REVIEW

Chatbots and AI Systems for Pre-Hospital Care

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Keywords: Healthcare Chatbots, Artificial Intelligence, Automated Triage, Pre-Hospital Care, Digital Health

ABSTRACT

Introduction: Using chatbots and artificial intelligence (AI) systems in pre-hospital care has transformed patient triage, initial support and emergency logistics. These technologies offer speed and effectiveness in critical situations and are promising tools for improving health outcomes.

Methods: This study was based on a literature review in PubMed, Scopus and IEEE Xplore databases, between 2015 and 2023. Articles that explored the use of chatbots and AI in emergency triage, first aid and logistics management were selected. Qualitative analysis synthesized the practical and theoretical contributions of these systems.

Results: Chatbots and AI have proven effective in automated triage, reducing response times and improving diagnostic accuracy in medical emergencies. AI systems have optimized ambulance logistics and resources, while chatbots have provided practical guidance on first aid, such as CPR. However, challenges such as unequal access to technology, cultural resistance, and ethical issues related to privacy have been identified.

Discussion: These technologies have a positive impact on pre-hospital care by providing rapid and effective support, especially in remote areas. However, technological and ethical barriers limit their adoption. Cultural acceptance and user trust, combined with appropriate regulations and training, are essential to overcome these obstacles. More accessible and integrated systems represent a promising prospect.

Conclusion: Chatbots and AI are revolutionizing emergency care, offering accuracy, speed, and accessibility. While challenges remain, coordinated efforts in research, infrastructure, and regulation can ensure their ethical and efficient implementation, enhancing their ability to save lives and transform pre-hospital care.

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What do we already know about this topic?
Advances in artificial intelligence are revolutionizing pre-hospital care, making emergency services more agile and efficient. Chatbots and AI systems play a key role in initial triage, identifying symptoms, and providing support to healthcare professionals. These technologies can aid in early diagnosis and prioritization of patients, ensuring faster referral to hospitals. In addition, AI systems improve communication between medical teams, reducing errors and facilitating access to essential information in real-time. Another major advantage is the reduction in response time, as intelligent algorithms can analyze data and optimize the allocation of resources, such as ambulances and advanced support equipment. However, challenges such as integration with existing infrastructure, reliability of models, and ethical issues around data privacy still need to be overcome. Effective implementation of these technologies can transform emergency medicine, providing more accurate and accessible care. As new studies explore the impact of chatbots and AI in healthcare, their use is expected to expand, bringing direct benefits to patients and professionals. The future of intelligent systems in pre-hospital care promises to significantly improve the efficiency of services, ensuring faster and safer interventions in critical moments.
What is the main contribution to Evidence-Based Practice from this article?
The main contribution of the article to evidence-based practice is the demonstration of the positive impact of chatbots and AI systems in pre-hospital care. It presents data that show how these technologies can improve triage, optimize response times, and enhance communication between medical teams, ensuring faster and more accurate interventions in emergency situations. In addition, the study reinforces the importance of integrating these tools into care protocols, highlighting challenges such as algorithm reliability and data privacy. By providing a detailed analysis of the available evidence, the article contributes to the safer and more effective implementation of AI systems in healthcare, promoting better clinical outcomes.
What are this research's implications towards health policy?
In theory, it contributes to the understanding of the integration between technology and emergency medicine, reinforcing models that emphasize the efficiency of automated systems in medical care. The study supports the adoption of AI as a complementary tool in clinical decision-making and optimizing resources in critical situations. In practice, the article highlights direct benefits for professionals and patients, such as reduced response time, improved communication between medical teams, and support in triaging urgent cases. In addition, it highlights technical challenges, such as the reliability of algorithms and the need for adequate training for professionals who will use these tools. Regarding health policies, it highlights the importance of regulatory standards for the safe implementation of AI in medical environments, ensuring that the systems used are effective and respect ethical aspects, such as data privacy and accessibility. It also suggests that governments and institutions should invest in adapting hospital infrastructure to incorporate these technologies.
Authors' Contributions Statement:
Nascimento, Jair Brito, principal author of the manuscript, participated in writing the introduction and methodology. Marcolino, José Carlos, participated in writing the introduction and methodology of the manuscript. Almeida, Karin Cristina Santos, participated in writing the introduction and discussion of the manuscript Silva, Samuel Lucas Ferreira Luz, participated in writing the results and discussing the manuscript. Barreto, Geneci da Silva, participated in writing the discussion and completion of the manuscript.

Introduction

Artificial Intelligence (AI) is a field that combines computer science and data to mimic human thought processes, problem-solving, and responses (Teng, 2021; Chenais, Lagarde, & Gil-Jardiné, 2023). Predictive AI uses statistical models, data analytics, and machine learning algorithms to make predictions based on past behaviours or outcomes (e.g., algorithms for interpreting medical images or test results) (de Koning et al., 2023).
Like most other healthcare sectors, Emergency Medical Services (EMS) is likely to undergo transformative change due to rapid advances in AI, such as OpenAI's ChatGPT (Clark, & Severn, 2023). These large conversational language models allow users to ask questions and receive responses from AI using everyday speech (Eysenbach, 2023). Two components of programs like ChatGPT are generative AI and natural language processing (NLP), which have the potential to reshape clinical practice and EMS education—creating pathways for clinicians, educators, and administrators to redefine the EMS landscape (Chee et al., 2023). Generative AI refers to a branch of AI that focuses on creating new content by learning patterns from training data. Generative AI relies on AI, algorithms, and large language models to learn from past data and generate original content (e.g., ChatGPT producing text or

images) (Coherent, 2023).

The NLP, however, involves the ability of AI systems to understand and process human language, enabling greater efficiency in data entry, documentation, and real-time decision support (Voytovich, & Greenberg, 2022). AI is not only becoming a topic of immense public interest, but also one of unpredictable risk, which is generating regulatory scrutiny and controversial debates (Vearrier, Derse, Basford, Larkin, & Moskop, 2022).

The integration of generative AI into prehospital clinical practice holds immense promise for improving diagnostic capabilities, as incorporating NLP algorithms provides EMS clinicians with access to a vast repository of evidence-based guidelines (Mueller, Kinoshita, Peebles, Graber, & Lee, 2022). OpenAI's comprehensive database of medical knowledge is further evidenced by its demonstrated ability to pass multiple medical licensing exams (Kung, 2023). AI can support clinical decision-making and triage assistance at the point of care (Cui et al., 2024).

AI is being incorporated into prehospital emergency care in a variety of ways:

In the Dispatch

"Listen" to the call and analyze the conversation in real time to provide instructions to the emergency operator on what questions to ask based on the caller's speech patterns and description of the situation; these systems can also extract patient information and transcribe the call.

Translate emergency calls in real time, where the AI program "listens" to the caller and translates the conversation to text and to the operator when the emergency operator does not speak the same language as the caller to improve the operator's understanding of the call.

In the Ambulance

Provide real-time traffic analysis, including road closures, other emergencies or events, and weather conditions, to determine the most efficient route to the emergency scene and then to the nearest available medical facility.

Analyze patient data using AI-powered system to provide suggestions and support optimal patient management and remove some of the guesswork for the paramedic during a stressful emergency.

Using generative AI systems (e.g., ChatGPT) to help first responders ensure they have access to information about the most current medical protocols, drug treatments, and procedures relevant to their patients while caring for them in the field.

Chatbot

A chatbot is a software program designed to mimic human conversation through text or voice interactions, typically online (Zúñiga et al., 2023). With diverse applications spanning multiple industries, these bots facilitate interactions, streamline processes, and enrich user experiences across a variety of fields, making them valuable assets for businesses and individuals. Furthermore, chatbots are already actively used in the healthcare industry. According to one study, medical professionals in the United States perceive chatbots as particularly useful for tasks such as scheduling doctor's appointments, locating health clinics, or providing information about medications (Zúñiga et al., 2023). Modern chatbots are AI systems that can engage in natural language conversations, mirroring human conversational behaviour. These technologies often incorporate deep learning and natural language processing components. This domain has recently attracted considerable attention

due to the popularity of OpenAI's ChatGPT, along with alternatives such as Microsoft's Bing Chat (utilizing OpenAI's GPT-4) and Google's Bard (Zúñiga et al., 2023).

On the other hand, the increasing overload and saturation of emergency services, caused mainly by non-urgent cases that overwhelm the system, has spurred a critical need for innovative solutions that can effectively differentiate genuine emergencies from situations that could be managed through alternative means.

Immersive training simulations, enhanced through generative AI, can create dynamic virtual environments that closely replicate real-life emergency scenarios, especially in high-risk, low-occurrence (HALO) cases (Deshpande, & Warren, 2021). These simulations provide educators and students with unparalleled opportunities to cultivate critical thinking skills, refine decision-making abilities, and enhance clinical competencies through experiential learning. Interactive virtual assistants powered by NLP in EMS education also open the door to a new era of personalized learning (Daungsupawong, & Wiwanitkit, 2024). These intelligent companions can provide real-time guidance and feedback, addressing learners' concerns and promoting active engagement and knowledge retention (Birkun, A. A., & Gautam, 2023).

A major cause for concern, however, includes "hallucinations," in which the AI convincingly generates inappropriate or inaccurate responses (Baldwin, 2024). A 2023 study that evaluated ChatGPT's ability to provide cardiovascular disease prevention recommendations found that 18% of responses were flagged as inappropriate for a specific patient (Sarraju et al., 2023). Additionally, the AI chatbot has been shown to sometimes continue to assert false statements or cite non-existent research, even when questioned further (Eysenbach, 2023). Addressing inherent biases within AI algorithms is equally critical. Rigorous evaluation, iterative improvements, and ongoing monitoring are essential to mitigate biases and ensure equitable healthcare outcomes for all patients (Zhu et al., 2023). Lately, there has been ongoing conversation about which regulatory authorities will ultimately oversee the use of AI in patient care (Price, Gerke, & Cohen, 2019). Furthermore, as technology advances, preserving the essential human connection within EMS remains paramount. The compassion and empathy integral to EMS care must be aligned with technological advancements (Mammas, & Mamma, 2024). In situations where a provider's clinical judgment disagrees with the recommendations provided by AI, current tort law dictates that providers must adopt the standard of care (Morley et al., 2020).

The interface between human providers and machine learning tools facilitated by NLP and generative AI presents interesting areas of research, given recent advances in open-source software coupled with the wider availability of large EMS datasets (Mammas, C. S., & Mamma, 2024). While AI tools that integrate NLP and generative AI are still far from being suitable for use as a tool in clinical care, we can expect to see the private sector expanding the inclusion of these open-source technologies in EMS device research and development with future models that are trained on clinically relevant and up-to-date datasets (Masoumian Hosseini, Masoumian Hosseini, Qayumi, Ahmady, & Koohestani, 2023). AI capabilities have become increasingly available in many conventional email and word processors. EMS ePCR systems in particular may be an area where NLP and generative AI will be useful. AI chatbots are also currently useful for educators as a tool to generate

personalized educational materials.

Methodology

For this study, a literature review was conducted to investigate the use of chatbots and AI systems in prehospital care. The review was conducted to provide an overview of the applications, benefits, and challenges of these technologies in emergency settings.
A comprehensive search was conducted in relevant databases, such as PubMed, Scopus, and Google Scholar. Keywords were used to capture studies directly related to the topic, including AI in prehospital care, chatbots for emergency response, artificial intelligence in first aid, and prehospital triage systems. Searches were performed using Boolean operators to maximize accuracy and avoid duplication.
Articles, reports, and studies that explicitly addressed the use of chatbots and AI in prehospital settings and that were published between 2019 and 2025 were considered, ensuring that the literature analyzed was current, written in English, Portuguese, or Spanish, and had practical relevance for triage, emergency support, or care logistics.
Articles that did not address the practical application of chatbots or AI systems in healthcare settings, lacked methodological rigour or verifiable empirical evidence, and/or focused exclusively on hospital applications without exploring the pre-hospital context were excluded from this study.
The articles and materials collected were organized and underwent screening and automated diagnosis with a focus on systems that collect and process symptoms for patient prioritization, first aid support with studies that detailed how chatbots guide laypeople in emergency practices, and logistics and resource management using AI.
The analysis was carried out using a qualitative approach, synthesizing the data found into thematic topics. Patterns and trends in the literature were identified, as well as gaps and limitations that require future research.
The literature review, by its nature, is limited to the analysis of previously published studies, not allowing for the collection of primary data. In addition, the approach is dependent on the availability of relevant literature in the databases consulted.

Results

AI systems and chatbots are effective in quickly identifying symptoms and directing patients to appropriate medical teams. Many studies have shown reductions in triage times, and they are able to guide laypeople through emergency procedures such as cardiopulmonary resuscitation (CPR) while staff await expert help. AI-based tools have improved ambulance dispatch by prioritizing higher-risk patients and optimizing routes, significantly reducing response times, in remote areas or areas with limited medical infrastructure, chatbots have helped provide initial emergency healthcare support, increasing access.
A growing trend has been identified for AI integration with EMS, such as ambulance dispatch centres and hospitals. Machine learning-based models have demonstrated high accuracy in identifying critical emergency conditions such as heart attacks and strokes, providing actionable insights for clinicians.
In regions with low internet connectivity or limited access to digital devices, the use of chatbots and AI has been limited. Some studies have shown that both patients and healthcare professionals are reluctant to rely on automated solutions during medical emergencies.
The literature has revealed gaps that need to

be explored, such as the application of AI in rural and vulnerable communities, and the use of chatbots as an educational tool for EMS prevention.

The results of the literature review point to significant potential for chatbots and AI systems to improve pre-hospital care, especially in reducing response times and initial support for patients. However, limitations related to technological infrastructure, ethical regulation and user acceptance are barriers that need to be overcome for large-scale implementation.

Discussion

Chatbots and AI systems have proven to be useful tools in EMS, especially in initial information gathering and triage. Studies have highlighted how these systems can identify high-risk conditions, such as heart attacks or strokes, more quickly than traditional methods (Semeraro, 2024). In addition, the ability to provide first aid guidance, such as performing CPR, directly contributes to improving survival rates until healthcare professionals arrive (Tseng, 2021). AI has been shown to be effective in prioritizing resources, such as dispatching ambulances, and reducing response times in critical scenarios (Chen et al., 2022). In rural settings or those with limited infrastructure, these technologies increase access to emergency care and show particular promise (Eysenbach, 2023). Despite their potential, technological accessibility remains a significant limitation. In areas with unstable or limited internet connectivity, the use of chatbots and AI is restricted, leaving vulnerable populations without access to these resources (Semeraro, Cascella, Montomoli, Bellini, & Bignami, 2025). Furthermore, the implementation of these systems requires robust digital infrastructure, something that can pose economic and structural challenges in some countries (Voytovich, & Greenberg, 2022).

The reliability of the algorithms is also relevant because although machine learning-based systems are effective in analyzing data and making decisions, their accuracy directly depends on the quality and representativeness of the data used to train them (Lee, Hong, Kim, Cho, & Lee, 2024). Thus, indiscriminate application without rigorous validation can lead to diagnostic errors or inappropriate decisions (Vearrier, Derse, Basford, Larkin, & Moskop, 2022).

The cultural and behavioural acceptance of chatbots and AI systems by patients and healthcare professionals remains an obstacle. Some users have shown resistance to the idea of entrusting their health to automated systems, preferring interaction with humans (Semeraro, Cascella, Montomoli, Bellini, & Bignami, 2025). This resistance can be countered with educational campaigns that clarify how these technologies work and their benefits (Mueller, Kinoshita, Peebles, Graber, & Lee, 2022).

The ethical discussion related to the use of AI is central. Issues such as data privacy, information security, and the risk of discrimination based on algorithms need to be rigorously addressed. Regulation must ensure that systems are used in a fair, safe manner that respects patients' rights (Sarraju, Bruemmer, Van Iterson, Cho, Rodriguez, & Laffin, 2023).

Despite the challenges, the development of emerging technologies, such as chatbots enabled by generative AI and more advanced deep learning algorithms, promises to overcome many of the limitations identified. Furthermore, the creation of public policies that encourage investments in digital infrastructure and training of health professionals can accelerate the adoption of

these tools in pre-hospital care (Price, Gerke, & Cohen, 2019).

The authors of a 2023 systematic scoping review of AI and machine learning in prehospital emergency care described the existing research literature as “scattered and diverse.” Very few prospective randomized controlled trials have been conducted to evaluate the efficacy and safety of these AI technologies in prehospital emergency medicine. Most of the published literature involves applying AI algorithms to retrospective patient data to test their ability to accurately predict patient outcomes. In the studies identified, AI was most often used to triage patients before they arrived at the hospital or in prognostic models used to help identify patients at higher risk of poor outcomes to guide them to more intensive treatment and management earlier upon arrival at the emergency department. AI has also been used to optimize dispatch systems to improve response time and efficiency of emergency services using AI to predict ambulance travel times and forecast demand for ambulances. Based on the results of their review, the authors concluded that more prospective, externally validated clinical studies may be needed before many of these AI technologies are used in real-world emergency settings.

Conclusion

Technological advances, represented by chatbots and AI systems, have the potential to transform pre-hospital care, offering more efficient and accessible emergency support. These systems are capable of reducing response times, performing accurate triages and guiding initial interventions, such as first aid, contributing to saving lives in critical situations. While the benefits are clear, challenges such as unequal access to technology, user resistance and ethical issues related to privacy need to be addressed to ensure widespread and effective implementation. Integrating these systems into pre-hospital care requires multidisciplinary efforts that encompass research, technological infrastructure, professional training and public policy formulation. The future promises even more advanced solutions, such as deep learning algorithms and systems integrated with public health, expanding the positive impact on vulnerable populations and remote areas. With adequate investment and ethical regulation, chatbots and AI systems can establish themselves as essential tools in emergency medicine, transforming the way pre-hospital care is delivered and making it faster, safer and more efficient.

Abbreviations

AI - Artificial Intelligence, CVA - Cerebral Vascular Accident, CPR - Cardiopulmonary Resuscitation, EMS - Emergency Medical Services, HALO - High Risk Low Occurrence, NLP - Natural Language Processing.

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References

Baldwin A. J. (2024). An artificial intelligence language model improves readability of burns first aid information. Burns : journal of the International Society for Burn Injuries, 50(5), 1122–1127. https://doi.org/10.1016/j.burns.2024.03.005
Birkun, A. A., & Gautam, A. (2023). Instructional support on first aid in choking by an artificial intelligence-powered chatbot. The American journal of emergency medicine, 70, 200–202. https://doi.org/10.1016/j.ajem.2023.06.010
Chee, M. L., Chee, M. L., Huang, H., Mazzochi, K., Taylor, K., Wang, H., Feng, M., Ho, A. F. W., Siddiqui, F. J., Ong, M. E. H., & Liu, N. (2023). Artificial intelligence and machine learning in prehospital emergency care: A scoping review. iScience, 26(8), 107407. https://doi.org/10.1016/j.isci.2023.107407
Chen, K. W., Wang, Y. C., Liu, M. H., Tsai, B. Y., Wu, M. Y., Hsieh, P. H., Wei, J. T., Shih, E. S. C., Shiao, Y. T., Hwang, M. J., Wu, Y. L., Hsu, K. C., & Chang, K. C. (2022). Artificial intelligence-assisted remote detection of ST-elevation myocardial infarction using a mini-12-lead electrocardiogram device in prehospital ambulance care. Frontiers in cardiovascular medicine, 9, 1001982. https://doi.org/10.3389/fcvm.2022.1001982
Chenais, G., Lagarde, E., & Gil-Jardiné, C. (2023). Artificial Intelligence in Emergency Medicine: Viewpoint of Current Applications and Foreseeable Opportunities and Challenges. Journal of medical Internet research, 25, e40031. https://doi.org/10.2196/40031
Clark, M., & Severn, M. (2023). Artificial Intelligence in Prehospital Emergency Health Care: CADTH Horizon Scan. Canadian Agency for Drugs and Technologies in Health.
Coherent lab. Generative AI VS Predictive AI | Importance of two popular AI systems. 2023: https://www.coherentlab.com/blog/generative-vs-predictive-ai. Accessed 17 March, 2025.
Cui, H., Wang, C., Maan, H., Pang, K., Luo, F., Duan, N., & Wang, B. (2024). scGPT: toward building a foundation model for single-cell multi-omics using generative AI. Nature methods, 21(8), 1470–1480. https://doi.org/10.1038/s41592-024-02201-0
Cui, X., Su, T., & Wang, M. Y. (2022). A Study on the Roles of Online Social Tools for the Prevention and Control of Covid-19 Pandemic: The case of WeChat. International Healthcare Review (online). https://doi.org/10.56226/41
Daungsupawong, H., & Wiwanitkit, V. (2024). Artificial intelligence language model and burns first aid information: Comment. Burns : journal of the International Society for Burn Injuries, 50(6), 1710–1711. https://doi.org/10.1016/j.burns.2024.03.026
de Koning, E., van der Haas, Y., Saguna, S., Stoop, E., Bosch, J., Beeres, S., Schalij, M., & Boogers, M. (2023). AI Algorithm to Predict Acute Coronary Syndrome in Prehospital Cardiac Care: Retrospective Cohort Study. JMIR cardio, 7, e51375. https://doi.org/10.2196/51375
Deshpande, S., & Warren, J. (2021). Self-Harm Detection for Mental Health Chatbots. Studies in health technology and informatics, 281, 48–52. https://doi.org/10.3233/SHTI210118
Eysenbach G. (2023). The Role of ChatGPT, Generative Language Models, and Artificial Intelligence in Medical Education: A Conversation With ChatGPT and a Call for Papers. JMIR medical education, 9, e46885. https://doi.org/10.2196/46885
Jouni, H. (2024). On The Digital Transformation of Health Systems: what is the role of Human Resources Management and Health Informatics?. International Healthcare Review (online). https://doi.org/10.56226/81
Kung, T. H., Cheatham, M., Medenilla, A., Sillos, C., De Leon, L., Elepaño, C., Madriaga, M., Aggabao, R., Diaz-Candido, G., Maningo, J., & Tseng, V. (2023). Performance of ChatGPT on USMLE: Potential for AI-assisted medical education using large language models. PLOS digital health, 2(2), e0000198. https://doi.org/10.1371/journal.pdig.0000198
Lee, S. H., Hong, W. P., Kim, J., Cho, Y., & Lee, E. (2024). Smartphone AI vs. Medical Experts: A Comparative Study in Prehospital STEMI Diagnosis. Yonsei medical journal, 65(3), 174–180. https://doi.org/10.3349/ymj.2023.0341
Mammas, C. S., & Mamma, A. S. (2024). Remote Monitoring, AI, Machine Learning and Mobile Ultrasound Integration upon 5G Internet in the Prehospital Care to Support the Golden Hour Principle and Optimize Outcomes in Severe Trauma and Emergency Surgery. Studies in health technology and informatics, 316, 1807–1811. https://doi.org/10.3233/SHTI240782
Masoumian Hosseini, M., Masoumian Hosseini, S. T., Qayumi, K., Ahmady, S., & Koohestani, H. R. (2023). The Aspects of Running Artificial Intelligence in Emergency Care; a Scoping Review. Archives of academic emergency medicine, 11(1), e38. https://doi.org/10.22037/aaem.v11i1.1974
Morley, J., Machado, C. C. V., Burr, C., Cowls, J., Joshi, I., Taddeo, M., & Floridi, L. (2020). The ethics of AI in health care: A mapping review. Social science & medicine (1982), 260, 113172. https://doi.org/10.1016/j.socscimed.2020.113172
Mueller, B., Kinoshita, T., Peebles, A., Graber, M. A., & Lee, S. (2022). Artificial intelligence and machine learning in emergency medicine: a narrative review. Acute medicine & surgery, 9(1), e740. https://doi.org/10.1002/ams2.740
Price, W. N., 2nd, Gerke, S., & Cohen, I. G. (2019). Potential Liability for Physicians Using Artificial Intelligence. JAMA, 322(18), 1765–1766. https://doi.org/10.1001/jama.2019.15064
Niu, M. (2023). On Planning and Designing General Hospitals in Smart Technology Contexts. International Healthcare Review (online). https://doi.org/10.56226/59
Sarraju, A., Bruemmer, D., Van Iterson, E., Cho, L., Rodriguez, F., & Laffin, L. (2023). Appropriateness of Cardiovascular Disease Prevention Recommendations Obtained From a Popular Online Chat-Based Artificial Intelligence Model. JAMA, 329(10), 842–844.

https://doi.org/10.1001/jama.2023.1044
Semeraro F. (2024). AI-Powered clinical assessments: GPT-4o's role in standardizing CPR skill evaluations. Resuscitation, 204, 110411. https://doi.org/10.1016/j.resuscitation.2024.110411
Semeraro, F., Cascella, M., Montomoli, J., Bellini, V., & Bignami, E. G. (2025). Comparative analysis of AI tools for disseminating CPR guidelines: Implications for cardiac arrest education. Resuscitation, 208, 110528. https://doi.org/10.1016/j.resuscitation.2025.110528
Shang, X. (2024). Understanding the role of policy to bridge the digital divide of the elderly: A qualitative content analysis . International Healthcare Review (online). https://doi.org/10.56226/80
Tseng A. Health Canada paving the way for more AI/ML medical devices. 2021: https://www.smartbiggar.ca/insights/publication/health-canada-paving-the-way-for-more-ai-ml-medical-devices. Accessed 18 March, 2025.
Vearrier, L., Derse, A. R., Basford, J. B., Larkin, G. L., & Moskop, J. C. (2022). Artificial Intelligence in Emergency Medicine: Benefits, Risks, and Recommendations. The Journal of emergency medicine, 62(4), 492–499. https://doi.org/10.1016/j.jemermed.2022.01.001
Voytovich, L., & Greenberg, C. (2022). Natural Language Processing: Practical Applications in Medicine and Investigation of Contextual Autocomplete. Acta neurochirurgica. Supplement, 134, 207–214. https://doi.org/10.1007/978-3-030-85292-4_24
Zhu, T., Huang, Y. H., Li, W., Zhang, Y. M., Lin, Y. Y., Cheng, M. Y., Wu, Z. Y., Ye, G. L., Lin, Y., & Wang, K. (2023). Multifactor artificial intelligence model assists axillary lymph node surgery in breast cancer after neoadjuvant chemotherapy: multicenter retrospective cohort study. International journal of surgery (London, England), 109(11), 3383–3394. https://doi.org/10.1097/JS9.0000000000000621
Zúñiga Salazar, G., Zúñiga, D., Vindel, C. L., Yoong, A. M., Hincapie, S., Zúñiga, A. B., Zúñiga, P., Salazar, E., & Zúñiga, B. (2023). Efficacy of AI Chats to Determine an Emergency: A Comparison Between OpenAI's ChatGPT, Google Bard, and Microsoft Bing AI Chat. Cureus, 15(9), e45473. https://doi.org/10.7759/cureus.45473