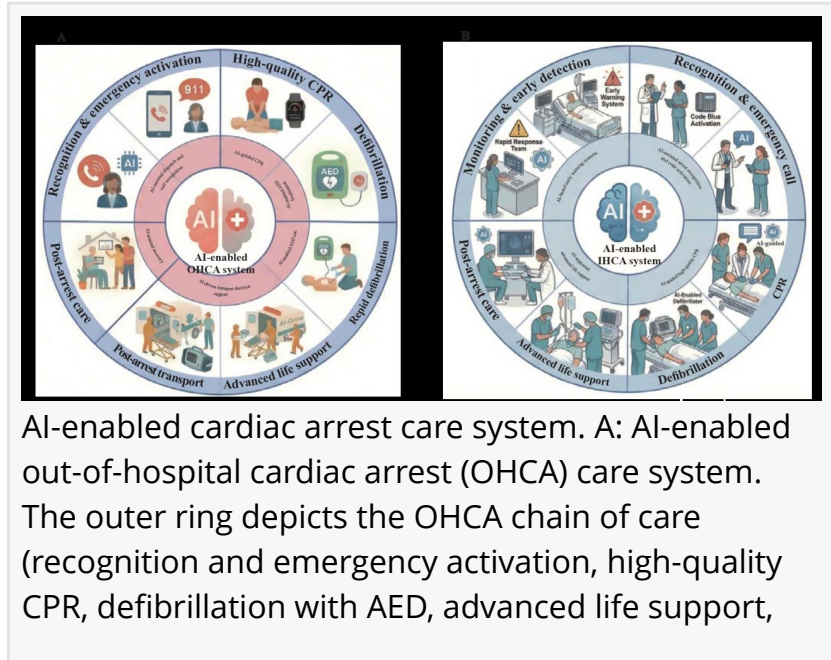


Beyond the chain of survival: a scoping review of artificial intelligence applications in cardiac arrest

GA, UNITED STATES, June 9, 2026

/EINPresswire.com/ -- A research team has mapped how artificial intelligence is beginning to reshape cardiac [arrest](#) care, from early warning and emergency response to cardiopulmonary resuscitation and recovery after survival. By reviewing 114 studies involving more than 9.57 million patients, the study shows that artificial intelligence is most often used to predict cardiac arrest, guide resuscitation decisions, and estimate post-arrest outcomes. The findings suggest that artificial intelligence could become a practical tool for identifying high-risk patients earlier, supporting time-critical decisions during resuscitation, and improving post-arrest care, while also highlighting the need for stronger real-world validation before these tools can be widely adopted in emergency medicine.



Cardiac arrest remains one of the most urgent and unforgiving medical emergencies, where every minute can determine survival and neurological recovery. Traditional care depends on rapid recognition, high-quality cardiopulmonary resuscitation, defibrillation, advanced life support, and post-arrest management, yet survival rates remain limited, especially after out-of-hospital cardiac arrest. At the same time, hospitals and emergency systems now generate large volumes of data from electronic health records, monitoring devices, emergency calls, and wearable technologies. These data streams create opportunities for artificial intelligence, but many models remain retrospective, difficult to interpret, or insufficiently tested across diverse clinical settings. Because of these challenges, in-depth research into artificial intelligence across the full cardiac arrest care continuum is needed.

Researchers from the Department of Intensive Care Medicine, Sun Yat-sen University, and the Department of Emergency Medicine, Sun Yat-sen Memorial Hospital, Sun Yat-sen University,

published the review in the 2026 issue of World Journal of Emergency Medicine. The article provides a broad overview of artificial intelligence applications in both in-hospital cardiac arrest and out-of-hospital cardiac arrest, covering prediction, resuscitation support, prognosis, large language models, emergency call handling, wearable detection, rhythm identification, education, and extracorporeal cardiopulmonary resuscitation candidate identification.

The review followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines and searched PubMed, Embase, the Cochrane Library, and Web of Science from database inception to June 10, 2025. After screening 2,108 records, the team included 114 studies and assessed 92 artificial intelligence models. Most studies focused on pre-arrest prediction, especially in-hospital cardiac arrest, where a multilayer perceptron model achieved the highest reported area under the receiver operating characteristic curve of 0.998. In out-of-hospital cardiac arrest prediction, extreme gradient boosting and random forest models reached an area under the receiver operating characteristic curve of 0.950. For cardiopulmonary resuscitation-related decision support, convolutional neural network models showed strong performance, with a best reported area under the receiver operating characteristic curve of 0.990. Prognostic models were also widely studied, especially after out-of-hospital cardiac arrest, where a multilayer perceptron model reached 0.976. The review also captured newer directions, including large language models such as generative pre-trained transformer systems, emergency call recognition, wearable-based detection, and artificial intelligence-assisted education.

The authors said the review shows that artificial intelligence is no longer confined to one point in the cardiac arrest pathway. Instead, it is moving across the full chain of care, from warning signs before collapse to decisions made during resuscitation and recovery after return of spontaneous circulation. They said the next step is not only to build better algorithms, but to test them in multicenter clinical settings, make them easier for clinicians to understand, and ensure that they improve real patient outcomes rather than only model performance scores.

The study points to several practical implications for emergency and critical care systems. Artificial intelligence may help hospitals identify patients at risk of in-hospital cardiac arrest before deterioration becomes irreversible. In pre-hospital settings, it could support emergency dispatch, automated external defibrillator localization, and real-time cardiopulmonary resuscitation feedback. After resuscitation, artificial intelligence may assist with prognosis, rehabilitation planning, and clinical trial design. However, the review also warns that data imbalance, limited external validation, infrastructure gaps, privacy concerns, and algorithmic bias remain major barriers. Future work should focus on prospective trials, explainable models, and equitable deployment across both high-resource and resource-limited settings.

References

DOI

[10.5847/wjem.j.1920-8642.2026.025](https://doi.org/10.5847/wjem.j.1920-8642.2026.025)

Original Source URL

<https://doi.org/10.5847/wjem.j.1920-8642.2026.025>

Funding information

This research was supported by grant from the National Natural Science Foundation of China (82372207).

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