GLOBAL RESEARCH TRENDS ON EMERGENCY MEDICAL TECHNICIANS: A BIBLIOMETRIC ANALYSIS (2015-2025)

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Disubmit: 10 Januari 2026 Diterima: 15 Juli 2026 Diterbitkan: 01 Agustus 2026
Doi: https://doi.org/10.33024/mahesa.v6i8.24438

ABSTRACT

Emergency medical technician (EMT) is a frontline responder trained to provide basic emergency care, including CPR, bleeding control, airway management, and patient assessment. Despite growing research, no comprehensive bibliometric analysis has been conducted on this topic. This study systematically maps the scientific landscape, research trends, and thematic structures of emergency medical technician, identifying clusters, gaps, and future directions. A bibliometric analysis of publications in the Scopus database was performed, with visualization, co-occurrence, and trend analyses conducted using VOS viewersoftware (version 1.6.20). From 6,459 relevant publications indicated increasing research activity despiteperiodic fluctuations, Five thematic clusters emerged: (1) EMT, (2) emergency health service, (3) emergency medical service, (4) emergency medical technician, and (5) rescue personnel. Overlay visualisation revealed a recent research shift (2015–2025) toward paramedic personnel, and allied health personnel. China was the country with leading contributor and The most cited work was Bulger et al. (2019), cited 161 times. This bibliometric study on emergency medical technician highlights priorities in The role of Emergency Medical Technicians (EMTs) in the global healthcare and emergency medical systems, the development and increasing complexity of professional practice, and the growing volume of scholarly publications related to EMTs. The findings offer a reference for future research of understanding of the evolution, structure, and direction of global EMT and offers valuable insights for researchers, educators, practitioners, and policymakers seeking to strengthen emergency medical services worldwide..

Keywords: Bibliometric Analysis, Emergency Medical Technician, Paramedic, Vosviewer.

INTRODUCTION

Emergency Medical Teams (EMTs) are an integral part of the global health workforce network; in this context, they play a role in disaster situations and health emergencies.. Consisting of doctors, nurses, paramedics and other health professionals from across the world, the teams are rapidly deployed to help patients during disease outbreaks, sudden onset disasters (WHO, 2022). In the last few decades, different initiatives have been made to improve performance of Emergency Medical Technicians (EMTs), such as continuing education, training programs, mental health support, and

application based support like mobile health technologies. These programs are intended to make sure that the EMT personnel have the necessary skills, dependability, and the necessary equipment to facilitate the professional practice in the area, and thus, provide the best emergency care possible. Nevertheless, up to now, these development policies remain subject to systematic review to ascertain which practices are most effective, can be utilized as an evidence base in policymaking, and can be transferred to other contexts. (Albasrawi et al,. 2024).

While these dedicated workers ensure the health and safety of communities, they themselves are at risk of experiencing psychological distress, including post-traumatic stress disorder (PTSD), fatigue / compassion fatigue, work-related burnout, and even suicidal thoughts. In addition, the mental stress faced by EMS workers may be compounded by the physical demands and time-sensitive tasks they must perform (He, 2025).

LITERATURE REVIEW

Bibliometrics is a type of qualitative and quantitative scientific evaluation. Through a comprehensive analysis of the author, country, H index, citation amount, publication time and other issues of the selected relevant articles, the contributions of academic groups and individual researchers were evaluated objectively. Similarly, through the integration and analysis of the keywords of the included articles, the keywords with high frequency and the keywords newly emerged in recent years, which were treated as hotspots, were selected to provide supporting evidence with regard to future development trends (Albasrawi, Muntadhar Ali Ahmed et al, 2024).

METHODOLOGY RESEARCH

To analyze global trends in EMT research publications (2015–2025). To identify the most productive countries, the most influential authors and journals, as well as dominant themes and keywords. This study adopts a quantitative bibliometric methodology to systematically examine prevailing research trends and thematic patterns, with the objective of identifying underrepresented areas that present potential for novelty in subsequent scholarly investigations (Donthu et al., 2021; Kumar et al., 2024; Öztürk et al., 2024). The Scopus database was chosen as the source of this study. Most bibliometric studies utilize Scopus as the central database (Abushamma et al., 2021; Al-Jabi, 2023). The Scopus database was chosen for its comprehensive coverage of highquality academic publications across various disciplines, including health and biomedical sciences (Pranckutė, 2021). In addition, Scopus provides a simple bibliometric tool that is easy to understand (AlRyalat et al., 2019).

On December 25, 2025, systematic search was done to locate publications on emergency medical techinician in the past decade. The time selection is made to ensure that the latest trends and the progress in the same field are captured. Scopus Engine combines the words that are relevant to the keywords and adds the words that are the emergency medical technician to the keywords and their synonyms. The search strategy uses Boolean operators to ensure relevant matches. Quotation mark symbol ("") to check the search for a specific term or phrase. Publication is limited to original

articles and reviews in English. The search formula will target the article's title, abstract, and keywords. The search process was completed on December 25, 2025, to avoid inconsistent results due to database updates.

Articles collected were limited to those published between 2015 and 2025. The inclusion criteria included articles addressing emergency medical technician, English-language articles, original articles, and reviews, while exclusion criteria focused on editorials, book chapters, notes, letters, conference papers, short surveys, conference reviews, retracted articles, and articles in press, non-English publications and studies unrelated to emergency medical technician. The selection process was carried out in stages. After the initial search, the results obtained were screened based on title and abstract to identify relevant articles that met the inclusion criteria. Articles that were irrelevant were filtered out. Data was extracted into the Microsoft excel 2019 to be analyzed in terms of its relevance in terms of year of publication, authorship, institutional affiliation, country of origin, citations, and keywords..

The collected articles were subsequently analysed using the VOSviewer application. The process of entering data into the VOSviewer application is carried out by researcher. VOSviewer is a software tool designed for analysing and visualising bibliometric data (van Eck & Waltman, 2010). Bibliometric visualisation was carried out using cooccurrence of terms in titles and abstracts (Donthu et al., 2021; Kumar et al., 2024) resulting in three distinct types of visualisation: network visualisation, overlay visualisation, and density visualisation (Donthu et al., 2021; Kumar et al., 2024; Öztürk et al., 2024; Van Eck & Waltman, 2010).

Density visualisation to illustrate term frequency, network visualisation to depict the interconnections between terms, and overlay visualisation to show temporal distribution (van Eck & Waltman, 2010). With 29,578 keyword found and 4,907 meet the treshold the minimum number of occurrences was set at fifty in order to capture significant terms. Subsequently, all of the resulting visualisations were verified, interpreted and researcher. (Zupic & Čater, 2014). This study involved bibliometric analysis, which analyzes published literature and did not involve direct interaction with human oranimal subjects. However, ethical standards were adhered to, particularly in ensuring the integrity and transparency of the review process.

RESEARCH RESULTS

According to the search results on the Scopus database, 6,459 articles concerning emergency medical technician in 2015 to 2025 have been found, 5,779 articles and 680 reviews (Figure 1). The number of publications addressing the emergency medical technician issue has been increasing and decreasing within the last decade as in Figure 2. It can be seen that the general pattern of the research is rising though not steady, with the highest number of publications in 2021 (749 publications), 2022 (647 publications), and 2020 (639 publications), which does not contradict the global interest towards emergency medical technician.

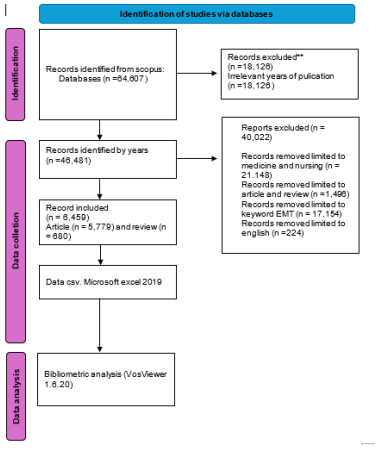

Figure 1. Flowchart of literature selection

A hundred and eight countries contributed to the literature on emergency medical technician. China emerged as the leading contributor with 2171 publications, followed by United states (1325 publications) and Australia (545 publications) (Table 1).

Table 1. Top 10 Active Countries Ranked By Article Output On Emergency Medical Technician From 2015 To 2025

Ranking	Country	Total Publication
1	China	2171
2	United States	1325
3	Australia	545
4	Canada	420
5	Germany	238
6	Japan	206
7	South Korea	158
8	Italy	140
9	Taiwan	138
10	India	134

The research publications on emergency medical technician have been varying over the last ten years (2015-2025). The increase in the rate of publications grew significantly in 2019, 2020, 2021, and 2022 which were four years of this period. The year 2021 recorded the greatest number of publications amounting to 750 articles.

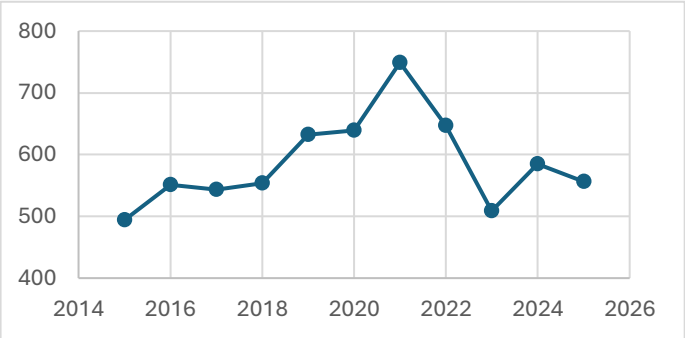

Figure 2. Graph Of Research Trends On Emergency Medical Technician From 2015 To 2025: Source: Scopus Data Analysis

The ten most cited publications can be seen in Table 2. The most cited publications are works by (Bulger et al., 2019), published by the BMJ Journal, with 161 citations. Then, in second place is a publication by (Sun et al., 2018), published in European Resuscitation Council (ERC), with 43 citations. Moreover, in third place is a publication by (Ducar et al., 2020), published in the Journal explore, with 40 citations (Table 2).

Table 2. Top 10 Most Cited Publications In Research Related To Emergency Medical Technician From 2015 To 2025

Quartile	Author	Source	Cited by
Q2	E.M. Bulger (2019)	BMJ Journal	161
Q1	J.T. Sun (2018)	European Resuscitation Council (ERC)	43
Q1	D.M. Ducar (2020)	Explore	40
Q2	R. Friedenberg (2022)	Archives of Environmental and Occupational Health	38
Q1	P.I. Pietersen (2021)	Scandinavian Journal of Trauma Resuscitation and Emergency Medicine	37
Q1	X. Zhang (2018)	Addictive Behaviors	28
Q1	H. Vagle (2019)	Nursing Open	26
Q4	A. Rahimi (2015)	Trauma Monthly	25
Q1	M.B. Cannell (2016)	BMC Emergency Medicine	23
Q1	G. Nadim (2021)	BMC Health Services Research	23

Key Emerging Themes

Figure 3 Shows Network Visualization And Three Main Clusters Are Formed In Different Colors: Red, Green, And Blue.

The bibliometric structure gave out three major clusters where each cluster is denoted by a given colour implying relationships of the terms used within the literature (van Eck & Waltman, 2010). The clusters are individual research interests (Donthu et al., 2021).

Cluster 1 (red) : ambulance, ambulances, emergency care,

emergency health services, emergency medical services, hospital, emergency ward, organization and management, patient transport. This cluster focusing on functioning as a systemic conduit that integrates hospital-based management (emergency ward, emergency care) and operational logistics (ambulance)."

Cluster 2 (green) : cardiopulmonary resuscitation, emt, male, out of hospital cardiac arrest, resuscitation, survival rate, This cluster focus on the professional roles of EMTs and paramedics within emergency medical service systems, particularly in the context of prehospital care

Cluster 3 (blue) : allied health personnel, emegency medical technician, paramedic, paramedical personnel, paramedics, prehospital, rescue personnel. This cluster focus on focuses on human resources and technical qualifications, encompassing terminology such as 'paramedical personnel', 'rescue personnel', and 'emergency medical technicians'.

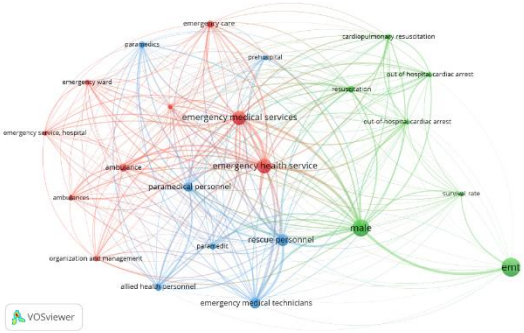

Figure 3. Network Visualization Map Of Publications Related To Emergency Medical Technician From 2015-2025

The visualization above shows that the more frequently an occurrence is used, the larger the node that appears. The data indicate that the largest occurrences are emergency health service, emergency medical service, emt, emergency medical techinician, male and rescue personnel.

Trend and Future Research

Based on the VOSviewer overlay visualization, this map illustrates the dynamic evolution of research topics related to Emergency Medical Technicians (EMTs) over the analyzed publication period. Colors represent the chronological emergence of keywords, with blue indicating earlier topics and green–yellow denoting more recent themes.

Early topics (blue–purple), such as out-of-hospital cardiac arrest, cardiopulmonary resuscitation, and resuscitation, reflect an initial research focus on critical clinical outcomes and life-saving interventions. Over time, the focus shifted toward green-colored themes, including emergency medical services, emergency health service, emergency care, and ambulance, indicating growing scholarly attention to emergency service systems, prehospital–hospital integration, and the performance and continuity of care.

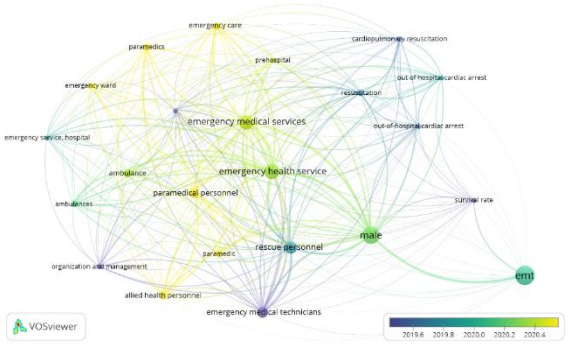

Figure 4. Overlay Visualization Map Of Publications Related To Emergency Medical Technician From 2015-2025

Density Visualization Analysis

The density visualization generated through VOSviewer provides an in-depth overview of research intensity and intellectual concentration within the emergency medical services domain. This visualization reveals intellectual centers of gravity that are highly concentrated in several key areas, marked by intense yellow brightness. The primary focus of the literature is clearly directed toward "emergency medical services" and "emergency health service," indicating that these two terminologies serve as the fundamental pillars with the highest co-occurrence frequency within the data corpus. Interestingly, there is a very strong density saturation at the "male" and "emt" nodes, suggesting that discussions regarding emergency medical technician personnel and patient demographic variables (specifically male) constitute the most established and saturated research areas. The brightness in these areas reflects a high volume of publications consistently exploring the relationship between the technical role of EMTs and specific patient characteristics often linked to clinical outcomes.

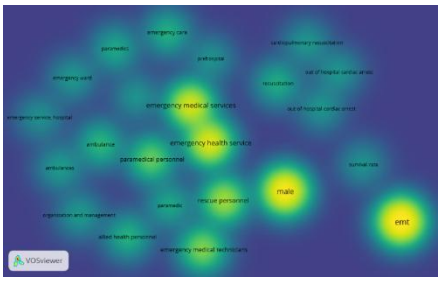

Figure 5. Density Visualization Map Of Publications Related To Emergency Medical Technician From 2015-2025

DISCUSSION

EMT role during pandemic

During the pandemic, dispatch calls increased substantially (80.07%; P < 0.05). The total number of EMS missions remained similar (1.63%; P < 0.05). The study notes a shift in the EMS case mix toward illness-related missions, with fewer trauma calls. There was also an increase in deaths before arrival,

bystander CPR, and field childbirth, reflecting COVID-19's substantial impact on EMS. Additionally, EMS managers should consider implementing Tele-EMS and remote physician support to minimize delays and unnecessary emergency department visits. Introducing new services during a pandemic can help EMS respond safely (Farajpour,. et al. 2025).

Overview of Global Research Trends

The most powerful cluster and the central cluster is the red cluster, with core keywords being the emergency medical technicians, EMT, emergency medical services, paramedic(s) and rescue personnel. This is evidenced by the large number of connections suggesting that the majority of publications are devoted to professional roles of EMTs and paramedics in emergency medical service systems, especially focusing on prehospital care, where EMS should serve as the main center connecting the issues connected to healthcare staff, emergency response, and service effects.

The blue cluster reflects on operation and service system such as ambulances, hospital emergency, and patient transportation. Its close connection with the red cluster highlights the idea that EMT studies are not limited to individualistic characteristics or capabilities of workforce but focus on prehospital-hospital integration, careideas, and system efficiency (Zupic, I., & Čater, T, 2014).

The green cluster is targeted at such critical clinical outcomes as out-of-hospital cardiac arrest, resuscitation, and cardiopulmonary resuscitation. Its close connection to the EMS implies that the literature is highly focused on the contribution of the EMTs to life-saving interventions, and the initial intervention performance in particular, with the primary focus on resuscitation as one of the central recurring issues.

Emerging and Declining Research Themes

In general, the overlay visualization shows a positive evolutionary pattern of EMT studies, where there is the transition of the focus on critical clinical interventions to the reinforcement of the emergency service system and, more recently, the construction and coordination of the emergency healthcare workforce. Such temporal development is indicative of the maturity and sophistication of the field with the recent trends in research being more concerned with the sustainability of the systems, interprofessional relationships, and the general enhancement of emergency care quality.

The down density periphery (green to dark blue), conversely, suggests thematic dissimilarity and uninvestigated research potentials. Topics such as organization and management, allied health personnel, and emergency ward appear less intensively studied than core clinical themes, suggesting persistent gaps in the literature. These "cool" areas highlight the need for further research on emergency ward management and multidisciplinary workforce effectiveness to achieve a more balanced and comprehensive EMT knowledge base.

High density in male nodes mean two things. The first is that the majority of EMT staff are men, or conversely, that men are more likely to be victims brought to the hospital, whether due to accidents or because of their role as breadwinners. The study in US revealed that over the decade, females who were certified as paramedics did not rise above the initial 23% noted in 2008 while EMT

certification among females rose from 28% in 2008 to 35% in 2017. Woman, in the past, have more compassion and tend to make it for the long run in Nursing. Less compassionate Nurses tend to end up in the specialties that require less caring attitudes. These often tend to be in the Emergency fields such as Emergency Medicine. Also the EMS system tends to be physically demanding and you must be strong in these positions. Having two people to lift a 250 to 300 pound person onto a stretcher and carry him down a narrow staircase requires a lot of strength and a very good back (Foat et al,. 2019).

Although characteristics at ED arrival are roughly similar, male ED patients have substantially higher crude and adjusted in-hospital mortality and were more often admitted to high dependency care units compared to female ED patients. These increased risks were also present in all triage categories and with almost all presenting complaints (including chest pain), as well as in subgroups of patients with suspected infection and trauma (Candel, 2022)

In activities that might result in accidents with traumatic results. Some estimates suggest that men are three times more likely to experience a brain injury than women. Groups like the United States Centers for Disease Control (CDC) suggest that men regularly engage in behaviors that are much more likely to result in injury and damage to the head or brain than the activities regularly engaged in by women (Babcock, 2022).

Geographical Contributions

A bibliometric analysis of 6,459 Scopus articles shows that worldwide research on emergency medical technicians generally increased between 2015 and 2025, despite some year-to-year fluctuations. The highest output occurred in 2021 with 750 publications. This growth mirrors findings by Karimifard (2025), who observed an upward trend in emergency services linked to accidents, heart disease, and respiratory issues, often fluctuating by season.

The country with the highest number of article publications is China, with 2,171 publications. Over the past decade, the number of ED visits tripled from 51.9 million to 166.5 million; and utilization of pre-hospital emergency care increased from 3.2 million to 6.8 million. In response to rapid increases in demand, the number of licensed emergency physicians raised from 20,058 to 59,409; the beds' number increased from 10,783 to 42,367. For pre-hospital emergency care, the volume of health workforce increased from 3,687 to 8,671, with a 109% increase in the number of physicians from 1,774 to 3,712. However, overcrowding, the long length of stay in EDs, poor work environment, and work exhaustion were still the critical challenges faced by China's EMSS (Pan et al., 2021)

The prehospital emergency service is the initial part of the Emergency Medical Service System (EMSS) in China, and is the de facto overall emergency medical service for China. As the EMSS in China continues to undergo rapid development, it faces the challenge of providing rapid response times with adequate coverage for this highly populated country. China has one of the most rapidly growing economies in the world. The annual growth rate of China's GDP has averaged around 9% since 1978. Emergency Medical Service System (EMSS) has become more and more important in China with the rising incidence of cardiovascular diseases

and trauma, and subsequent need for emergency stabilization, rapid transport and timely treatment. (Hung et al., 2009)

There have been many natural disasters in China in the past decade, most notably the 2008 Sichuan earthquake that killed 87,000 individuals and affected 46 million people. During the emergency phase of the disaster, in addition to its usual responsibilities of hospital receiving for injured patients, the emergency centre also sent out medical rescue teams, arranged transportation of healthcare professionals, drugs and medical equipment and transported patients. The large scale of the earthquake also exposed some of the weaknesses of the prehospital emergency service response. (Hung et al., 2009)

The Dominance Of Developed Countries Over Developing Countries

Fewer than half of countries had emergency medicine. Only half of countries offered board certification, and fewer than half had national laws regulating emergency care, national clinical guidelines for emergency care, emergency medicine peer-reviewed journals, or any emergency medicine subspecialty training Overall emergency medicine remains underdeveloped in most countries in our sample. Perhaps unsurprisingly, we found associations between country income groups and certain emergency medicine development milestones. Higher income was associated with a higher number of emergency medicine RTPs per population and higher frequency of ultrasound and critical care fellowships, EMS protocols, trained paramedics, scene-to-hospital transportation, and prehospital government air transport. The most common threat to the growth of emergency medicine reported was limited economic resources in the health system (Patiño et al, 2022)

CONCLUSION

The results of a bibliometric analysis conducted on 6,459 articles show that research related to emergency medical technicians (EMTs) has increased. The highest number of publications occurred in 2021, with a total of 750 articles and China lead the contributor with 2171 publication, while The most cited publications are works by (Bulger et al., 2019), published by the BMJ Journal, with 161 citations. The shift in keywords reflects growing awareness that the role of EMTs should not be limited solely to pre-hospital care. As a result, recent studies have increasingly focused on improving an integrated system between pre-hospital services and in-hospital care, which is expected to enhance patient safety outcomes. The findings also indicate that pre-hospital emergency services, the emergency department, and the intensive care unit form an interconnected framework. This framework constitutes a survival chain that includes emergency stabilization, rapid transportation, in-hospital resuscitation, and definitive treatment.

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