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Prehospital team composition and mortality: a scoping review

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Abstract

Emergency Medical Services (EMS) operate with heterogeneous team configurations, yet the impact of prehospital staffing models on patient mortality remains uncertain. Existing evidence suggests that survival differences may reflect system-level factors rather than the intrinsic superiority of specific professional roles. The aim of the present study was to map and synthesize the available evidence on the association between EMS team composition and mortality outcomes in prehospital care. A scoping review was conducted in accordance with PRISMA-ScR guidelines. PubMed, CINAHL, Web of Science, ProQuest, and Scopus were searched through July 2025. Peer-reviewed studies published from 2000 onwards that reported mortality outcomes in relation to defined prehospital team configurations were included. Two reviewers independently screened studies and extracted data, with disagreements resolved by a third reviewer. Twenty-five studies were included, encompassing diverse EMS systems across Asia, Europe, the Americas, and Oceania. Mortality outcomes varied substantially according to clinical severity, system maturity, dispatch accuracy, and prehospital time intervals. Physician-staffed teams demonstrated selective mortality benefits in high-acuity trauma and traumatic out-of-hospital cardiac arrest. Nurse–paramedic and advanced paramedic teams frequently achieved comparable survival outcomes in mixed emergencies and medical conditions when supported by robust training and standardized protocols. Across all models, emergency nurses contributed substantially to early assessment, physiological stabilization, clinical decision-making, and safety processes. System heterogeneity emerged as a dominant determinant of observed outcomes. No single EMS staffing model consistently outperforms others across all clinical contexts. Mortality outcomes appear to be shaped by the interaction between team competence and system organization rather than by professional composition alone. Future research should prioritize standardized quality indicators, intermediate outcomes, and comparative designs to support evidence-informed EMS workforce planning.

Introduction

Prehospital care plays a pivotal role in the management of time-sensitive emergencies, particularly major trauma, where early decision-making and timely interventions may substantially influence patient outcomes. Early North American studies introduced the concept of the “golden hour,” suggesting an association between shorter prehospital intervals and improved survival.[1] Subsequent research raised concerns that prolonged scene or transport times may worsen outcomes in patients with hemorrhagic shock or severe physiological derangement.[2,3] However, evidence remains inconsistent, with several studies reporting no clear association between total out-of-hospital time and mortality.[4,5] These findings suggest that factors beyond time alone, including system organization, clinical capabilities, and prehospital team composition, may play a decisive role in influencing outcomes.

This uncertainty underpins the long-standing debate between “scoop and run” and “stay and play” models of prehospital care. Paramedic-led systems typically emphasize rapid transport to definitive care, whereas physician-staffed or mixed models may prioritize advanced on-scene assessment and interventions, potentially improving physiological stability despite longer scene times.[6-9]

Such differences reflect broader international variability in Emergency Medical Services (EMS) organization and raise important questions regarding the contribution of different professional roles, including paramedics, nurses, and physicians, to prehospital outcomes.
In parallel, financial pressures, workforce shortages, and the need to ensure long-term service sustainability have prompted several EMS systems to expand the role of paramedics and advanced practice nurses, while reducing routine physician involvement in field response. Although these organizational changes may improve efficiency and resource allocation, they also raise an important policy question: whether different staffing configurations influence patient survival. In this context, examining mortality across EMS team models becomes highly relevant not only from a clinical perspective, but also for workforce planning and system design.
In parallel, increasing attention has focused on defining and measuring quality in prehospital care. Consensus initiatives have identified key research priorities for physician-staffed EMS,[10,11] while projects such as EQUIPE have proposed multidimensional quality indicators tailored to the prehospital setting.[12] Process indicators are often considered particularly suitable in EMS, given short time frames, heterogeneous patient populations, and limited opportunities for case-mix adjustment.[13] Nevertheless, mortality remains a widely used outcome in prehospital research and system evaluation. Its interpretation is complex: in-hospital and 30-day mortality may diverge,[14] deaths may primarily reflect underlying injury severity rather than quality of care,[14,16] and effective prehospital interventions may paradoxically increase in-hospital mortality by preventing death at the scene.[17,18] For these reasons, integrated assessment frameworks combining process and outcome measures have been strongly advocated.[19,20]
A substantial body of literature has examined Helicopter Emergency Medical Services (HEMS) and advanced prehospital critical care teams, particularly in major trauma. Several systematic reviews have reported an association between HEMS deployment and improved survival,[17-19] although findings remain heterogeneous across healthcare systems, injury patterns, and patient subgroups.[20] Importantly, observed benefits are not consistently explained by reduced prehospital time alone; advanced clinical capabilities such as airway management, analgesia, hemostatic interventions, and early physiological optimization appear central to outcome differences.[21] In many European models, HEMS teams are staffed by anesthesiologists, emergency physicians, or nurse anesthetists, achieving high procedural success rates in the prehospital setting.[22-26]
Despite this extensive literature, the specific contribution of prehospital team composition to mortality remains insufficiently clarified. Existing studies are fragmented across clinical conditions, service configurations, and geographic contexts, often focusing on single team models rather than systematically comparing staffing structures. Nurse-led and nurse–paramedic models, widely

implemented across EMS systems, remain underrepresented in comparative syntheses, despite their central role in global prehospital care delivery. Consequently, it remains unclear whether observed differences in mortality reflect team composition itself or broader system and contextual factors. Given this variability, a scoping review is warranted to map existing evidence on mortality outcomes associated with different prehospital team configurations. The aim of this review was to systematically describe how mortality is defined and reported across prehospital settings, identify clinical contexts in which team composition has been evaluated, and highlight methodological gaps to inform future research and system-level decision-making in prehospital emergency care.

Materials and Methods

Study design

This scoping review was conducted in accordance with the methodological framework originally described by Arksey and O'Malley[27] and subsequently refined by Levac and colleagues.[28] Reporting followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines.[29] The review protocol was prospectively registered on the Open Science Framework (OSF; DOI: 10.17605/OSF.IO/PG8AQ), where the full methodology, search strategies, and planned analytical procedures were documented prior to study selection. The overarching aim of this scoping review was to map and critically examine the existing evidence on the relationship between Emergency Medical Services (EMS) team composition and patient mortality in the prehospital setting, across different clinical contexts and system configurations.

Eligibility criteria

Eligibility criteria were defined a priori using the Population–Concept–Context (PCC) framework. Population. We included studies involving patients of any age receiving prehospital emergency care across urban and extra-urban settings, as well as in major or mass-casualty incidents. For the purpose of this review, prehospital EMS was operationally defined as emergency medical response delivered from the scene of an incident or during primary emergency transport. Studies focusing exclusively on secondary interfacility or interhospital critical care transport were excluded, as these settings involve different organizational structures and clinical objectives compared with primary EMS response.

Concept

The concept of interest was mortality, reported at any time point along the prehospital or early in-hospital continuum, including on-scene, prehospital, Emergency Department, or in-hospital mortality.

Context

Eligible studies were required to explicitly describe or compare EMS team composition, including nurse-led teams as well as other staffing configurations (e.g., nurse–paramedic, paramedic-only, or physician-staffed models).

Studies conducted exclusively in military settings, involving volunteer-only responders, or focusing on populations already admitted to hospital were excluded. Grey literature (conference abstracts, posters, dissertations) was excluded due to limited methodological detail and the absence of peer review. Only peer-reviewed quantitative, qualitative, or mixed-methods studies published in English or Italian from 2000 onwards were considered eligible, in accordance with the registered protocol.

Search strategy

A comprehensive search strategy was developed using the Population–Concept–Context (PCC) framework and refined iteratively to maximize sensitivity across databases. Searches were conducted on July 2, 2025, in the following electronic databases: PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science, ProQuest, and Scopus.

For each database, controlled vocabulary terms (e.g., MeSH terms, CINAHL Headings) were combined with free-text keywords to capture three core dimensions: i) EMS personnel (e.g., physicians, nurses, emergency medical technicians, paramedics); ii) mortality outcomes (e.g., mortality, emergency department mortality, in-hospital mortality, death); iii) EMS context (e.g., Emergency Medical Services, prehospital care, out-of-hospital care).

The complete search strategies for each database, including applied syntax, export formats, and retrieved record counts, are reported in Table 1. No restrictions were applied regarding publication date, patient age, geographical setting, or study design to ensure comprehensive coverage of the available evidence. Prior to data synthesis, a final search update was performed to minimize time-lag bias.

Although the search strategy did not explicitly include terms describing crew configuration (e.g., staffing models, skill mix, or team composition), these concepts were indirectly captured through the combination of EMS personnel descriptors (physicians, nurses, emergency medical technicians, paramedics) with mortality outcomes within the EMS context. In many EMS publications, staffing models are described implicitly through the professional roles involved rather than through standardized terminology related to team composition.

In some databases (e.g., Scopus and ProQuest), EMS context terms were restricted to specific fields (TITLE or TI) to improve retrieval specificity and reduce the retrieval of hospital-based studies unrelated to prehospital care. Given the broad initial yield across databases (n = 4,779 records), this strategy was considered adequate to balance sensitivity and specificity while maintaining feasible screening volumes.

Study selection

All retrieved records were exported in their original formats and imported into Rayyan for reference management and screening support. Rayyan was used exclusively to organize citations, identify and remove duplicates, and facilitate blinded independent screening; no automated, algorithm-based, or artificial intelligence–driven decision-making was used at any stage of study selection.

Following duplicate removal, titles and abstracts were independently screened by two reviewers against the predefined eligibility criteria. Screening decisions were made entirely by the reviewers based on manual assessment. The blinded screening environment was used to reduce selection bias and to highlight disagreements, which were subsequently resolved through discussion.

Studies deemed potentially eligible proceeded to full-text review, which was again conducted independently by the same two reviewers. Full-text articles were assessed in detail to confirm eligibility based on the PCC framework and to verify the reporting of mortality outcomes in relation to clearly defined EMS team compositions. In cases of disagreement, a third senior reviewer was consulted to ensure consistent and rigorous application of the eligibility criteria as prespecified in the registered protocol.

Reasons for exclusion at the full-text stage were systematically recorded. The complete study selection process is summarized in a PRISMA flow diagram (Figure 1).

Data charting

Data extraction was conducted using a structured yet flexible charting approach consistent with scoping review methodology. Working in independent reviewer pairs, data were systematically extracted on study design, setting, population characteristics, EMS crew configuration, and definitions of mortality outcomes. Particular attention was given to how each study conceptualized and operationalized team composition, the central variable of interest in this review.

Any uncertainties or discrepancies identified during data charting were resolved through discussion and, when necessary, consultation with a third reviewer to ensure methodological consistency. All data-charting procedures adhered to the workflow and specifications predefined in the registered OSF protocol.

Synthesis of results

Given the anticipated heterogeneity in study designs, EMS system models, and mortality outcomes, findings were synthesized using a descriptive and narrative approach. Results were grouped according to patterns in team composition and outcome reporting and were supported by summary tables presenting key study characteristics. In line with scoping review methodology, no meta-analysis or statistical pooling of results was performed.

Ethical considerations

As this study involved the synthesis of data from previously published literature, institutional ethics approval was not required. This approach is consistent with international standards for evidence synthesis and with the procedures outlined in the registered protocol.

Data availability

All materials supporting this review, including the protocol, search strategies, PRISMA flow diagram, and data-charting templates, are publicly available through the project's Open Science Framework repository (DOI: 10.17605/OSF.IO/PG8AQ).

Results

Study selection

The database search identified 4,779 records. After removal of duplicates (n = 791), 3,988 citations were screened at title and abstract level by two independent reviewers using a blinded approach. Disagreements were resolved through discussion or adjudication by a third senior reviewer.
Eighty full-text reports were sought for retrieval; six could not be retrieved, resulting in 74 full-text articles assessed for eligibility. Of these, 25 studies met the inclusion criteria and were included in the final synthesis. Reasons for exclusion at the full-text stage are summarized in the PRISMA flow diagram (Figure 1).

Characteristics of included studies

The 25 included studies represented a wide range of EMS systems across Asia, Europe, the Middle East, North and South America, and Oceania, reflecting substantial international heterogeneity in prehospital care organization. Detailed characteristics of the included studies, including study design, population, and EMS crew configuration, are summarized in Table S1. Most investigations focused on trauma populations, including blunt polytrauma, traumatic brain injury, and traumatic Out-Of-Hospital Cardiac Arrest (OHCA). Other clinical contexts included ST-Elevation Myocardial Infarction (STEMI),[30,31] septic shock,[32] pediatric trauma,[33] and mixed medical–trauma emergency cohorts.[34,35]

EMS team composition varied considerably across systems. Physician-staffed prehospital teams were most frequently investigated, particularly within Japanese EMS systems,[36-41] as well as in European models from the Netherlands[42,43] and Switzerland.[44] Nurse–paramedic critical care models were reported in Sweden,[45] Scotland,[46] and within Brazil's SAMU service,[47] whereas paramedic-only Advanced Life Support (ALS) configurations predominated in Anglo-American EMS systems.[34,48,49]

Marked clinical and operational heterogeneity was observed. Patient severity ranged from highly critical cohorts, such as traumatic OHCA,[50] hypotensive major trauma,[41] and Injury Severity Score (ISS) ≥ 25,[36,37] to mixed-acuity emergency transports[51] and interfacility transfers.[49] Mortality outcomes were variably reported as prehospital, 24-hour, 30-day, or in-hospital mortality, limiting direct comparability across studies.

A substantial proportion of the evidence originated from physician-staffed EMS systems, particularly in Japan,[36-41] highlighting a geographic concentration that may limit generalizability to other EMS configurations. In contrast, European and American studies more frequently described nurse–paramedic and paramedic-only models. The geographic distribution of included studies is presented in Figure 2.

Across several mixed staffing models, nurses were frequently involved in advanced airway management, physiological stabilization, analgesia, and triage processes reported within the included studies.[34,48,49]

Mortality outcomes by EMS team configuration

To improve interpretability across heterogeneous studies, mortality outcomes were mapped according to EMS team configuration, clinical context, and mortality endpoint. This structured overview is presented in Table 2. Across the included studies, mortality outcomes varied according to injury severity, clinical condition, EMS system maturity, and the balance between procedural capability and prehospital time. Physician-staffed teams were associated with lower adjusted mortality in several large trauma registry studies, particularly among patients with severe injury or high-complexity clinical needs.[36,37,40,42,46] Consistent survival benefits were also reported in traumatic brain injury and traumatic out-of-hospital cardiac arrest.[39,50]

However, multiple analyses reported no significant survival advantage for physician-staffed care after propensity score matching, despite higher intervention rates and longer prehospital times.[20,33,38,49] In hypotensive major trauma, physician-staffed EMS was associated with higher in-hospital mortality, largely mediated by prolonged scene and transport intervals delaying definitive hemorrhage control.[41]

Nurse–paramedic critical care team configurations generally demonstrated mortality outcomes comparable to physician-led models. In Sweden, critical care nurses working alongside paramedics provided advanced airway and circulatory management with similar survival outcomes.[45] Within Brazil's SAMU system, nurse–physician teams were preferentially deployed to more severe cases, while mortality remained comparable across team types.[47] In the United Kingdom, enhanced care teams combining physicians and advanced paramedics demonstrated improved survival after adjustment for injury severity.[35]

Paramedic-only ALS models also achieved outcomes comparable to physician-staffed systems in selected clinical contexts. In STEMI care, paramedic-led teams demonstrated similar mortality after risk adjustment.[30] Within trauma populations, advanced paramedic certification was independently associated with reduced mortality in selected subgroups, although findings varied according to system organization and case mix.[48]

Overall, the findings indicate that prehospital team composition is associated with differences in survival outcomes primarily in high-acuity settings, while neutral or context-dependent effects predominate in mixed and medical emergency populations.

Discussion

Interpretation of main findings

This scoping review mapped 25 studies examining the association between prehospital team composition and mortality across trauma, out-of-hospital cardiac arrest, and mixed medical emergencies. Overall, the available evidence does not support a universal mortality advantage attributable to any single prehospital team configuration. Rather than reflecting the intrinsic superiority of specific staffing models, observed differences in mortality appear to arise from a complex interaction between patient severity, case selection, system maturity, time-critical processes, and the distribution of advanced skills within prehospital teams.

Across high-acuity scenarios, particularly severe trauma and traumatic cardiac arrest, physician-staffed teams were more frequently associated with lower adjusted mortality. However, these findings were not consistent across all contexts and were strongly influenced by dispatch criteria, prehospital time intervals, and system organization. In several studies, prolonged scene or transport times attenuated or negated the potential benefits of advanced on-scene interventions, underscoring the importance of balancing procedural capability with timely access to definitive care.

Importantly, longer scene times associated with advanced teams may also represent intentional investment in early stabilization, including airway management, analgesia, hemodynamic optimization, and decision-making regarding destination hospitals. In this context, extended prehospital intervals should not necessarily be interpreted as inefficiency but rather as part of a strategy aimed at improving downstream survival.

Conversely, nurse-led and nurse–paramedic team models demonstrated mortality outcomes comparable to physician-staffed configurations across a range of mixed and medical emergency settings. These findings highlight the clinical relevance of advanced nursing competencies in prehospital care, particularly in airway management, hemodynamic stabilization, analgesia, and complex triage decision-making. However, most included studies described these contributions primarily in terms of clinical processes rather than directly measured mortality outcomes. Within multidisciplinary EMS systems, nursing expertise therefore appears to represent an important component of prehospital care, particularly in relation to early stabilization and the quality of clinical processes.

Taken together, these findings suggest that prehospital team composition should not be interpreted in isolation when evaluating mortality outcomes. Mortality represents a robust but blunt endpoint, influenced by upstream system factors and downstream in-hospital care pathways that may obscure the specific contribution of prehospital staffing models. Another key determinant of the effectiveness of advanced prehospital teams is the accuracy of dispatch systems in identifying patient severity. Advanced teams can only influence outcomes when they are deployed to patients who are most likely to benefit from higher-level prehospital interventions. Inaccurate triage at the dispatch level may therefore dilute the observable impact of team configuration on mortality by sending advanced resources to low-acuity cases or failing to deploy them to critically ill patients.

Another important methodological consideration concerns potential selection bias in studies evaluating physician-staffed EMS teams. In many EMS systems, physicians or advanced prehospital teams are preferentially dispatched to patients with greater clinical severity, which may confound comparisons with standard paramedic crews. Several included studies attempted to address this issue through risk adjustment using injury severity scores or propensity score matching; however, residual confounding related to case selection and dispatch criteria may still influence observed mortality differences.

Role of professional composition within different clinical contexts

The apparent benefit of physician-staffed EMS appears to be highly context-dependent rather than universally generalizable. Severe trauma represents the clinical scenario in which physician involvement demonstrates the most consistent association with improved survival, particularly among patients with high injury severity or severe traumatic brain injury.[19,52,53] In these settings, advanced interventions such as airway management, rapid sequence intubation, and early hemodynamic stabilization may mitigate secondary injury or refractory shock when delivered in a timely manner.[54]

However, several matched-pair and registry-based analyses reported no significant survival advantage despite higher intervention rates in physician-staffed groups.[55] Furthermore, studies comparing early injury assessment and prediction accuracy between physicians and paramedics identified minimal differences, suggesting that diagnostic capability alone does not explain observed mortality outcomes.[56]

In OHCA, findings were similarly heterogeneous. While some national registry data suggest improved ROSC and 30-day survival with physician involvement,[57] other studies indicate no significant survival benefit when physician-staffed teams arrive later in the arrest timeline.[58] These observations reinforce the dominant role of time-sensitive factors, early defibrillation, high-quality cardiopulmonary resuscitation, and rapid advanced life support, over professional composition alone.

Across trauma, OHCA, and mixed medical emergencies, nurse-led and nurse–paramedic team models consistently demonstrated mortality outcomes comparable to physician-staffed or paramedic-only configurations. Evidence from Nordic EMS systems indicates that nurse-supported ambulance staffing improves the quality of clinical assessment and documentation, with reductions in intensive care unit length of stay despite no change in crude mortality.[59] These findings suggest that nursing expertise may exert its primary effect through process quality and early stabilization rather than through direct mortality reduction.

Similarly, advanced practice nursing within prehospital assessment units and non-conveyance pathways has been shown to reduce short-term hospital admissions without increasing mortality.[60] Together, these data reinforce that mortality alone may underestimate the contribution of nursing-led models to system performance and patient safety.

System-level factors and implications for EMS organization

Across the included studies, system-level heterogeneity emerged as a dominant determinant of mortality outcomes, frequently outweighing the independent contribution of team composition. Key contextual factors included dispatch accuracy, case mix, transport modality, prehospital time intervals, scope of practice, and regional resource allocation.

For example, helicopter transport has been independently associated with improved trauma outcomes,[61] introducing confounding effects that may be erroneously attributed to physician presence rather than to faster access to definitive care or specialized receiving centers. Economic and health services analyses further demonstrate that the cost-effectiveness of physician-staffed HEMS is highly dependent on triage precision, mission selection, and integration within regional trauma and stroke networks.[62]

Several studies also indicate that paramedic-only ALS teams can achieve outcomes comparable to mixed or physician-staffed models when embedded within mature EMS systems characterized by standardized training pathways, protocol-driven care, and effective clinical governance. Within such systems, professional background appears less influential than the ability to deliver timely, evidence-based interventions.

Overall, these findings reinforce a central conclusion of this scoping review: prehospital team composition cannot be meaningfully interpreted independently of system organization and operational context. This insight has direct implications for policymakers and EMS leaders, highlighting the need to align workforce configuration decisions with system maturity, training infrastructure, and regional care pathways to ensure both effectiveness and sustainability.

Limitations

This scoping review has several limitations that should be considered when interpreting the findings. First, the review was designed to map and synthesize existing evidence rather than to estimate causal effects. As such, the included studies were heterogeneous with respect to design, patient populations, EMS system characteristics, and outcome definitions, precluding quantitative pooling or direct comparisons between team models.

Second, mortality was the primary outcome of interest, but it represents a relatively blunt endpoint for evaluating prehospital care. Mortality is influenced not only by prehospital interventions and team composition, but also by downstream in-hospital care, injury severity, comorbidities, and broader system-level factors. Consequently, differences in survival cannot be attributed solely to prehospital staffing models, and important process-related benefits, such as early stabilization, avoidance of deterioration, or appropriate non-conveyance, may not be captured by mortality outcomes alone.

Third, a substantial proportion of the included evidence originated from specific national contexts, particularly physician-staffed EMS systems in Japan. This geographic concentration may limit the generalizability of findings to other settings with different organizational structures, scopes of practice, and resource availability. Additionally, nurse-led and paramedic-only models were underrepresented in some clinical scenarios, reflecting gaps in the existing literature rather than an absence of such models in practice.

Fourth, most included studies were observational in nature and subject to residual confounding despite the use of adjustment methods such as propensity score matching. Factors such as dispatch criteria, case selection, prehospital time intervals, and system maturity were variably reported and inconsistently controlled for, limiting the ability to isolate the independent effect of team composition on mortality.

Finally, the exclusion of grey literature and non–peer-reviewed sources may have resulted in the omission of relevant operational data, particularly from EMS systems where evaluation is conducted primarily through internal audits or service reports. However, this decision was made to ensure methodological transparency and consistency across included studies.

Conclusions

This scoping review mapped and synthesized 25 studies examining the relationship between EMS team composition and patient mortality in prehospital care. The findings reveal that no single staffing model consistently outperforms others across all clinical contexts. Instead, mortality outcomes appear to be shaped by a combination of clinical severity, system maturity, dispatch accuracy, prehospital time intervals, and the balance of skills within the responding team. Physician-staffed units demonstrate selective benefit in high-acuity trauma and traumatic cardiac arrest, whereas nurse–paramedic and advanced paramedic teams frequently achieve comparable survival outcomes in mixed emergencies and medical conditions when supported by robust protocols and training. Across all models, emergency nurses play a central role in early assessment, physiological stabilization, decision-making, and safety processes, underscoring the value of nursing expertise in prehospital care. However, substantial heterogeneity in study design, outcome definitions, and EMS organization limits the generalizability of current evidence. Overall, these findings highlight the need for standardized quality indicators, improved reporting, and well-designed comparative studies capable of isolating the true contribution of different staffing configurations. Strengthening methodological rigor, clarifying intermediate outcomes, and evaluating cost-effectiveness will be essential to inform workforce planning and guide future EMS system development.

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Table 1. Search strategy adopted for database consultation and study identification.

Databases	Search Strategy	Limits	Export Format	Results (n)	Last Search
PubMed	("Physicians"[MeSH] OR "Nurses"[MeSH] OR "Emergency Medical Technicians"[MeSH] OR "Health personnel"[MeSH] OR Paramedic*[tiab]) AND ("Mortality"[MeSH] OR "ED Mortality"[tiab] OR "Hospital Mortality"[tiab] OR "in hospital mortality"[tiab] OR "death"[tiab]) AND ("Emergency Medical Services"[MeSH] OR "Prehospital care"[tiab] OR "Prehospital"[tiab])	Nessuno	.nbib	1334	02.07.2025
Cinahl	((MH "Health Personnel" OR TX "physicians" OR TX "Emergency nurse" OR TX "Emergency Medical Technicians" OR TX paramedic*)) AND ((MH "Mortality" OR TX	Nessuno	.ris	798	02.07.2025

	"ED mortality" OR TX "hospital mortality" OR TX "in hospital mortality")) AND ((MH "Emergency Medical Services" OR TX "prehospital care" OR TX prehospital))				
Web of Science	TS=("health personnel" OR "physicians" OR "nurses" OR "emergency medical technicians" OR paramedic*) AND TS=("mortality" OR "ED mortality" OR "hospital mortality" OR "in hospital mortality" OR "death") AND TS=("emergency medical services" OR "prehospital care" OR "prehospital")	Nessuno	.ris	1157	02.07.2025
ProQuest	(TX("health personnel") OR TX("physicians") OR TX("emergency nurse") OR TX("emergency medical technicians") OR TX(paramedic*))	Nessuno	.ris	847	02.07.2025

	AND (TX("mortality") OR TX("ED mortality") OR TX("hospital mortality") OR TX("in hospital mortality")) AND (TI("prehospital") OR TI("emergency medical services"))				
Scopus	(TITLE-ABS-KEY("health personnel" OR "physicians" OR "emergency nurse" OR "emergency medical technicians" OR paramedic*)) AND (TITLE-ABS-KEY("mortality" OR "ED mortality" OR "hospital mortality" OR "in hospital mortality")) AND (TITLE("emergency medical services" OR "prehospital care" OR prehospital))	Nessuno	.ris	643	02.07.2025

Note: All searches were conducted on July 2, 2025. No limits were applied. Export formats refer to the files used for uploading into Rayyan for screening.

Table 2. Characteristics and main findings of the included studies.

Study	**Team configuration**	**Clinical context**	**Mortality endpoint**	**Main finding**
Abe et al., 2014	Physician-staffed EMS vs paramedic EMS	Out-of-hospital cardiac arrest	Survival / mortality after OHCA (hospital outcome)	Physician presence associated with improved survival
Sato et al., 2019	Physician-staffed EMS vs paramedic EMS	Out-of-hospital cardiac arrest	Survival to hospital discharge	Physician-staffed EMS associated with higher survival
Akutsu et al., 2025	Physician-staffed EMS vs paramedic EMS	Out-of-hospital cardiac arrest	Neurologically favorable survival at hospital discharge	Physician-staffed EMS associated with better neurological outcomes
Fukuda et al., 2018	Physician-staffed EMS (doctor car) vs paramedic EMS	Out-of-hospital cardiac arrest	1-month survival	Physician-staffed EMS associated with higher 1-month survival
Gunnarsson et al., 2017	Physician-staffed HEMS vs non-physician HEMS	STEMI interfacility transfer	In-hospital mortality	No statistically significant difference in mortality (4.9% vs 9.9%)
Borowicz et al., 2021	Physician-staffed ambulance vs paramedic-staffed ambulance	STEMI patients	In-hospital mortality	No significant difference in mortality between physician- and paramedic-staffed ambulances
Najafi et al., 2022	EMS transport (paramedics) vs non-EMS transport	ST-segment elevation myocardial	Overall mortality	EMS transport associated with lower mortality than non-EMS transport

		infarction (STEMI)		
Harrison et al., 2024	Physician-staffed prehospital critical care team vs paramedic EMS care	Traumatic out-of-hospital cardiac arrest	Survival to hospital discharge	Very low survival in both groups; no clear mortality advantage associated with physician-staffed teams
Den Hartog et al., 2015	Physician-staffed HEMS + EMS vs EMS paramedic crew only	Severe trauma (ISS >15)	30-day injury-related mortality	Physician-staffed HEMS associated with improved survival
Endo et al., 2021	Physician-led prehospital management vs paramedic-led EMS care	Severe blunt trauma (ISS ≥16)	In-hospital mortality	Physician-led prehospital management associated with reduced mortality
Osterwalder et al., 2023	EMT-only EMS vs physician-staffed EMS	Blunt polytrauma	30-day mortality	Trend toward lower mortality with physician-staffed EMS; adjusted analysis showed higher mortality in EMT-only teams
Hirano et al., 2018	Physician-staffed ambulance vs paramedic EMS	Severe trauma (ISS ≥16)	Survival to hospital discharge	No significant difference in survival between physician and paramedic teams after adjustment for injury severity
Smith et al., 2018	Paramedic EMS vs enhanced care team (doctor + critical care paramedic)	Severe trauma (ISS ≥9)	Risk-adjusted survival (TARN Ws; 30-day survival)	Enhanced care teams associated with significantly improved survival after adjustment

Nabeta et al., 2021	Physician-staffed HEMS vs paramedic GEMS	Severe trauma (ISS ≥16)	24-h mortality; in-hospital mortality	No significant difference in mortality between HEMS and GEMS after propensity score matching
Ono et al., 2021	Paramedic EMS vs physician-staffed EMS	Severe trauma	In-hospital mortality	Physician-staffed EMS associated with reduced in-hospital mortality
Tsuboi et al., 2024	Physician-staffed ground EMS (doctor car) vs paramedic GEMS	Severe trauma (ISS ≥16)	In-hospital survival	Physician-staffed EMS associated with improved survival (adjusted OR 1.228)
Strandqvist et al., 2023	Paramedic EMS vs physician-staffed prehospital critical care team	Major trauma	30-day mortality	No significant difference in adjusted mortality between physician and standard EMS teams
Moors et al., 2019	Paramedic EMS vs physician-based HEMS	Severe pediatric trauma (ISS>15)	30-day mortality / modeled survival	Physician-based HEMS associated with an estimated survival benefit of approximately 2.5 additional lives saved per 100 dispatches
Franschman et al., 2012	EMS paramedic crew vs EMS + physician-staffed P-HEMS	Severe traumatic brain injury (GCS ≤8)	Observed mortality	Mortality similar between groups; neurological outcome more favorable with physician-staffed P-HEMS
Gonsaga et al., 2012	SAMU medicalized EMS vs Fire Brigade rescue service	Trauma patients	Overall mortality	Physician-based HEMS associated with an estimated survival benefit of

				approximately 2.5 additional lives saved per 100 dispatches
Maddock et al., 2020	Paramedics vs physician-led prehospital critical care team	Adult trauma patients	30-day mortality	Physician-led critical care team associated with reduced mortality after multivariate adjustment (OR 0.56; 95% CI 0.36–0.86)
Yamamoto et al., 2021	Physician-staffed ambulance vs EMS personnel ambulance	Hypotensive trauma patients	In-hospital mortality	Physician EMS associated with increased mortality (adjusted OR 1.22)
Kashyap et al., 2016	Helicopter EMS vs ground ambulance	Severe sepsis and septic shock	Hospital mortality	Helicopter transport associated with faster transport but higher crude mortality due to greater illness severity; transport mode not an independent predictor of mortality
Noergaard Bech et al., 2017	Ambulance (EMT) vs ambulance + physician-staffed MECU	Mixed emergency conditions transported to ED	7-day mortality	Higher mortality in physician-assisted cases, reflecting greater patient severity rather than team effectiveness

EMS, Emergency Medical Services; HEMS, Helicopter Emergency Medical Services; GEMS, Ground EMS; P-HEMS, Physician-staffed Helicopter Emergency Medical Services; MECU, Mobile Emergency Care Unit; OHCA, Out-of-Hospital Cardiac Arrest; STEMI, ST-Segment Elevation Myocardial Infarction; ISS, Injury Severity Score; GCS, Glasgow Coma Scale; OR, Odds Ratio; CI, Confidence Interval; TARN, Trauma Audit and Research Network.

Figure 1. PRISMA 2020 flow diagram of the study selection process.

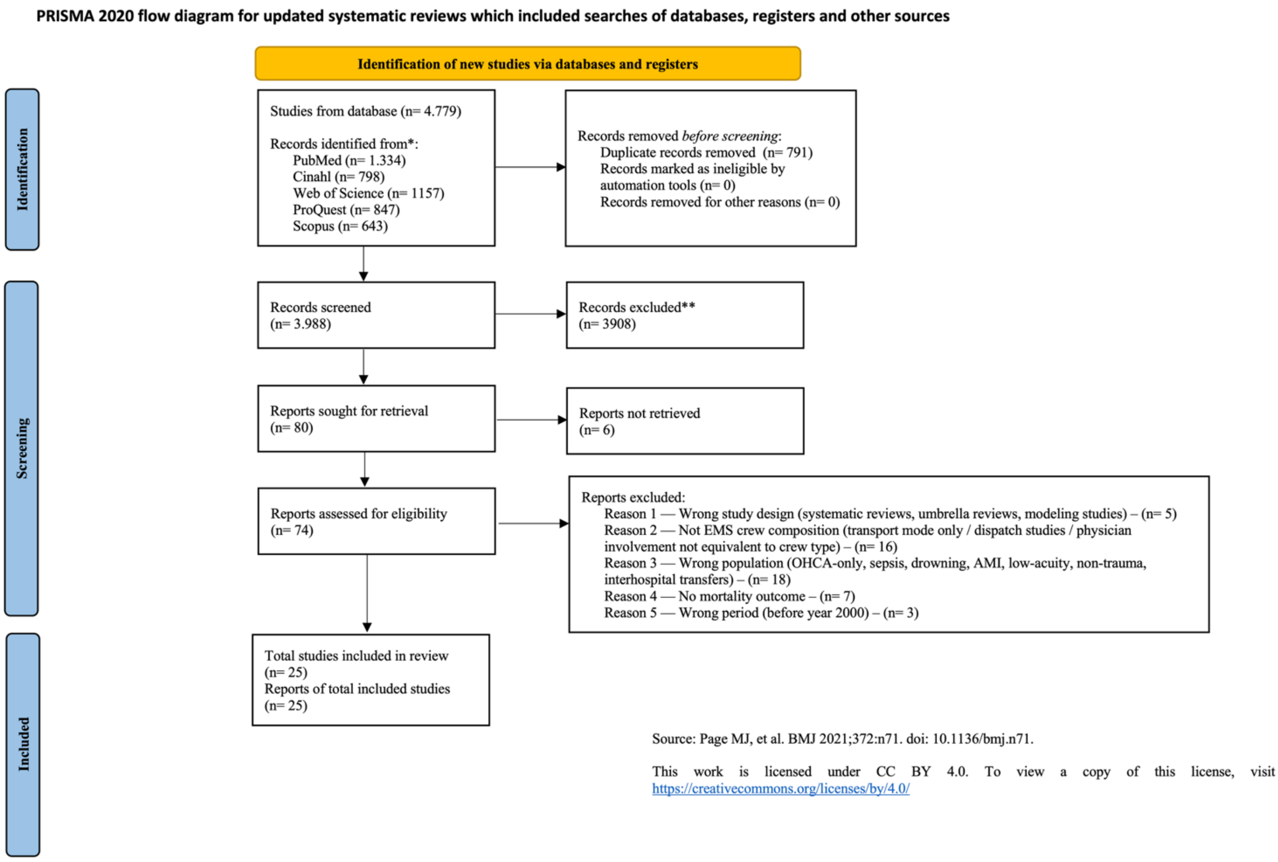
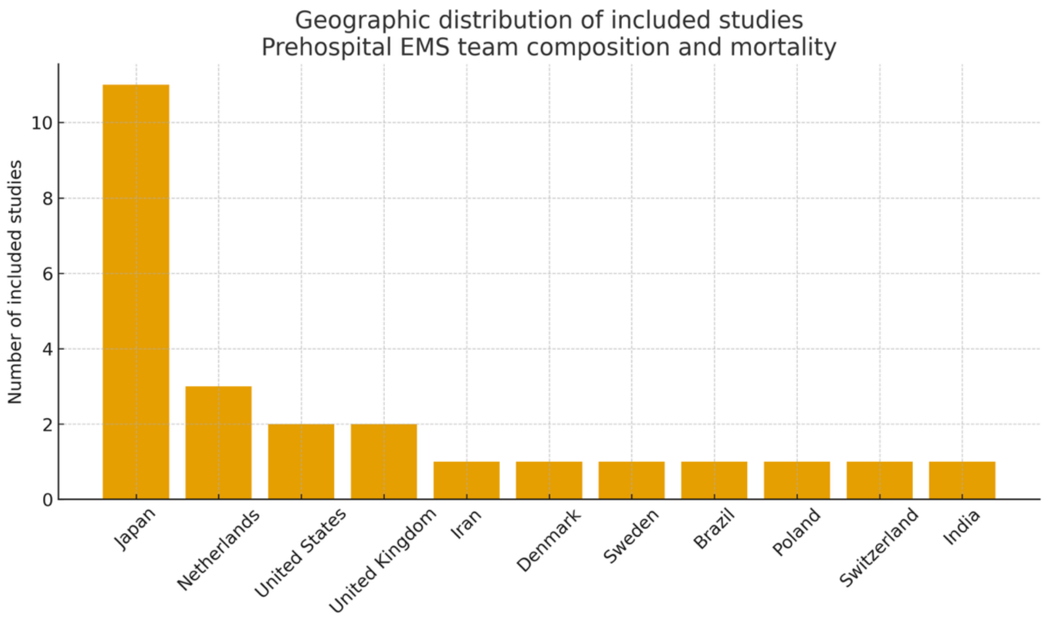


Figure 2. Geographic distribution of the studies included in the review.



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Online supplementary materials

Table 1. Included studies.

Table 2. Excluded studies.