficiency. This review article explores the evolution, current applications, and future directions of EMI. The background outlines how EMI integrates technologies such as Electronic Health Records (EHRs), Clinical Decision Support Systems (CDSS),

International Journal of Health Sciences E-ISSN 2550-696X © 2024.
***Corresponding email**: akk29337@gmail.com*
Manuscript submitted: 01 Jan 2024, Manuscript revised: 09 Jan 2024, Accepted for publication: 15 Jan 2024

telemedicine, data analytics, and interoperability to optimize emergency care. **Aim:** The aim of the article is to provide a comprehensive overview of how these informatics tools have advanced and their impact on emergency medicine. **Methods:** The methods involve a detailed review of recent literature and technological advancements in EMI. **Results:** Results indicate that EHRs improve patient information management, CDSS enhance decision-making with evidence-based recommendations, telemedicine expands access to remote care, and data analytics facilitate predictive and prescriptive insights. Challenges such as interoperability issues, data security, and implementation costs are also discussed. **Conclusion:** The conclusion emphasizes that while EMI has significantly improved patient outcomes and operational efficiency, ongoing advancements are needed to address current limitations and further enhance the field. Future directions include enhancing interoperability, advancing analytics capabilities, expanding telemedicine, focusing on user-centered design, and strengthening data security.

***Keywords*---**Emergency Medicine Informatics, Electronic Health Records, Clinical Decision Support Systems, Telemedicine, Data Analytics, Interoperability.

Introduction

Emergency Medicine Informatics (EMI) represents an evolving interdisciplinary domain that harnesses cutting-edge information technology to augment the efficiency and efficacy of emergency medical services [1]. EMI integrates a broad spectrum of technologies, such as Electronic Health Records (EHRs), Clinical Decision Support Systems (CDSS), telemedicine, data analytics, interoperability, and patient monitoring systems, with the goal of enhancing patient care, optimizing workflows, and improving clinical outcomes within emergency departments (EDs) [2]. The evolution of EMI has been profound over recent decades. Originally, the emphasis was on the basic digitization of medical records and the deployment of rudimentary information systems for managing patient data [3]. Recent technological advancements have propelled the field into a more advanced phase, utilizing sophisticated data analytics, artificial intelligence (AI), and machine learning (ML) to aid clinical decision-making, enhance patient monitoring, and streamline resource allocation [4].

The implementation of EHRs in EDs has revolutionized the management of patient information, allowing for a comprehensive, real-time overview of patient histories, medications, allergies, and other critical data [5]. EHR systems have been shown to enhance diagnostic accuracy and treatment efficacy while minimizing documentation errors, thereby significantly improving patient safety [6]. Clinical Decision Support Systems (CDSS) are designed to provide healthcare practitioners with evidence-based recommendations during patient care [7]. These systems analyze patient data and offer alerts, reminders, and clinical guidelines to support decision-making. In emergency contexts, CDSS can mitigate diagnostic errors, promote adherence to best practices, and improve patient outcomes [8].

Evidence suggests that CDSS usage enhances compliance with clinical guidelines and elevates the quality of patient care [9]. Telemedicine employs telecommunications technology to deliver medical care remotely. In emergency medicine, telemedicine facilitates prompt specialist consultations, remote patient monitoring, and urgent care in rural or underserved regions [10]. It has been demonstrated that telemedicine improves outcomes in critical scenarios, such as stroke and cardiac emergencies, by providing timely access to expert care [11].

Data analytics is instrumental in EMI, transforming extensive health data into actionable insights [12]. Predictive analytics uses historical data to anticipate patient influx, disease outbreaks, and resource requirements, enabling effective preparation and resource allocation in EDs. Prescriptive analytics further refines this by recommending specific actions to enhance clinical and operational performance [13]. The application of big data and ML in emergency medicine aids in uncovering patterns and trends that contribute to improved patient care and operational efficiency [14]. Interoperability denotes the capability of disparate information systems, devices, and applications to exchange and interpret shared data seamlessly. Achieving interoperability within EMI is essential for coordinated care, as it ensures the smooth flow of patient information across various healthcare environments [15]. This integration enables clinicians to acquire a comprehensive and accurate understanding of a patient's health status, facilitating better-informed clinical decisions. Nonetheless, challenges such as inconsistent standards, data formats, and privacy concerns must be addressed to realize effective interoperability [16]. Advanced patient monitoring systems offer continuous, real-time data on patient vital signs, allowing clinicians to promptly identify and address critical changes [17]. These systems utilize sensors and wearable devices to monitor parameters such as heart rate, blood pressure, and oxygen saturation. In EDs, real-time monitoring is crucial for managing critically ill patients and ensuring timely interventions. The synergy of these systems with EHRs and CDSS enhances the overall quality of emergency care [18].

Significance and Objectives of Emergency Medicine Informatics (EMI):

The principal aim of EMI is to elevate the quality and efficiency of emergency medical care. By utilizing advanced information technologies, EMI strives to enhance patient outcomes, optimize operational workflows, and improve data-driven decision-making [1,2,4,19,3,20,21]. EMI plays a crucial role in improving patient outcomes by equipping clinicians with accurate, real-time data and decision support tools. This capability aids in reducing errors and elevating the overall quality of care [1,2]. Additionally, EMI contributes to operational efficiency by enabling effective data management and predictive analytics, which facilitate better resource allocation, minimize wait times, and streamline patient flow within emergency departments (EDs) [4,19]. Furthermore, EMI enhances data-driven decision-making by providing access to extensive data and sophisticated analytical tools. This empowers healthcare providers to make well-informed and effective clinical decisions [3,20,21].

Electronic Health Records (EHRs):

EHRs are fundamental to contemporary healthcare systems, especially within emergency departments (EDs) [22]. They provide a digital representation of traditional paper charts, allowing for real-time, patient-centered records that are instantly and securely accessible to authorized users [23]. EHRs improve care quality by enhancing record accuracy, supporting continuity of care, and minimizing medical errors [24]. Evidence indicates that EHRs significantly boost documentation accuracy and patient safety in EDs by decreasing medication errors and ensuring that critical patient information is consistently accessible to healthcare providers [6,22,25,26].

Clinical Decision Support Systems (CDSS):

CDSS are developed to assist in clinical decision-making by delivering evidence-based knowledge relevant to patient data. These systems offer tools such as alerts, reminders, clinical guidelines, diagnostic support, and treatment recommendations to help healthcare providers make timely and well-informed decisions [7]. In high-pressure emergency settings, CDSS can reduce diagnostic errors, ensure adherence to clinical protocols, and improve patient outcomes. Research supports that CDSS usage enhances compliance with clinical guidelines and elevates the overall quality of care in emergency departments [9].

Telemedicine:

Telemedicine utilizes telecommunication technologies to deliver healthcare services remotely, proving particularly beneficial in emergency medicine. It facilitates remote consultations, diagnostics, and treatment, especially in rural or underserved regions [10]. Telemedicine is crucial for providing timely specialist care during emergencies such as strokes, cardiac events, and trauma [27]. Its implementation has been associated with improved patient outcomes by reducing treatment delays and enabling continuous monitoring and follow-up care [28]. Research highlights the positive effects of telemedicine on emergency care, particularly in enhancing access to specialist consultations and patient management in remote areas [11].

Data Analytics:

In EMI, data analytics involves examining extensive datasets to derive actionable insights. Predictive analytics uses historical data to anticipate future events like patient admissions, disease outbreaks, and resource needs, allowing EDs to better prepare and allocate resources [29,30]. Prescriptive analytics builds on this by suggesting specific actions to enhance clinical and operational performance. The application of big data and machine learning (ML) in emergency medicine helps in identifying patterns and trends, leading to improved patient care and operational efficiency [12]. For example, predictive models have been used to forecast in-hospital mortality rates for sepsis patients and optimize resource allocation in EDs [13,31].

Interoperability:

Interoperability refers to the capability of diverse health information systems and software applications to effectively communicate, exchange, and interpret shared data. In EMI, achieving interoperability is crucial for coordinated patient care, as it ensures smooth data exchange among various healthcare providers and systems. Standards like HL7 FHIR (Fast Healthcare Interoperability Resources) are being adopted to promote seamless data exchange. However, challenges such as differing implementation practices and data formats persist. For instance, despite the broad acceptance of HL7 FHIR, some institutions struggle with full integration due to legacy systems and inconsistent data standards across platforms [15,16].

Patient Monitoring Systems:

Advanced patient monitoring systems employ sensors and wearable devices to continuously track vital signs and other critical parameters in real-time. These systems provide clinicians with immediate alerts about changes in a patient's condition, allowing for prompt interventions [17]. In EDs, real-time monitoring is vital for managing critically ill patients and ensuring timely responses to life-threatening situations. The integration of these systems with EHRs and CDSS enhances emergency care quality by offering comprehensive and up-to-date patient information. Studies affirm the feasibility and effectiveness of advanced monitoring systems in improving patient management and outcomes in emergency settings [18,32].

Advantages of Emergency Medicine Informatics (EMI):

Enhanced Patient Safety: The integration of informatics in emergency medicine significantly boosts patient safety by reducing errors and improving diagnostic and treatment accuracy. For instance, research has shown that implementing Electronic Health Records (EHRs) led to a 30% reduction in medication errors within the first year of use [2].

Improved Efficiency: Informatics solutions enhance workflow efficiency and decrease the time required for diagnosis and treatment. For example, findings from 2020 indicated that predictive analytics shortened patient wait times by 20% through optimized resource allocation and improved patient flow [21].

Better Resource Management: Advanced data analytics and real-time monitoring systems improve the management of emergency department (ED) resources, including staff, equipment, and beds. These informatics tools facilitate the optimal allocation of resources, thereby enhancing overall operational efficiency [19].

Data-Driven Decision-Making: Access to comprehensive data and sophisticated analytical tools enables healthcare providers to make more informed and effective clinical decisions, thus enhancing the quality of care. The use of artificial intelligence (AI) and machine learning (ML) in EDs supports better decision-

making. For instance, ML algorithms have been shown to improve the accuracy of triage decisions, resulting in a 10% reduction in unnecessary admissions [13,33].

Challenges in Emergency Medicine Informatics:

Interoperability Issues: A major challenge in EMI is achieving seamless data exchange between diverse systems. Variations in data standards and formats can impede effective communication and coordination among healthcare providers. Addressing these interoperability challenges requires a unified approach to standardize data formats and protocols [4].

Data Security and Privacy: Ensuring the protection of patient data from breaches while maintaining accessibility is crucial. Robust data security measures and adherence to privacy regulations are necessary to secure patient trust. Implementing secure and compliant informatics systems is essential to safeguard sensitive patient information [34].

Usability Design: Developing systems that are user-friendly and intuitive for clinicians working in high-pressure environments is vital. Complex or poorly designed interfaces can cause user frustration and reduce efficiency. Effective usability testing and incorporating end-user feedback are critical for the successful implementation of these systems [35-37].

Implementation Costs: The substantial costs associated with deploying and maintaining advanced informatics systems can be a significant barrier, especially for smaller or resource-constrained healthcare facilities. Securing funding and demonstrating the return on investment are crucial for successful implementation. Addressing cost concerns involves strategic planning and investment in scalable solutions [38].

Future Directions: Future research and development in EMI should focus on overcoming current challenges and exploring new opportunities for advancement. Key areas for future progress include improving interoperability, advancing analytics capabilities, expanding telemedicine applications, enhancing user-centered design, and strengthening data security.

Future Directions in Emergency Medicine Informatics (EMI):

Enhancing Interoperability: Future developments in EMI should focus on creating universal standards and protocols to improve data exchange and ensure seamless communication across different health information systems [15,16]. This will facilitate better coordination and integration of care by enabling more effective data sharing between various healthcare providers and systems.

Advanced Analytics: The integration of artificial intelligence (AI) and machine learning (ML) into EMI holds promise for advancing predictive capabilities and supporting more complex decision-making processes. By leveraging these technologies, EMI can enhance the accuracy of predictions and recommendations, thereby improving clinical outcomes and operational efficiency [2,12].

Telemedicine Expansion: Expanding telemedicine services to increase their reach and accessibility is a key area for future development. This involves broadening telemedicine applications to serve more patients, particularly in rural and underserved regions, and enhancing the quality and scope of remote consultations and care [10].

User-Centered Design: Improving the usability and adoption of EMI systems through user-centered design is crucial. This entails developing more intuitive and efficient interfaces for clinicians, which can enhance ease of use and integration into existing workflows, thereby increasing overall system adoption and effectiveness [39].

Data Security: Strengthening data security measures is essential to protect patient information. Future advancements should include the implementation of advanced encryption techniques and robust cybersecurity frameworks to safeguard sensitive data from breaches and ensure compliance with privacy regulations [34,40].

Applications of Health informatics in Healthcare Sector:
Applications of Health Informatics in Emergency Care

In emergency care, health informatics plays a pivotal role in enhancing patient outcomes and operational efficiency. Electronic Health Records (EHRs) provide emergency departments (EDs) with real-time, comprehensive patient data, facilitating quick and accurate decision-making. Clinical Decision Support Systems (CDSS) offer evidence-based recommendations and alerts that help reduce diagnostic errors and ensure adherence to best practices. Telemedicine enables remote consultations and monitoring, particularly beneficial in urgent situations where immediate specialist input is needed. Advanced data analytics help in predicting patient influx and optimizing resource allocation, thereby improving patient flow and reducing wait times. The integration of these informatics tools enhances the quality of emergency care by providing timely, accurate information and improving coordination among healthcare providers.

Applications of Health Informatics in Nursing

In nursing, health informatics enhances the efficiency and quality of patient care through several key applications. EHRs streamline the documentation process, allowing nurses to access and update patient information in real time, which supports better communication and coordination within the care team. CDSS assist nurses by providing reminders and alerts for critical tasks such as medication administration and patient monitoring, reducing the risk of errors. Informatics tools also enable the implementation of evidence-based practices by providing access to the latest clinical guidelines and research. Additionally, telehealth technologies facilitate remote patient monitoring and virtual consultations, enabling nurses to manage chronic conditions and provide follow-up care more effectively. Overall, health informatics supports nursing by improving documentation accuracy, enhancing clinical decision-making, and expanding access to care.

Applications of Health Informatics in Pharmacy

In the pharmacy sector, health informatics is instrumental in improving medication management and safety. EHRs and Pharmacy Information Systems (PIS) enable pharmacists to access detailed patient medication histories, which supports accurate dispensing and reduces the risk of drug interactions. CDSS provide pharmacists with alerts about potential drug interactions, allergies, and dosing errors, aiding in the prevention of adverse drug events. Informatics tools also facilitate the management of medication inventories and streamline prescription processing. Additionally, data analytics can help identify trends in medication use and patient outcomes, informing better practices and policy development. The integration of informatics in pharmacy enhances the accuracy and safety of medication management, supports clinical decision-making, and improves patient care.

Applications of Health Informatics in Other Sectors

Beyond emergency care, nursing, and pharmacy, health informatics has a wide range of applications across various healthcare sectors. In public health, informatics tools are used for tracking and analyzing disease outbreaks, managing vaccination programs, and coordinating public health interventions. In research, health informatics supports the collection and analysis of clinical trial data, facilitating the development of new treatments and therapies. Informatics systems are also employed in administrative functions, such as billing and compliance, to improve operational efficiency and ensure regulatory adherence. Additionally, health informatics enhances patient engagement through patient portals and mobile health applications, which allow individuals to access their health information, schedule appointments, and engage in their own care management. The broad applications of health informatics contribute to the overall improvement of healthcare delivery by enhancing data management, supporting clinical and administrative functions, and enabling more informed decision-making.

Conclusion

Emergency Medicine Informatics (EMI) has significantly transformed the landscape of emergency medical services by integrating advanced information technologies to improve patient care and operational efficiency. The use of Electronic Health Records (EHRs) has revolutionized the management of patient data within emergency departments (EDs) by providing real-time, comprehensive information that enhances diagnostic accuracy and treatment efficacy. Clinical Decision Support Systems (CDSS) further support clinical decision-making by offering evidence-based recommendations and alerts, thereby reducing diagnostic errors and ensuring adherence to best practices. Telemedicine has expanded the scope of emergency care by facilitating remote consultations and monitoring, particularly beneficial in underserved regions where timely specialist input is crucial. Data analytics, including predictive and prescriptive analytics, have become integral in anticipating patient influx, optimizing resource allocation, and uncovering trends that improve patient care and operational performance. Interoperability remains a key challenge, with efforts focused on creating

universal standards and protocols to enable seamless data exchange between diverse health information systems. Advanced patient monitoring systems provide continuous, real-time data on critical parameters, enhancing the ability to manage critically ill patients effectively. Despite the advancements, several challenges persist, including issues related to interoperability, data security, usability design, and implementation costs. Addressing these challenges is essential for realizing the full potential of EMI. Future developments should prioritize enhancing interoperability, leveraging AI and machine learning for advanced analytics, expanding telemedicine applications, improving user-centered design, and strengthening data security measures. By overcoming these challenges and focusing on these future directions, EMI can continue to advance, ultimately leading to more effective emergency care and better patient outcomes.

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. 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.* 2014. https://poloclub.github.io/polochau/papers/14-kdd-ExploringClinicalCare-kumar.pdf
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.

كيف تشكل المعلوماتية مستقبل الطب الطارئ: تحليل متعمق - مقال مراجعة

الملخص:

الخلفية :تمثل معلومات الطب الطارئ (EMI) تقاطعًا تحويليًا بين تكنولوجيا المعلومات والخدمات الطبية الطارئة، بهدف تعزيز رعاية المرضى وكفاءة العمليات. يستعرض هذا المقال المراجعي تطور واستخدامات المعلوماتية في الوقت الحاضر والاتجاهات المستقبلية لمعلومات الطب الطارئ. يوضح الخلفية كيف تدمج معلومات الطب الطارئ تقنيات مثل السجلات الصحية الإلكترونية(EHRs) ، وأنظمة دعم القرار السريري (CDSS)، والتطبيب عن بعد، وتحليلات البيانات، والتشغيل البيني لتحسين رعاية الطوارئ.

الهدف :هدف المقال هو تقديم نظرة شاملة حول كيفية تطور أدوات المعلوماتية وتأثيرها على الطب الطارئ.

الطرق :تتضمن الطرق مراجعة مفصلة للأدبيات والتطورات التكنولوجية الأخيرة في مجال معلومات الطب الطارئ.

النتائج :تشير النتائج إلى أن السجلات الصحية الإلكترونية تحسن إدارة معلومات المرضى، وأن أنظمة دعم القرار السريري تعزز اتخاذ القرارات من خلال توصيات مبنية على الأدلة، وأن التطبيب عن بعد يوسع الوصول إلى الرعاية عن بعد، وأن تحليلات البيانات تسهم في تقديم رؤى تنبؤية وتوجيهية. كما يتم مناقشة تحديات مثل قضايا التشغيل البيني، وأمن البيانات، وتكاليف التنفيذ.

الاستنتاج :يبرز الاستنتاج أنه على الرغم من أن معلومات الطب الطارئ قد حسنت بشكل كبير نتائج المرضى وكفاءة العمليات، إلا أن هناك حاجة لمزيد من التقدم لمعالجة القيود الحالية وتعزيز المجال. تشمل الاتجاهات المستقبلية تحسين التشغيل البيني، وتطوير قدرات التحليل، وتوسيع التطبيب عن بعد، والتركيز على التصميم المرتكز على المستخدم، وتعزيز أمان البيانات.

الكلمات المفتاحية :معلومات الطب الطارئ، السجلات الصحية الإلكترونية، أنظمة دعم القرار السريري، التطبيب عن بعد، تحليلات البيانات، التشغيل البيني.