Artificial intelligence applications in out-of-hospital cardiac arrest: an analysis of emerging research trends

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Abstract

Background Out-of-hospital cardiac arrest (OHCA) remains a major public health challenge despite advances in emergency medical services (EMS) and resuscitation systems. Artificial intelligence (AI), including machine learning (ML), deep learning (DL), and artificial neural networks, is increasingly being investigated for applications spanning cardiac arrest recognition, rhythm analysis, prognostication, and clinical decision support. This study characterized the growth, geographic and institutional structure, collaboration patterns, influential sources, and emerging themes of the AI-OHCA literature.

Methods A bibliometric analysis was conducted using the Web of Science (WoS) Core Collection. The search identified 290 publications related to AI applications in OHCA, spanning 1996–2026. Publication and citation trends, countries, institutions, authors, journals, subject categories, and keyword co-occurrence were evaluated. VOSviewer was used to construct bibliometric networks, and Microsoft Excel was used for descriptive analyses and publication-trend visualization.

Results A total of 290 publications were identified. Research output increased sharply beginning in 2019 and reached 53 publications (18.3% of the corpus) in 2025; 21 publications were indexed in 2026 at the time of data collection, representing an incomplete year. The United States (85 publications) and Spain (39) were the leading contributing countries, and the University of the Basque Country was the most productive institution (31 publications; 10.69%). Resuscitation was the most frequent publication source (40 publications; 13.79%), followed by Circulation (23) and Resuscitation Plus (16). Emergency Medicine, Critical Care Medicine, and Cardiac & Cardiovascular Systems were the dominant WoS subject categories. Keyword mapping emphasized machine learning, survival, out-of-hospital cardiac arrest, cardiac arrest, and resuscitation, while author-level analyses demonstrated a concentrated, highly collaborative research network.

Conclusions Research at the intersection of AI and OHCA has expanded rapidly since 2019 but remains concentrated within a relatively small number of countries, institutions, and collaborative research groups. The literature is primarily clinically oriented, with particular emphasis on recognition, resuscitation, survival prediction, and post-arrest outcomes. Future work should prioritize prospective and external validation, real-world EMS implementation, and evaluation across diverse patient populations and EMS systems.