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Publication Trends on Cardiopulmonary Resuscitation Performed By Laypersons in Cardiac Arrest Patients: A Bibliometric Analysis From 1979-2025

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Abstract
Cardiac arrest is a leading cause of death and requires immediate intervention. Cardiopulmonary resuscitation (CPR) is a critical initial response, making it a central topic in clinical and research settings. This study aims to identify research trends on CPR using bibliometric analysis. Data were collected from Web of Science and Scopus on April 19, 2025, covering publications from 1979 to 2025. The data were exported in plain text and BibTeX formats, then analyzed using RStudio v.4.5.0. Analysis of 3,510 documents from 679 sources revealed a sharp rise in CPR-related publications by laypersons, particularly post-2008, peaking in 2023. Resuscitation was the leading journal. Prominent authors included Herlitz J, Iwami T, and Ong M, with the United States contributing the most publications. Common keywords "survival," "resuscitation," and "cardiopulmonary-resuscitation" highlight the literature's focus on improving survival outcomes. This trend underscores the urgency of empowering the public to perform CPR during cardiac emergencies. The emphasis on "survival" indicates it remains the main success metric of layperson-initiated CPR. Geographic disparities in research output highlight the need to strengthen CPR research and training in developing countries. There has been substantial growth in research on bystander CPR, especially over the past two decades. These findings stress the need for public education, institutional support, and global policy initiatives. Future efforts should focus on inclusive research, wider CPR training, and leveraging technology to improve community response to cardiac arrest.
Keywords: *bystanders/layperson, cardiac arrest, cardiopulmonary resuscitation (CPR)*

INTRODUCTION

Cardiac arrest has been a continuing public health burden, with most patients having a poor prognosis. It can occur in hospital (IHCA) and out of hospital (OHCA)(1–3). OHCA is a crucial public health issue characterized by high prevalence of mortality and morbidity. It has been identified as a contributing factor for congenital heart disease and acute coronary syndrome (4). The golden time for resuscitation on OHCA patients is only 4 min, bystander cardiopulmonary resuscitation (CPR) is important to save lives. Bystander CPR can increase a patient's chance of survival but without perfect time and effective CPR and defibrillation, survival rates decrease and neurological outcomes are worse (5). Several studies have highlighted the importance of bystander CPR as a contributing factor to improving the survival rate of cardiac arrest patients in OHCA cases (6–12). In this condition, the success of first aid depends on the speed and accuracy of initial actions, one of which is through cardiopulmonary resuscitation by a layperson.

Studies have shown that CPR by a layperson before the medical team arrives can double the patient's chances of survival (13). Even though, the percentage of bystander who perform CPR to OHCA patients is significantly low worldwide between 35% to 45% (14). CPR implementation by general public remains low in many countries, especially in developing countries. Commonly reported barriers include lack of training, lack of confidence, and fear of making mistakes. In summary, adequate and appropriate training, including refresher courses, with a specific focus on known barriers to bystander CPR, has the potential to strengthen the chain of survival, resulting in higher survival rates in OHCA (15). Due to these concerns, there is wide consensus on disseminating education on bystander CPR to the general public and even incorporating it into the curriculum for school-aged children to rapidly recognize signs of cardiac arrest and perform immediate and effective CPR (16). Public education has been conducted to encourage lay person to initiate CPR for fainted patient who are not breathing but it's not enough to prepare lay person to help OHCA patient (17). Psychological factors play important roles in CPR process and affect future psychological and behavioral performance of bystander. Stress and fear during the whole process of CPR can effect decision making and implementation of CPR (18). Therefore, increasing public awareness, improving training accessibility, and addressing psychological barriers are critical steps toward empowering laypersons to take timely and effective action during cardiac emergencies. With a coordinated effort in education and support, bystander CPR can become a more common and confident response, ultimately saving more lives.

In the last decade, there has been increasing interest in research on CPR training and education for the general public. Scientific publications in this area cover a variety of approaches such as school-based training, community programs, and the use of digital media (19,20). Bystanders or laypersons can be laypersons who assist patients with cardiac arrest outside the hospital by performing chest compressions only, primary caregivers or family members of high-risk patients, and elementary school children who can perform high-quality CPR (21). Although many studies have been conducted on CPR, there has been little research on comprehensive bibliometric analysis that maps the development of trends, and collaborations between researchers, institutions, and countries on this topic. Bibliometrics is a set of methods for quantitatively analysing academic literature. Along with the increasing number of publications in the literature, the ability of researchers to evaluate the results of the analysis of thousands of scientific outputs on a subject in a short time has contributed greatly in terms of time and holistic dominance on the subject (22). Therefore, this study aims to conduct a bibliometric analysis of scientific publications discussing cardiopulmonary resuscitation by laypeople in the context of cardiac arrest. The analysis will include publication trends, dominant keywords, author and institutional collaborations, and geographic distribution of research. The results of this study are expected to provide strategic information for the development of nursing policies, education, and research in the future.

METHODES

Data collection

The researchers obtained data from the Web of Sciences (WoS) and Scopus databases. The researchers used inclusion criteria, namely articles containing the search string ("cardiopulmonary resuscitation" OR "CPR") AND ("bystander" OR "layperson") AND ("cardiac arrest"). In our analysis, we have restricted keywords and search strings but we accept all source type, document type, and language. The period is not limited, and the entire retrieval process was completed on April 19, 2025. Total 2725 WoS, 2881 Scopus and 2061 duplicate articles were removed. By eliminating irrelevant documents and duplicate documents, 3510 documents were finally obtained, which is shown in Fig. 1 and Fig. 2.

Analysis Method and Tools

In this study, we first exported the search results as a plain text format for WoS and BibTeX format for Scopus. The two databases were merged using code in RStudio, and the merged data was exported in xlsx format to enhance the accuracy of the subsequent bibliometric analysis. The data collection procedure in this study used Bibliometrix software in R, data were extracted including information about authors, affiliations, year of publication, keywords, and citations. This data was cleaned by removing duplicates and correcting entry errors. Analysis was performed using the Bibliometrix and Biblioshiny packages in R. This study used public data and did not involve human subjects directly, so it did not require approval from the ethics committee. This study was limited to data available in the Scopus and Web of Science databases and may not include all relevant publications that are not indexed in these databases. Bibliometrix is written in the R programming language, which provides a high level of flexibility and seamless integration with other statistical packages in the R ecosystem. This feature enables researchers to customize their bibliometric analysis by leveraging the extensive range of statistical tools and functions available in R (23).

Figure 1.
Flow Diagram of The Search Strategy

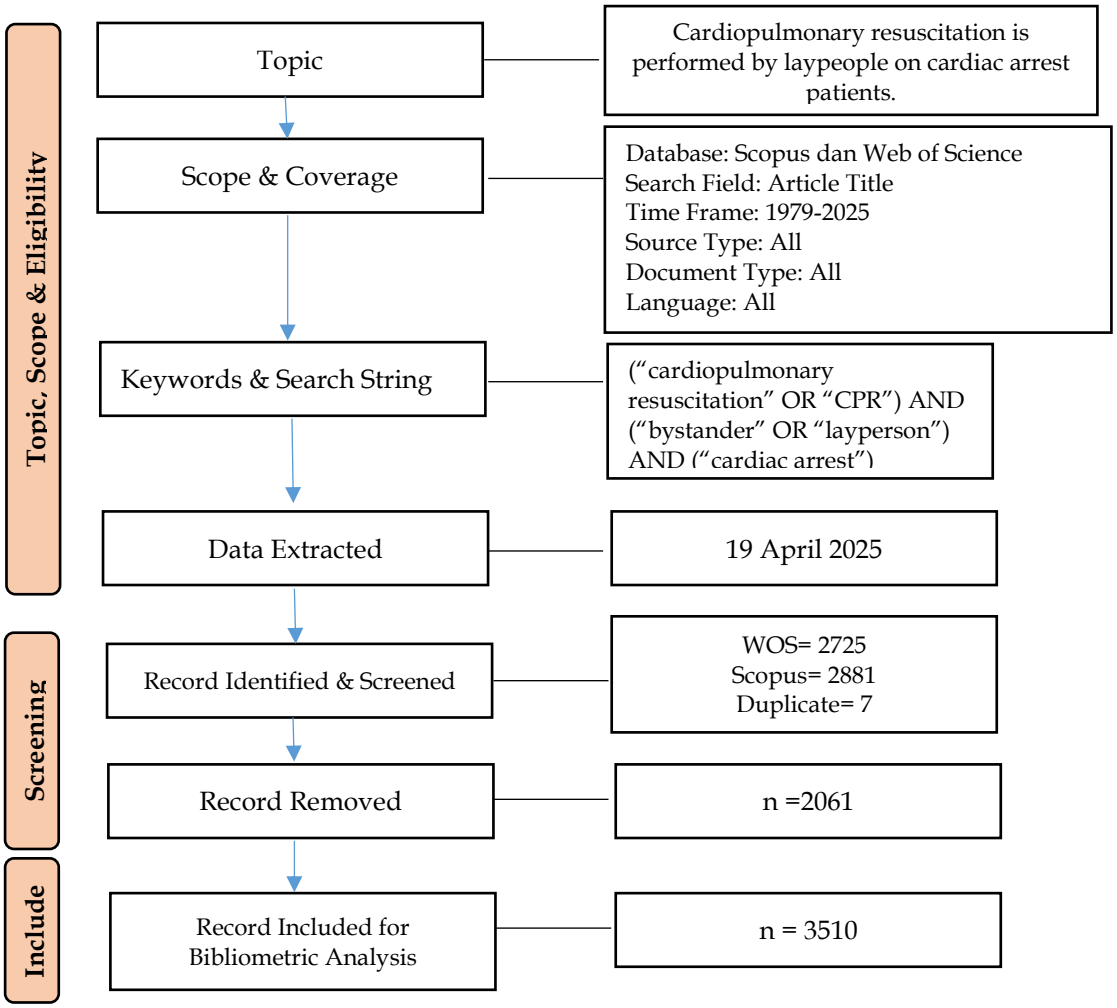
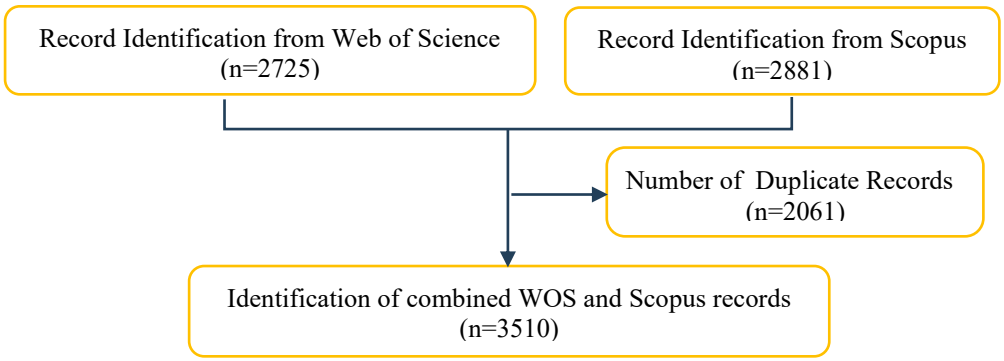


Figure 2.
Data Flow Diagram



RESULTS AND DISCUSSION

RESULT

Characteristic of Publication

This study aims to investigate the characteristics of publications on cardiopulmonary resuscitation performed by laypeople in cardiac arrest patients. Researchers analyzed journals from 1979-2025 with a total of 679 sources consisting of 3510 documents and originating from 13610 authors.

Annual Analysis of Publication

The "Annual Scientific Production" graph shows the trend of publications in high-quality journals from 1979 to 2025. In the early period, from 1979 to about 2003, publications were very low, with only a few articles per year, suggesting that lay-administered cardiopulmonary resuscitation may not have been a major focus of educational research published in high-quality journals. However, since 2005, there has been a consistent and significant increase in publications, peaking in 2023 with almost 300 articles. This suggests that there is a growing recognition and interest in the importance of lay-administered cardiopulmonary resuscitation among researchers. The sharp decline in 2025 seen in the graph could indicate several possibilities, such as it is still early in the year and there are still 8 months left so research in this field is not yet optimal, topic saturation, a shift in research focus to new areas, or a response to changes in funding dynamics and research policies.

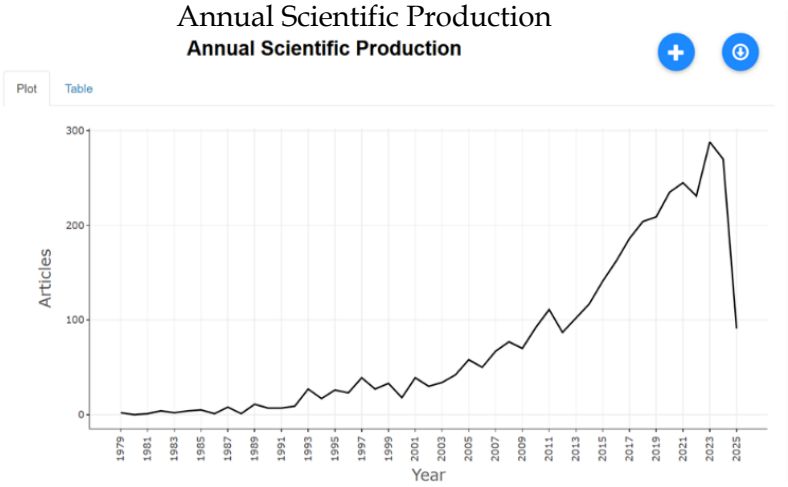
The conclusion that can be drawn is that lay-administered cardiopulmonary resuscitation has become an area of research that is increasingly recognized in academia, particularly in the context of high-quality journals, indicating that the topic is seen as critical in shaping future education. The increase in publications through 2023 may be driven by factors such as greater integration of technology into education and the impact of the COVID-19 pandemic, which accelerated the adoption of digital technologies and online learning. The decrease in 2024 requires further analysis to identify the exact causes and determine future directions for research in this area. This analysis is important for policymakers, educators, and researchers to understand and address the challenges and capitalize on emerging opportunities in lay-administered cardiopulmonary resuscitation.

In graph 2, we see that the average number of citations per article shows a significant upward trend from 1982 to around 1992, peaking around 1991 at over six citations per article. After this year, the graph fluctuates with several peaks and valleys until 2022, indicating variation in how frequently articles are cited over time, which could reflect shifts in research interest or topic relevance.

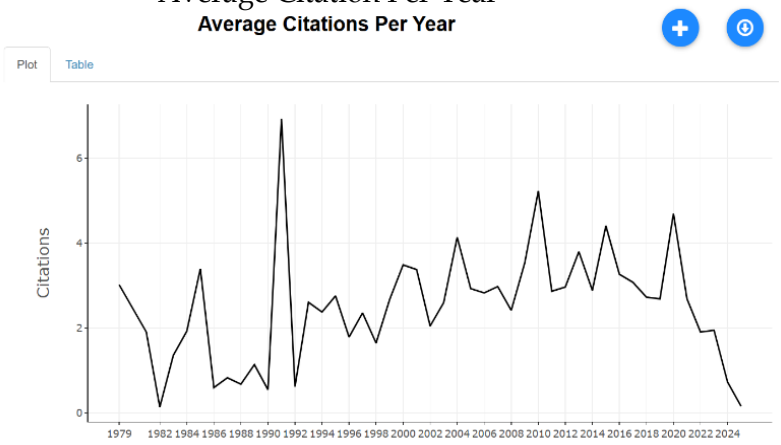
From 2020 to 2024, the graph shows a sharp decline in the number of citations per article, reaching its lowest point in 2024. This decline may indicate that new articles may not have been fully absorbed or cited by the academic community, or it may indicate that lay cardiopulmonary resuscitation as a research topic may be declining in terms of novelty or academic relevance.

The conclusion that can be drawn from this analysis is that lay-administered cardiopulmonary resuscitation is a topic that has fluctuated in its level of recognition and influence in academia over the past two decades. Periods of high citations indicate peaks in interest and influence, while declines in citations may reflect topic saturation or a change in focus within the discipline. The sharp decline in citations in recent years suggests the need for further evaluation of the relevance and approaches to research in this area for the future.

Graph 1.
Annual Scientific Production



Graph 2.
Average Citation Per Year

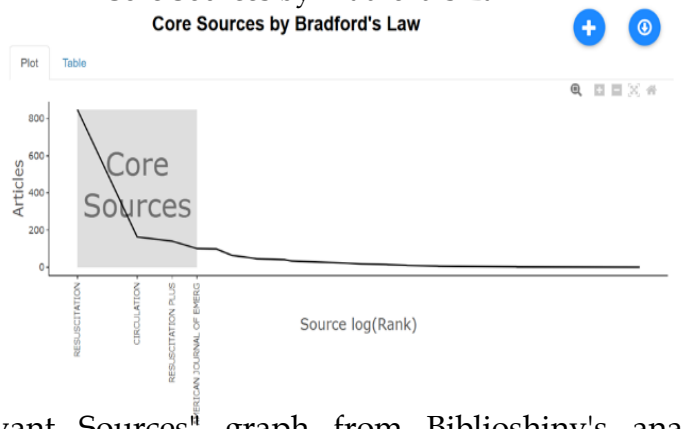


Journals

Based on the analysis using Bradford's Law, the core sources in this field consist of four major journals, namely Resuscitation, Circulation, Resuscitation Plus, and the American Journal of Emergency Medicine. These four journals produce the largest number of articles compared to other journals, as shown in the core zone on the graph. Among them, the journal Resuscitation contributes the highest number of publications. This indicates that the journal plays a central role in disseminating research related to lay cardiopulmonary resuscitation in cardiac arrest patients. Furthermore, Circulation and the American Journal of Emergency Medicine are also well-known for the number of publications they produce,

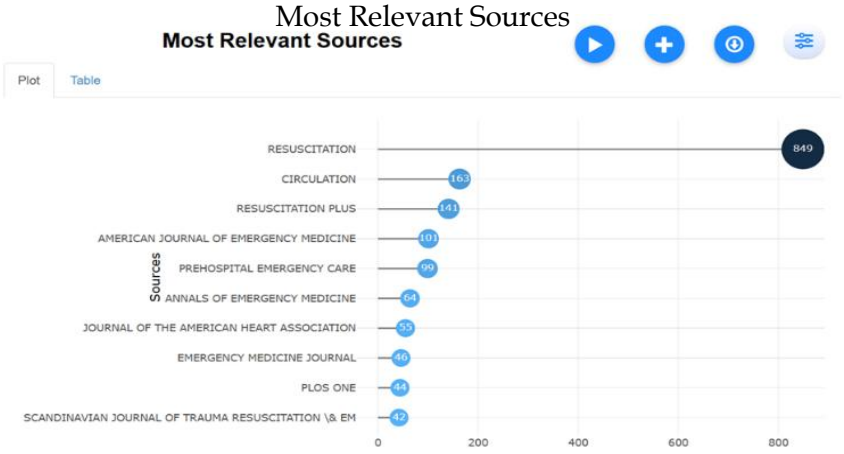
which reflects the quality and influence of the research published in these journals.
This shows that research related to "cardiopulmonary resuscitation by laypeople in cardiac arrest patients" is mostly published in these journals so these journals become the main references in the development of science in this field. Selecting these journals as sources of reference in the future is highly recommended to obtain relevant and up-to-date literature.

Graph 3.
Core Sources by Bradford's Law



The "Most Relevant Sources" graph from Biblioshiny's analysis entitled "Cardiopulmonary Resuscitation Performed by Lay People in Cardiac Arrest Patients" shows that the most relevant source for this theme is the Resuscitation Journal. This is followed by sources from the Circulation and Resuscitation Plus journals. The number of sources from the Resuscitation Journal reached 849 journals, followed by the Circulation Journal reaching 163 journals.

Graph 4.
Most Relevant Sources



The conclusion that can be drawn from this analysis is that cardiopulmonary resuscitation performed by laypeople is a topic of great interest to researchers. This is evidenced by the many sources that publish journals on cardiopulmonary resuscitation. Research in this field is of interest to many people because the number of cardiac arrests both inside and outside the hospital is very high.

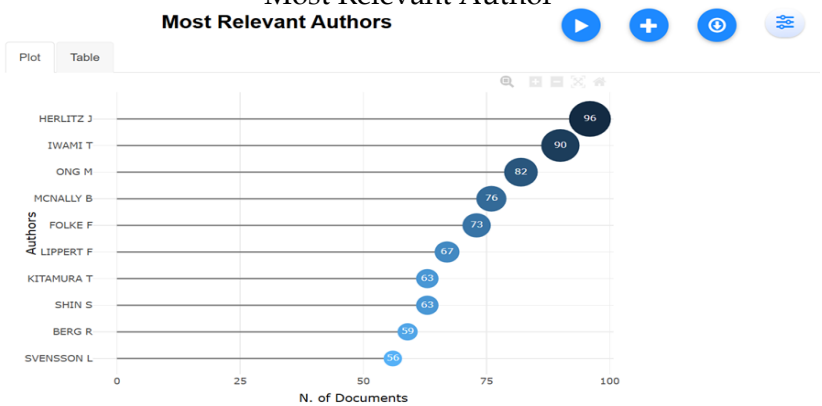
Therefore, cooperation is needed between health workers, laypeople, government policies, and Public Safety Center 119 to increase the life expectancy of cardiac arrest patients.

Contributions of Authors

The "Most Relevant Authors" graph from Biblioshiny's analysis entitled "Cardiopulmonary Resuscitation performed by Lay People in Cardiac Arrest Patients" shows that the author with the highest production of scientific papers on cardiopulmonary resuscitation is Herlitz J., with ninety-six documents. Then followed by Iwani T with ninety scientific papers. The third place is occupied by Ong M with eighty-two scientific papers. This distribution indicates that scientific production in this field is dominated by a small number of active authors, who play an important role in the formation and dissemination of scientific knowledge related to CPR outside the hospital. In addition, the presence of several authors from various countries indicates a high level of international collaboration in this study.

The dominance of authors such as Herlitz J, Iwami T, and Ong M in publications related to lay CPR indicates their significant contribution to the development of clinical practice and public policy in the field of cardiac arrest. The high productivity of these authors also correlates with their influence on the formation of international practice guidelines such as the American Heart Association (AHA) Guidelines and the European Resuscitation Council (ERC) Guidelines. Furthermore, the representation of authors from various countries, such as Japan (Iwami T, Kitamura T, Shin S) and European countries (Herlitz J, Folke F, Lippert F, Svensson L), indicates the importance of cross-cultural perspectives in the development of lay CPR programs. This indicates that successful CPR intervention strategies must take into account the local context and health care system of each country. These findings emphasize the need for global collaboration in research and policy development related to improving survival rates for patients with out-of-hospital cardiac arrest.

Graph 5.
Most Relevant Author



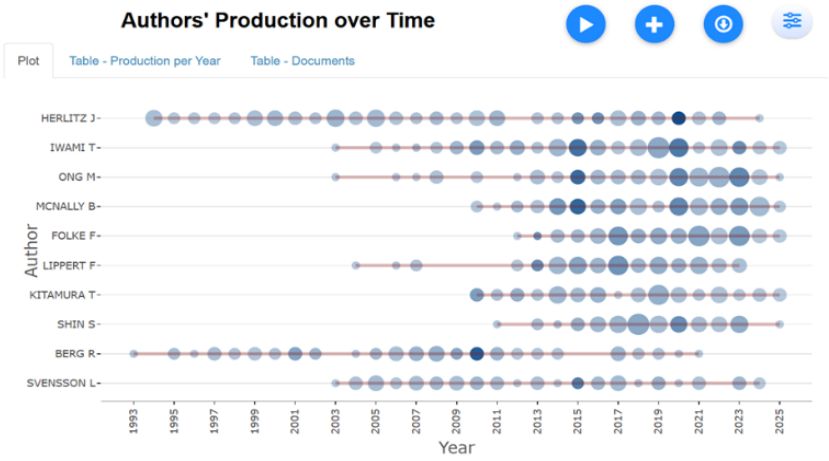
The distribution of scientific production of the ten most relevant authors in the field of lay cardiopulmonary resuscitation was analyzed by year of publication.

The figure above shows the productivity trend of each author from 1993 to 2025. In general, Herlitz J showed consistent scientific production since the beginning of the observation period, with a stable peak activity from 2000 to 2020. Iwami T and Ong M began to actively publish research in the early 2000s, with the highest intensity recorded in the period from 2010 to 2020. Meanwhile, Mcnally B, Folke F, and Kitamura T showed a significant growth pattern in production after 2010, in line with the increasing global attention to the importance of the role of lay people in cardiopulmonary resuscitation.

Berg R and Svensson L appear to have been active from the late 1990s to the present, with fluctuations in the number of publications per year. Shin S showed a peak in productivity between 2015 and 2020, while Lippert F showed a more sporadic but consistent trend in productivity. These trends reflect an increased focus on lay cardiopulmonary resuscitation research in the last decade, coinciding with global initiatives to improve survival rates from out-of-hospital cardiac arrest. The surge in scientific output between 2010 and 2020 reflects increased international collaboration, developments in life support technologies, and major revisions to global resuscitation guidelines.

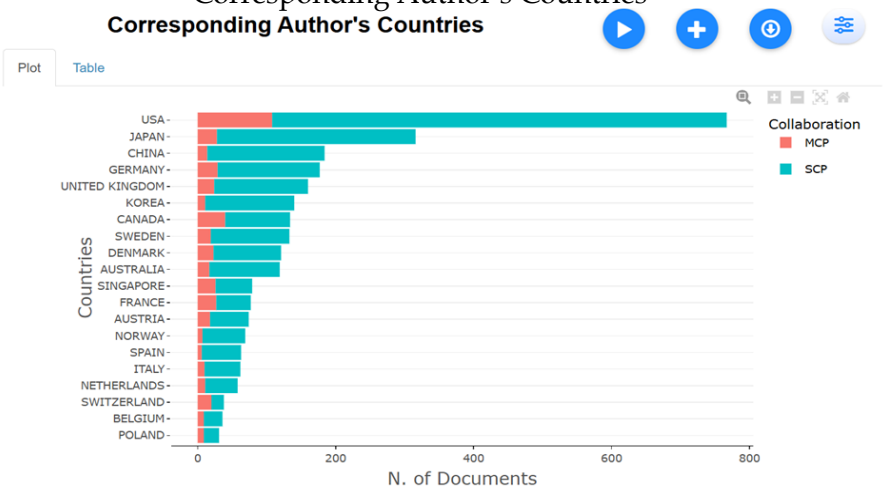
Graph 6.

Authors' Production Over Time



Graph 7.

Corresponding Author's Countries



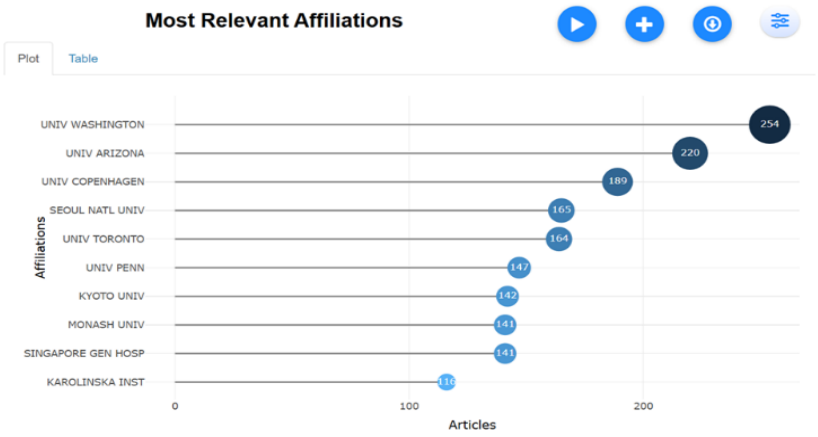
The Most Productive Country and Institutions

Geographical distribution analysis of the corresponding authors shows that publications related to lay cardiopulmonary resuscitation are dominated by developed countries. The United States (USA) is in the top position with the largest number of scientific papers, followed by Japan, China, Germany, and the United Kingdom. Most publications come from single collaborations (Single Country Publications/SCP), marked in light blue on the graph. The proportion of collaborative publications between countries (Multiple Country Publications/MCP), marked in pink, is quite significant in countries such as the United States, Canada, the United Kingdom, and Australia, reflecting the high involvement in international research.

Asian countries, such as Japan, China, and Korea, also show strong contributions, but with a higher tendency towards domestic production (SCP) than cross-country collaboration. This indicates that despite high levels of scientific production, international collaboration from Asian countries is still more limited compared to Western countries. Overall, this distribution shows that layperson CPR research is global, but remains concentrated in countries with advanced healthcare infrastructure and strong research cultures.

Graph 8.

Most Relevant Affiliations



This graph displays the ten most relevant affiliated institutions based on the number of articles published in the research fields analyzed. The University of Washington tops the list with a total of 254 articles, followed by the University of Arizona (220 articles) and the University of Copenhagen (189 articles). The dominance of institutions from North America and Europe indicates a strong concentration of scientific production in countries with advanced research infrastructure and substantial funding. The presence of institutions from Asia such as Seoul National University, Kyoto University, and Singapore General Hospital indicates the increasing contribution of Asian countries to the global research landscape, reflecting a shift in collaboration and expansion of research capacity across continents. However, institutions from developing countries are noticeably underrepresented in this list, highlighting the disparities in access to international research resources and publications.

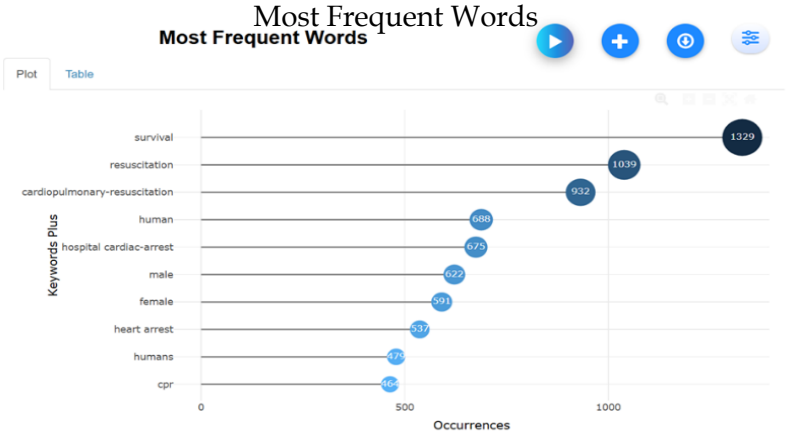
Critically, these data suggest that institutional contributions to scientific publications are influenced not only by the number of researchers or research budgets, but also by global collaboration networks, publishing capacity, and institutional strategies for encouraging publication in reputable journals. Further evaluation of the impact of publications (e.g. through citation analysis) is needed to complement this quantitative picture with qualitative aspects of scientific contribution.

Key Words

The figure shows a visualization of the top ten keywords that appear in the literature related to the research topic, based on Keywords Plus analysis. Based on the graph, the most frequently appearing keyword is "survival" with a total of 1329 occurrences, followed by "resuscitation" (1039 times), and "cardiopulmonary-resuscitation" (932 times). Other frequently found keywords include "human" (688), "hospital cardiac arrest" (675), "male" (622), "female" (591), "heart arrest" (537), "humans" (479), and "cpr" (464).

The high frequency of keywords such as "survival", "resuscitation", and "cardiopulmonary-resuscitation" indicates that the issue of successful interventions and resuscitation actions is a major focus in the analyzed literature. In addition, the occurrence of keywords related to demographic characteristics such as "male", "female", and "human(s)" indicates that population aspects are also an important concern in these studies. These findings provide an illustration that the scientific literature in this field consistently highlights clinical and demographic aspects that are relevant to the success of cardiopulmonary resuscitation actions, especially in the context of cardiac arrest.

Graph 9.
Most Frequent Words



The figure shows a WordCloud of the most frequently occurring keywords in the literature on cardiopulmonary resuscitation (CPR). This visualization provides an overview of the most dominant topics in the scientific studies analyzed. The size of the word reflects its frequency of occurrence; the larger the word size, the more frequently the word occurs.

The most prominent keywords were "survival," "resuscitation," and "cardiopulmonary resuscitation," indicating the literature's primary focus on patient survival and resuscitation as a key intervention. Other significant terms

such as "hospital cardiac arrest," "heart arrest," "male," "female," "humans," and "emergency health service" indicate that clinical, demographic, and emergency care contexts were also important in this study. The presence of terms such as "bystander cardiopulmonary-resuscitation," "American-heart-association," and "public-access defibrillation" indicates a particular focus on the role of laypeople, professional guidance, and life-saving technology in efforts to improve CPR success, especially in cases of out-of-hospital cardiac arrest.

Thus, this WordCloud reinforces the findings from the previous frequency graph, as well as provides visual insight into topical associations and thematic trends in the scientific literature related to CPR and cardiac arrest.

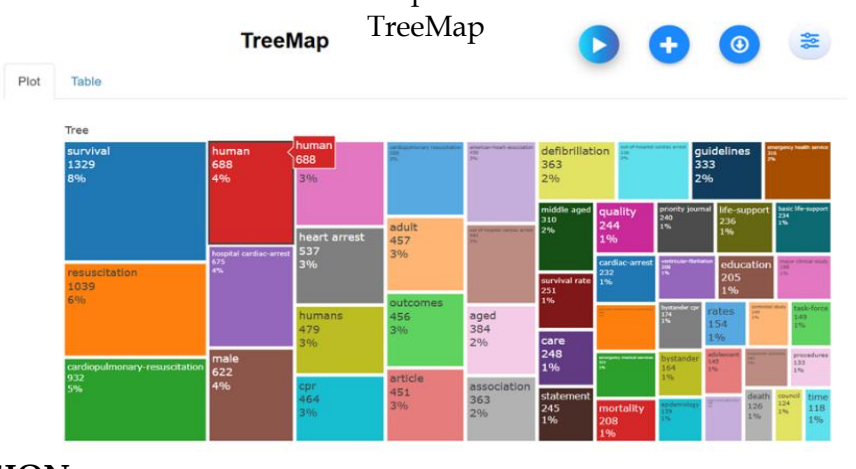
Graph 10.
WordCloud



TreeMap visualization presents the frequency distribution of keywords (Keywords Plus) in the form of proportional blocks, where the size of each block represents the number of occurrences of the word in the analyzed literature. The keyword "survival" dominates with a total of 1329 occurrences (8%), followed by "resuscitation" (1039 times, 6%) and "cardiopulmonary-resuscitation" (932 times, 5%). Other keywords that also stand out in this visualization include "human" (688), "hospital cardiac arrest" (675), "male" (622), "heart arrest" (537), "cpr" (464), "humans" (479), and "adult" (457). The different block sizes reflect the relative importance of each keyword in the analyzed literature corpus. Keywords such as "outcomes", "aged", "article", and "guidelines" also appear with quite high frequency, indicating the study's attention to clinical outcomes, age groups, and practice guidelines.

This visualization reinforces previous findings from the bar graph and WordCloud, emphasizing that key themes in CPR research center on patient survival, resuscitation interventions, and the role of demographic and healthcare system factors. Thus, TreeMap not only provides a visual mapping of frequently discussed topics but also helps identify research priorities and potential gaps for further study.

Graph 11.
TreeMap



DISCUSSION

In this research, we analyzed trend in publications about CPR performs by layperson in cardiac arrest patient using bibliometric analysis. A Significant upward trend in scientific publications on CPR by laypersons since 2005 has led to a consistent and significant increase in publications, peaking in 2023. This surge indicates a growing global interest in early intervention by the general public as a critical component in the chain of survival in OHCA. It's also in line with the efforts of international organizations such as the American Heart Association (AHA) and the European Resuscitation Council (ERC) in promoting cardiopulmonary resuscitation training for the public (24). This increase in line with the increasing global awareness of the importance of early intervention by bystanders in OHCA. Public policy, community-based CPR training, and technologies such as mobile alert responder apps have accelerated this trend. This increase can also be attributed to the development of mass training programs, public campaigns, and technological innovations such as mobile responder alerts, which directly encourage community involvement in cardiac emergency management. The sharp decline in 2025 could be due to limitations of incomplete annual data. Despite the increasing global trend, publications are still geographically uneven. Low- and middle-income countries continue to lag in research contributions, either due to resource constraints, low institutional capacity, or language and access to publications barriers (25).

These disparities present a major challenge in developing a global strategy to expand community-based CPR implementation. The annual scientific production graph reveals a significant upward trend in publications related to layperson-performed cardiopulmonary resuscitation (CPR) in cardiac arrest patients from 1979 to 2025. The early years (1979–2000) show minimal scientific output, indicating that the topic had not yet garnered widespread research attention. However, beginning in the early 2000s, there is a noticeable increase in the number of publications, reflecting a growing recognition of the importance of bystander CPR in out-of-hospital cardiac arrest (OHCA) survival. This growth trend becomes particularly pronounced after 2010, aligning with major international efforts to promote CPR awareness and training among the general

public. For instance, the American Heart Association (AHA) and European Resuscitation Council (ERC) released updated guidelines in 2010 and 2015 that strongly emphasized the critical role of bystanders in initiating CPR and the importance of dispatcher-assisted CPR (13,26). These guidelines likely contributed to the surge in research interest and publications during this period.

The peak in scientific production appears around 2022–2023, reaching nearly 300 articles per year. This surge may be attributed to increasing global awareness campaigns, integration of CPR training into school curricula, and the growth of community-based training programs (16,27). Moreover, the COVID-19 pandemic also stimulated interest in emergency preparedness and layperson involvement in life-saving interventions, possibly influencing publication rates in recent years (28). However, the sharp drop in publication volume observed in 2025 may not reflect an actual decline in research activity. Instead, it is likely a consequence of incomplete indexing of recent publications in bibliographic databases such as Web of Science at the time of analysis. Similar patterns have been observed in previous bibliometric studies, where the most recent year often appears underrepresented due to publication and indexing delays (29). Overall, the analysis demonstrates that layperson-performed CPR has become an increasingly important area of scientific inquiry, with consistent growth in academic output over the past two decades. This trend reflects the urgent need to empower the public with life-saving skills, reduce barriers to action, and improve survival rates from cardiac arrest through widespread implementation of community CPR programs.

The graph illustrating core sources based on Bradford's Law highlights the distribution of scholarly articles across various journals related to layperson-performed cardiopulmonary resuscitation (CPR) in out-of-hospital cardiac arrest (OHCA). Bradford's Law is a bibliometric model that categorizes scientific literature into zones based on the frequency of article publication, identifying a small set of "core journals" that contribute disproportionately to the total literature on a subject. In this analysis, the core sources—those that have published the highest number of relevant articles—are clustered on the left side of the plot and are represented within the shaded region. These include Resuscitation, Circulation, Resuscitation Plus, and the American Journal of Emergency Medicine. Notably, *Resuscitation* appears as the most dominant source, publishing over 800 articles, suggesting its central role in disseminating high-impact research in the field of emergency cardiovascular care and resuscitation science. This finding aligns with previous bibliometric studies, where *Resuscitation* and *Circulation* consistently emerge as key journals for CPR and OHCA research (29). Their high output can be attributed to their specialized focus, high impact factor, and global readership, which attract submissions from leading researchers and guideline developers such as the European Resuscitation Council and American Heart Association. The steep decline following the core sources reflects the classic Bradfordian distribution, where many other journals contribute only a small number of articles. While these peripheral journals still

provide valuable contributions, they lack the concentrated focus and influence of the core sources. Identifying these core journals is essential for researchers aiming to publish or stay updated in the field. It ensures strategic dissemination of evidence-based findings and supports more efficient literature searches and systematic reviews.

The analysis of average citations per year offers insight into the scholarly impact of publications on cardiopulmonary resuscitation (CPR) performed by laypersons in cases of out-of-hospital cardiac arrest (OHCA). As illustrated in the graph, citation trends have fluctuated over time, with several distinct patterns observed. In the early years (1979–1990), the average citation rate remained relatively low and inconsistent, likely reflecting the limited number of publications and the emerging nature of research on layperson CPR during that period. A significant spike in average citations occurred around 1992–1994, suggesting that one or more highly influential publications were released during this period and became foundational references in the field (29). These highly cited papers may have addressed landmark changes in CPR guidelines or introduced novel concepts in community-based resuscitation efforts.

From the late 1990s onward, the average citation per year stabilized, with moderate fluctuations between 2 to 5 citations per article annually. This trend indicates sustained research interest and continued referencing of prior work, which aligns with the global push for public training initiatives and dispatcher-assisted CPR (13,26). Notably, peaks observed around 2008–2012 may correspond with the release of updated international resuscitation guidelines and growing awareness campaigns promoting CPR education in schools and communities (27). A gradual decline in citation averages is observed after 2020, with a sharper drop by 2024. This pattern is common in bibliometric studies and does not necessarily reflect a decrease in article quality or relevance. Rather, it often results from citation lag, wherein recently published articles have not yet had sufficient time to accumulate citations (30). Therefore, the lower averages in the most recent years should be interpreted cautiously. Overall, the pattern of average citations per year demonstrates that while early research laid the groundwork for layperson CPR, more recent work continues to build on those foundations, contributing to a maturing and impactful body of literature. Continued efforts are needed to promote high-quality research and ensure that evidence-based strategies reach broader populations, particularly in low-resource settings where bystander CPR remains underutilized.

This bibliometric analysis highlights the growing academic interest in cardiopulmonary resuscitation (CPR) performed by laypersons, particularly in the context of out-of-hospital cardiac arrest (OHCA). Over the past two decades, there has been a steady increase in publications, indicating heightened global awareness of the critical role bystanders play in the chain of survival (13). Countries with well-established emergency response systems, such as the United States, Japan, and several European nations, have contributed significantly to the literature, both in terms of publication volume and citation impact (31). The most frequently cited articles emphasize the effectiveness of early bystander CPR in

improving survival outcomes, reinforcing its importance in emergency response protocols (24,26). However, the bibliometric data also suggest that a large proportion of research is concentrated in high-income countries, highlighting a geographic disparity. This reflects the need for more studies and intervention programs in low- and middle-income countries, where bystander CPR rates remain low due to limited public education, lack of infrastructure, and sociocultural barriers (14,27). Keyword co-occurrence and thematic evolution maps revealed several key research themes: public training, dispatcher-assisted CPR, psychological barriers, and CPR in school curricula. These findings reflect a shift in research focus from clinical efficacy toward community engagement and behavioral sciences. Furthermore, recent studies have explored the psychological burden and stress experienced by lay rescuers, which may influence their willingness and ability to perform CPR in real emergencies (16,18). Despite the growing number of public campaigns and educational programs, bystander CPR rates remain below optimal levels in many regions. The findings of this bibliometric analysis underscore the necessity of a multidisciplinary approach—combining public health, education, behavioral psychology, and emergency medicine—to improve CPR training programs and empower laypersons to act decisively in cardiac emergencies (15,17). Overall, this study provides a comprehensive overview of current research trends and gaps, serving as a valuable reference for future investigations aiming to increase the rate and quality of CPR performed by the general public during OHCA events.
Overall, the findings from this bibliometric analysis reinforce the urgency of expanding the reach of CPR training to the wider community and the integration of emergency response systems that support the involvement of lay people. The trend of scientific publications points to research directions that support health promotion policies and sudden death prevention through community-based interventions.

CONCLUSION

Overall, this study provides a bibliometric analysis of layperson-administered cardiopulmonary resuscitation in cardiac arrest patients from 1979 to 2025. The findings underscore the importance of ongoing research in understanding the role of laypersons in performing cardiopulmonary resuscitation in cardiac arrest patients. This study can provide an overview and focal point for future research in this area. This bibliometric analysis reveals a significant growth in research on CPR for bystanders of OHCA, particularly in the past two decades. These findings underscore the importance of public education, institutional leadership, and policy support. Future efforts should focus on promoting inclusive global research, expanding CPR training, and integrating technological solutions to strengthen the community's response to cardiac emergencies. The results of this bibliometric analysis also demonstrate that research on layperson-administered CPR is growing rapidly and is increasingly gaining attention from the global scientific community. The dominance of certain institutions, countries, and authors reflects the existence of centers of knowledge that have consistently

contributed to improving survival rates in out-of-hospital cardiac arrest. Future researchers are advised to explore new directions such as the use of AI in cardiac arrest detection and the expansion of technology-based training for the public.

REFERENCES

Andersen LW, Holmberg MJ, Berg KM, Donnino MW, Granfeldt A. In-Hospital Cardiac Arrest: A Review. JAMA. 2019 Mar 26;321(12):1200. doi:10.1001/jama.2019.1696

Myat A, Song KJ, Rea T. Out-of-hospital cardiac arrest: current concepts. The Lancet. 2018 Mar;391(10124):970–9. doi:10.1016/S0140-6736(18)30472-0

Hassager C, Nagao K, Hildick-Smith D. Out-of-hospital cardiac arrest: in-hospital intervention strategies. The Lancet. 2018 Mar;391(10124):989–98. doi:10.1016/S0140-6736(18)30315-5

Barcella CA, Christensen DM, Idorn L, Mudalige N, Malmborg M, Folke F, et al. Outcomes of out-of-hospital cardiac arrest in adult congenital heart disease: a Danish nationwide study. Eur Heart J. 2023 Sep 7;44(34):3264–74. doi:10.1093/eurheartj/ehad358

Grunau B, Kime N, Leroux B, Rea T, Van Belle G, Menegazzi JJ, et al. Association of Intra-arrest Transport vs Continued On-Scene Resuscitation With Survival to Hospital Discharge Among Patients With Out-of-Hospital Cardiac Arrest. JAMA. 2020 Sep 15;324(11):1058. doi:10.1001/jama.2020.14185

Geri G, Fahrenbruch C, Meischke H, Painter I, White L, Rea TD, et al. Effects of bystander CPR following out-of-hospital cardiac arrest on hospital costs and long-term survival. Resuscitation. 2017 Jun;115:129–34. doi:10.1016/j.resuscitation.2017.04.016

Hinchey PR, Myers JB, Lewis R, De Maio VJ, Reyer E, Licatese D, et al. Improved Out-of-Hospital Cardiac Arrest Survival After the Sequential Implementation of 2005 AHA Guidelines for Compressions, Ventilations, and Induced Hypothermia: The Wake County Experience. Ann Emerg Med. 2010 Oct;56(4):348–57. doi:10.1016/j.annemergmed.2010.01.036

Kragholm K, Wissenberg M, Mortensen RN, Hansen SM, Malta Hansen C, Thorsteinsson K, et al. Bystander Efforts and 1-Year Outcomes in Out-of-Hospital Cardiac Arrest. N Engl J Med. 2017 May 4;376(18):1737–47. doi:10.1056/NEJMoa1601891

Panchal AR, Bobrow BJ, Spaite DW, Berg RA, Stolz U, Vadeboncoeur TF, et al. Chest compression-only cardiopulmonary resuscitation performed by lay rescuers for adult out-of-hospital cardiac arrest due to non-cardiac aetiologies. Resuscitation. 2013 Apr;84(4):435–9. doi:10.1016/j.resuscitation.2012.07.038

Riddersholm S, Kragholm K, Mortensen RN, Pape M, Hansen CM, Lippert FK, et al. Association of bystander interventions and hospital length of stay and admission to intensive care unit in out-of-hospital cardiac arrest survivors. Resuscitation. 2017 Oct;119:99–106. doi:10.1016/j.resuscitation.2017.07.014

Semeraro F, Wingen S, Schroeder DC, Ecker H, Scapigliati A, Ristagno G, et al. KIDS SAVE LIVES implementation in Europe: A survey through the ERC Research NET. Resuscitation. 2016 Oct;107:e7–9. doi:10.1016/j.resuscitation.2016.08.014

Tanaka H, Ong MEH, Siddiqui FJ, Ma MHM, Kaneko H, Lee KW, et al. Modifiable Factors Associated With Survival After Out-of-Hospital Cardiac Arrest in the Pan-Asian Resuscitation Outcomes Study. Ann Emerg Med. 2018 May;71(5):608-617.e15. doi:10.1016/j.annemergmed.2017.07.484

Perkins GD, Handley AJ, Koster RW, Castrén M, Smyth MA, Olasveengen T, et al. European Resuscitation Council Guidelines for Resuscitation 2015. Resuscitation. 2015 Oct;95:81–99. doi:10.1016/j.resuscitation.2015.07.015

Farquharson B, Dixon D, Williams B, Torrens C, Philpott M, Laidlaw H, et al. The psychological and behavioural factors associated with laypeople initiating CPR for out-of-hospital cardiac arrest: a systematic review. BMC Cardiovasc Disord. 2023 Jan 14;23(1):19. doi:10.1186/s12872-022-02904-2

Kanstad BK, Nilsen SAa, Fredriksen K. CPR knowledge and attitude to performing bystander CPR among secondary school students in Norway. Resuscitation. 2011 Aug;82(8):1053–9. doi:10.1016/j.resuscitation.2011.03.033

Fodale V, Angileri FF, Antonuccio P, Basile G, Benedetto F, Leonetti D, et al. The dramatic increase in sudden cardiac deaths and the alarming low survival: A global call to action to improve outcome with the engagement of tertiary education system. J Educ Health Promot. 2023 May;12(1). doi:10.4103/jehp.jehp_1385_22

Brooks SC, Simmons G, Worthington H, Bobrow BJ, Morrison LJ. The PulsePoint Respond mobile device application to crowdsource basic life support for patients with out-of-hospital cardiac arrest: Challenges for optimal implementation. Resuscitation. 2016 Jan;98:20–6. doi:10.1016/j.resuscitation.2015.09.392

Krage R, Zwaan L, Tjon Soei Len L, Kolenbrander MW, Van Groeningen D, Loer SA, et al. Relationship between non-technical skills and technical performance during cardiopulmonary resuscitation: does stress have an influence? Emerg Med J. 2017 Nov;34(11):728–33. doi:10.1136/emermed-2016-205754

Iwami T, Kitamura T, Kiyohara K, Kawamura T. Dissemination of Chest Compression–Only Cardiopulmonary Resuscitation and Survival After Out-of-Hospital Cardiac Arrest. Circulation. 2015 Aug 4;132(5):415–22. doi:10.1161/CIRCULATIONAHA.114.014905

Taniguchi T, Sato K, Fujita T, Okajima M, Takamura M. Attitudes to Bystander Cardiopulmonary Resuscitation in Japan in 2010. Circ J. 2012;76(5):1130–5. doi:10.1253/circj.CJ-11-0054

Oliveira NC, Oliveira H, Silva TLC, Boné M, Bonito J. The role of bystander CPR in out-of-hospital cardiac arrest: what the evidence tells us. Hellenic J Cardiol. 2025 Mar;82:86–98. doi:10.1016/j.hjc.2024.09.002

Bornmann L, Leydesdorff L. Scientometrics in a changing research landscape: Bibliometrics has become an integral part of research quality evaluation and has been changing the practice of research. EMBO Rep. 2014 Dec;15(12):1228–32. doi:10.15252/embr.201439608

Aria M, Cuccurullo C. bibliometrix : An R-tool for comprehensive science mapping analysis. J Informetr. 2017 Nov;11(4):959–75. doi:10.1016/j.joi.2017.08.007

Gräsner JT, Wnent J, Herlitz J, Perkins GD, Lefering R, Tjelmeland I, et al. Survival after out-of-hospital cardiac arrest in Europe - Results of the EuReCa TWO study. Resuscitation. 2020 Mar;148:218–26. doi:10.1016/j.resuscitation.2019.12.042

Nas J, Thannhauser J, Vart P, Van Geuns RJ, Muijsers HEC, Mol JQ, et al. Effect of Face-to-Face vs Virtual Reality Training on Cardiopulmonary Resuscitation Quality: A Randomized Clinical Trial. JAMA Cardiol. 2020 Mar 1;5(3):328. doi:10.1001/jamacardio.2019.4992

Sasson C, Rogers MAM, Dahl J, Kellermann AL. Predictors of Survival From Out-of-Hospital Cardiac Arrest: A Systematic Review and Meta-Analysis. Circ Cardiovasc Qual Outcomes. 2010 Jan;3(1):63–81. doi:10.1161/CIRCOUTCOMES.109.889576

Böttiger BW, Van Aken H. Kids save lives –. Resuscitation. 2015 Sep;94:A5–7. doi:10.1016/j.resuscitation.2015.07.005

Baldi E, Sechi GM, Mare C, Canevari F, Brancaglione A, Primi R, et al. Out-of-Hospital Cardiac Arrest during the Covid-19 Outbreak in Italy. N Engl J Med. 2020 Jul 30;383(5):496–8. doi:10.1056/NEJMc2010418

Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM. How to conduct a bibliometric analysis: An overview and guidelines. J Bus Res. 2021 Sep;133:285–96. doi:10.1016/j.jbusres.2021.04.070

Ellegaard O, Wallin JA. The bibliometric analysis of scholarly production: How great is the impact? Scientometrics. 2015 Dec;105(3):1809–31. doi:10.1007/s11192-015-1645-z

Ong MEH, Perkins GD, Cariou A. Out-of-hospital cardiac arrest: prehospital management. The Lancet. 2018 Mar;391(10124):980–8. doi:10.1016/S0140-6736(18)30316-7