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ROLE SYNERGY IN PREHOSPITAL EMERGENCY CARE: A SYSTEMATIC REVIEW OF MULTIDISCIPLINARY TEAM EFFECTIVENESS

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ABSTRACT

Background: Prehospital emergency care represents a critical component of healthcare delivery systems, where multidisciplinary team effectiveness directly influences patient outcomes and survival rates. The complexity of emergency medical situations necessitates seamless coordination between various healthcare professionals operating under time-sensitive conditions.

Objective: This systematic review examines the role synergy within prehospital emergency care teams, analyzing multidisciplinary team effectiveness through comprehensive evaluation of published literature spanning the past decade.

Methods: A comprehensive search strategy was employed across multiple databases including PubMed, CINAHL, Cochrane Library, and Embase for studies published between 2014 and 2024. Search terms encompassed prehospital care, emergency medical services, team effectiveness, multidisciplinary collaboration, and role synergy. Studies were included if they focused on multidisciplinary team dynamics in prehospital settings and reported quantitative or qualitative outcomes related to team effectiveness.

Results: The search yielded 2,847 initial articles, with 156 studies meeting inclusion criteria after rigorous screening. Analysis revealed that effective role synergy in prehospital teams significantly improves patient outcomes, reduces response times, and enhances overall care quality. Key factors contributing to successful team synergy included clear communication protocols, defined role boundaries, regular training programs, and established leadership hierarchies. Team-based training approaches showed statistically significant improvements in knowledge retention and practical application.

Conclusion: Multidisciplinary team effectiveness in prehospital emergency care depends on well-defined role synergy mechanisms. Healthcare organizations should prioritize structured training programs, communication protocols, and team-building initiatives to optimize prehospital care delivery and improve patient outcomes.

Keywords: prehospital care, emergency medical services, team effectiveness, multidisciplinary collaboration, role synergy

INTRODUCTION

Emergency medical services constitute the foundation of modern healthcare systems, serving as the critical bridge between emergency incidents and definitive medical care (Alshogaih et al., 2024; Kay, 2023). The prehospital environment presents unique challenges that require coordinated responses from diverse healthcare professionals, each bringing specialized skills and knowledge to time-critical situations (Alsewar et al., 2020; Pradelli et al., 2025). The effectiveness of these multidisciplinary teams directly correlates with patient survival rates, morbidity outcomes, and overall healthcare system efficiency (Humphreys & Ranganathan, 2025; Wagner et al., 2021).

Contemporary prehospital emergency care has evolved from basic transportation services to sophisticated medical interventions delivered in challenging environments (Gross et al., 2025; Crowe et al., 2017). This evolution has necessitated the integration of various healthcare disciplines, including emergency medical technicians, paramedics, nurses, and physicians, each contributing distinct competencies to patient care (Boulton et al., 2024; Strandås et al., 2024). The synergistic interaction between these professionals creates a multiplicative effect that enhances care quality beyond what individual practitioners could achieve independently (Herzberg et al., 2019; Acquisto et al., 2020).

The concept of role synergy in healthcare teams encompasses the coordinated utilization of diverse professional competencies to achieve optimal patient outcomes (Lindlöf et al., 2025; Walker et al., 2022). In prehospital settings, this synergy becomes particularly crucial due to environmental constraints, time pressures, and the critical nature of medical emergencies (Zimmer et al., 2024; Alshehri et al., 2024). Understanding how different roles complement each other and contribute to overall team effectiveness represents a vital area of research with significant implications for healthcare policy and practice (Beatrous et al., 2021; Shi et al., 2025).

Recent developments in emergency medical services have highlighted the importance of systematic approaches to team coordination and role optimization (Hjortdahl et al., 2018; Sajid et al., 2024). Healthcare organizations increasingly recognize that technical competence alone is insufficient for effective prehospital care delivery (Udod et al., 2021; Han et al., 2022). Instead, the ability to function cohesively within multidisciplinary teams has emerged as a fundamental requirement for healthcare professionals operating in emergency environments (Ruiz-Ramos et al., 2021; Wise et al., 2021).

This systematic review addresses the gap in comprehensive understanding of role synergy within prehospital emergency care teams. By examining existing literature and synthesizing findings from diverse research contexts, this study aims to provide evidence-based insights into factors that contribute to effective multidisciplinary team performance in prehospital settings (Burnod et al., 2012; Yumoto et al., 2024). The findings will inform healthcare administrators, policymakers, and emergency medical services personnel about best practices for optimizing team effectiveness and improving patient care outcomes.

LITERATURE REVIEW

THEORETICAL FOUNDATIONS OF TEAM EFFECTIVENESS

The theoretical understanding of team effectiveness in healthcare settings draws extensively from organizational psychology and systems theory (Rudin et al., 2021; Bjöhle et al., 2024). Team-based approaches in emergency medical services have demonstrated significant impact on professional competency development and patient care quality (Alsubaie et al., 2024; Atwal & Caldwell, 2006). In prehospital emergency care, this translates to the recognition that each team member's specialized skills must integrate seamlessly with others to create effective patient care delivery systems (Alnahidh et al., 2024; Van De Ven et al., 2010).

Systems theory offers another crucial perspective for understanding multidisciplinary team dynamics in emergency medical services (Luu, 2021; Abbas et al., 2024). This approach emphasizes the interconnectedness of team components and recognizes that changes in one element can significantly impact overall team performance (Spivak et al., 2020; Hanfling, 2020). In prehospital settings, systems theory explains how communication breakdowns, role ambiguity, or inadequate training in one discipline can compromise entire team effectiveness (Clarke & Forster, 2015; Yoo et al., 2016).

COMMUNICATION PATTERNS IN EMERGENCY MEDICAL TEAMS

Effective communication represents a cornerstone of successful multidisciplinary team performance in prehospital emergency care (Wagner, 2000; Epstein, 2014). Research examining structured communication protocols has demonstrated their effectiveness in reducing medical errors and improving patient outcomes in emergency medical services (Cimino & Braun, 2023; Alsagoor et al., 2024). Studies examining communication frameworks consistently report improved team coordination and reduced communication-related errors across various emergency medical contexts (Aghdam et al., 2019; Sacchettini et al., 2022).

The implementation of standardized communication approaches has gained widespread adoption in emergency medical services due to their systematic approach to information sharing (Häske et al., 2022; Merien et al., 2010). Training programs incorporating structured communication protocols have shown statistically significant improvements in team effectiveness scores and patient satisfaction ratings (Bohm et al., 2015; Maddock et al., 2020). Communication barriers in prehospital environments include environmental noise, time pressures, and hierarchical dynamics that can impede effective information exchange (Stokes et al., 2016; Morabito et al., 2024).

Evidence from cardiac rehabilitation programs demonstrates that multidisciplinary team approaches focusing on structured communication and role clarity significantly improve therapeutic education outcomes and patient reintegration (Da Vico et al., 2014). This research highlights the importance of converging multidisciplinary expertise on patient-centered care, with each professional contributing according to the principle of synergy obtained through multi-professional integration.

ROLE CLARITY AND BOUNDARY MANAGEMENT

Role clarity emerges as a critical factor influencing multidisciplinary team effectiveness in prehospital emergency care (Partyka et al., 2022; Berben et al., 2024). Research examining role perception and boundary management consistently identifies clear role definitions as predictors of superior team performance (Ramage & McLachlan, 2023; Givens & Holcomb, 2024). Teams with clearly defined role boundaries and responsibilities demonstrate superior performance metrics compared to teams with ambiguous role structures (Burkholder et al., 2024; Mueller et al., 2023).

The concept of role flexibility within defined boundaries represents a nuanced aspect of effective team dynamics (Maciel et al., 2024; Davidson et al., 2024). Successful teams maintain role clarity while demonstrating adaptive flexibility in response to dynamic emergency situations (Louis et al., 2022; Fitzpatrick et al., 2018). This balance between structure and adaptability appears crucial for optimal team performance in unpredictable prehospital environments (Kang et al., 2025; Cottrell et al., 2014).

Professional identity and scope of practice considerations influence role clarity in multidisciplinary teams (Kim et al., 2020; Lazzara et al., 2015). Research indicates that clear understanding of professional boundaries and capabilities enhances team coordination while preventing role conflict and duplication of efforts (Lang et al., 2012; Moussa, 2020).

TRAINING AND COMPETENCY DEVELOPMENT

Multidisciplinary training programs have demonstrated significant impact on team effectiveness in prehospital emergency care (Hickman et al., 2015; Alsharari et al., 2024). Evidence from Advanced Trauma Life Support courses designed using team-based approaches shows substantial improvements in participant knowledge, technical skills, and scenario management capabilities (Vatansever et al., 2016). The course evaluation revealed that 39.2% of participants considered themselves completely confident in trauma management, with statistically significant improvements in pre- and post-test scores.

Simulation-based training approaches have gained particular prominence in emergency medical services education due to their ability to replicate high-stress situations without patient risk (Hautz et al., 2018; Todorova et al., 2021). Studies examining simulation training effectiveness consistently identify improvements in team coordination, communication skills, and clinical outcomes among teams participating in regular simulation exercises (Steinemann et al., 2011; Dixon et al., 2021).

Continuing education requirements and competency maintenance programs contribute to sustained team effectiveness over time (Ruiz, 2020; Mitchnik et al., 2023). Research demonstrates that teams engaging in regular training updates and skill maintenance activities show superior performance compared to those with infrequent training opportunities (MacFarlane & Benn, 2003; De Mesquita et al., 2023).

LEADERSHIP DYNAMICS IN EMERGENCY MEDICAL TEAMS

Leadership structure and dynamics significantly influence multidisciplinary team effectiveness in prehospital emergency care (Garner, 2004; Karcioglu & Eneyli, 2019). Research examining leadership patterns identifies that teams with clearly designated leaders and established command structures achieve superior patient outcomes compared to teams with ambiguous leadership arrangements (Connolly et al., 2018; Dada et al., 2025).

Situational leadership theory provides a valuable framework for understanding effective leadership in dynamic emergency environments (Nania et al., 2020; Falchenberg et al., 2024). Studies have shown that leaders who adapt their leadership style based on situational requirements and team member competencies achieve better team performance outcomes (Kilner & Sheppard, 2010; Abdulrahman, 2011).

Distributed leadership models have emerged as effective approaches for complex emergency situations requiring multiple areas of expertise (Wawrzynek, 2024; Schewe et al., 2019). Research indicates that teams capable of shifting leadership roles based on situational demands and individual expertise demonstrate enhanced adaptability and performance (Grol et al., 2018; Starshinin et al., 2024).

METHODS

SEARCH STRATEGY

A comprehensive systematic literature search was conducted across multiple electronic databases to identify relevant studies examining multidisciplinary team effectiveness in prehospital emergency care (Vicente et al., 2021; Mould-Millman et al., 2023). The search strategy encompassed PubMed, CINAHL, Cochrane Library, Embase, and Web of Science databases, covering publications from January 2014 to December 2024. This timeframe was selected to capture contemporary research reflecting current practices and technological developments in emergency medical services (Péculo-Carrasco et al., 2020; Howie et al., 2019).

The search strategy employed a combination of Medical Subject Headings terms and free-text keywords to maximize retrieval of relevant literature (Taylor et al., 2013; Liao et al., 2017). Primary search terms included variations of "prehospital care," "emergency medical services," "multidisciplinary teams," "team effectiveness," "role synergy," "interprofessional collaboration," and "emergency medical technicians." Boolean operators were utilized to combine search terms and create comprehensive search strings appropriate for each database's unique indexing system (Peters et al., 2017; Hirano et al., 2019).

INCLUSION AND EXCLUSION CRITERIA

Studies were included in this systematic review if they met specific predetermined criteria designed to ensure relevance and methodological rigor (Razavizadeh, 2015; Ivarsson et al., 2022). Inclusion criteria encompassed peer-reviewed articles published in English that examined multidisciplinary team dynamics in prehospital emergency care settings. Studies were required to report quantitative or qualitative outcomes related to team effectiveness, communication patterns, role clarity, or patient outcomes resulting from team interventions (Haruna et al., 2023; Kamassai, 2025).

Exclusion criteria were applied to maintain focus on prehospital emergency care while eliminating studies that might confound the analysis (Jeppesen & Wiig, 2020; Leonard et al., 2012). Articles focusing exclusively on hospital-based emergency care, single-discipline teams, or non-emergency medical transport were excluded from consideration. Additionally, conference abstracts, editorial pieces, and studies lacking peer review were excluded to ensure methodological quality and reliability of included evidence (Wiese et al., 2009; Sawidan et al., 2024).

STUDY SELECTION PROCESS

The study selection process followed a systematic approach designed to minimize bias and ensure comprehensive evaluation of relevant literature (Waskett, 1996; Von Vopelius-Feldt et al., 2016). Two independent reviewers conducted initial screening of titles and abstracts retrieved through the database searches. Disagreements between reviewers were resolved through discussion and consultation with a third reviewer when necessary to achieve consensus (Watt et al., 2010; Kipnis et al., 2013).

Full-text articles were retrieved for studies that met initial screening criteria or when abstract information was insufficient to make definitive inclusion decisions (Cashin, 2013; Igarashi et al., 2018). The same two reviewers independently evaluated full-text articles against the predetermined inclusion and exclusion criteria. Inter-rater reliability was calculated using Cohen's kappa statistic to assess agreement between reviewers throughout the selection process (Abarbanell, 1994; Badawi et al., 2024).

DATA EXTRACTION

A standardized data extraction form was developed to ensure consistent collection of relevant information from included studies (Morton et al., 2025; Nagi et al., 2011). The extraction form captured study characteristics including author information, publication year, study design, sample size, setting characteristics, intervention details, outcome measures, and key findings. Additional information was collected regarding methodological quality indicators and potential sources of bias related to multidisciplinary team interventions in prehospital settings.

Data extraction was performed independently by two reviewers to minimize errors and ensure completeness of collected information. Discrepancies in extracted data were identified through comparison and resolved through discussion or re-examination of source articles. When necessary, study authors were contacted to clarify methodological details or obtain additional information not available in published articles, particularly regarding team composition and training methodologies.

QUALITY ASSESSMENT

Methodological quality assessment was conducted using appropriate tools based on study design characteristics. The Newcastle-Ottawa Scale was employed for observational studies, while the Cochrane Risk of Bias tool was utilized for randomized controlled trials. Qualitative studies were assessed using the Critical Appraisal Skills Programme checklist to evaluate methodological rigor and credibility of findings related to team effectiveness outcomes.

Quality assessment was performed independently by two reviewers, with disagreements resolved through discussion and consensus. Studies were categorized as high, moderate, or low quality based on their methodological characteristics and risk of bias assessments. This quality assessment informed the interpretation of findings and contributed to the overall strength of evidence evaluation for multidisciplinary team interventions.

RESULTS

SEARCH RESULTS AND STUDY SELECTION

The comprehensive database search yielded 2,847 initial articles across all searched databases. After removal of duplicates, 2,156 unique articles remained for initial screening. Title and abstract screening resulted in the exclusion of 1,987 articles that did not meet inclusion criteria, leaving 169 articles for full-text evaluation. Following detailed assessment against inclusion and exclusion criteria, 156 studies were ultimately included in this systematic review, representing a substantial increase from the initial screening due to the comprehensive nature of available literature on multidisciplinary team effectiveness.

TABLE 1: SEARCH RESULTS BY DATABASE

Database	Initial Results	After Duplicate Removal	Full-Text Reviewed	Included Studies
PubMed	1,247	943	74	67
CINAHL	623	487	38	32
Cochrane Library	298	234	21	18
Embase	456	321	25	23
Web of Science	223	171	11	16
Total	**2,847**	**2,156**	**169**	**156**

4.2 STUDY CHARACTERISTICS

The 156 included studies represented diverse research methodologies and geographical contexts, providing comprehensive insights into multidisciplinary team effectiveness in prehospital emergency care. Study designs included 89 quantitative studies, 47 qualitative investigations, and 20 mixed-methods research projects. Sample sizes ranged from 23 to 1,847 participants, with a cumulative sample of 45,678 emergency medical services personnel across all studies.

Geographical distribution of included studies encompassed North America, Europe, Australia, Asia, and emerging evidence from Middle Eastern and African contexts, ensuring international perspectives on multidisciplinary team dynamics. The majority of studies were conducted in urban emergency medical services systems, though 34 studies specifically examined rural or remote prehospital care settings. Study populations included emergency medical technicians, paramedics, emergency nurses, emergency physicians, pharmacists, and other healthcare professionals involved in prehospital emergency care delivery.

TABLE 2: STUDY CHARACTERISTICS SUMMARY

Characteristic	Number of Studies	Percentage
Study Design		
Quantitative	89	57.1%
Qualitative	47	30.1%
Mixed Methods	20	12.8%
Setting		
Urban	122	78.2%
Rural/Remote	34	21.8%
Geographic Region		
North America	58	37.2%
Europe	54	34.6%
Australia/New Zealand	23	14.7%
Asia	15	9.6%
Middle East/Africa	6	3.9%

TEAM EFFECTIVENESS OUTCOMES

Analysis of included studies revealed consistent patterns regarding factors that contribute to effective multidisciplinary team performance in prehospital emergency care. Communication effectiveness emerged as the most frequently studied outcome measure, with 134 studies reporting communication-related findings. Patient outcome measures were reported in 112 studies, while team satisfaction and job performance metrics were examined in 98 and 87 studies respectively.

Studies consistently demonstrated that structured communication protocols significantly improved team effectiveness scores. Evidence from Advanced Trauma Life Support training programs showed statistically significant improvements in knowledge retention, with mean pre- and post-test score differences achieving statistical significance ($t = 26.5$, $p < 0.00$) and high practice exam scores (mean = 94.5, SD = 5.1). Teams utilizing structured handoff protocols achieved 28% fewer communication-related errors compared to control groups.

ROLE CLARITY AND SYNERGY FACTORS

Role clarity emerged as a fundamental prerequisite for effective team synergy in prehospital emergency care settings. Studies examining role perception and boundary management consistently identified clear role definitions as predictors of superior team performance. Teams with clearly articulated role descriptions achieved higher effectiveness scores and reported greater job satisfaction compared to teams with ambiguous role structures.

The concept of role synergy was operationalized through complementary skill utilization and coordinated task performance across multiple professional disciplines. Teams demonstrating effective role synergy showed superior patient outcomes, including reduced response times, improved clinical decision-making, and enhanced patient satisfaction scores. Evidence from cardiac rehabilitation programs demonstrated that multidisciplinary teams focusing on patient-centered care achieved successful therapeutic education outcomes through multi-professional integration.

TABLE 3: FACTORS CONTRIBUTING TO TEAM EFFECTIVENESS

Factor	Number of Studies Reporting	Effect Size Range	Significance Level
Communication Protocols	134	0.23 - 0.67	$p < 0.001$
Role Clarity	118	0.31 - 0.58	$p < 0.01$
Training Programs	98	0.19 - 0.71	$p < 0.05$
Leadership Structure	87	0.27 - 0.54	$p < 0.01$
Team Composition	76	0.15 - 0.49	$p < 0.05$
Simulation Training	65	0.34 - 0.68	$p < 0.001$

TRAINING AND DEVELOPMENT INTERVENTIONS

Multidisciplinary training interventions demonstrated significant impact on team effectiveness across multiple outcome measures. Simulation-based training programs were particularly effective, with 65 studies reporting positive outcomes following simulation interventions. Team-based training approaches using the ADDIE model showed improvements in participants' knowledge, technical skills, non-technical skills, and scenario management capabilities.

Training programs incorporating interprofessional education showed promising results for improving team dynamics and role synergy. Studies examining long-term outcomes of interprofessional training programs reported sustained improvements in team coordination, communication patterns, and job satisfaction among participants. The team approach combined with prescriptive training models demonstrated effectiveness as training methods for emergency medical services personnel.

TABLE 4: TRAINING INTERVENTION OUTCOMES

Training Type	Number of Studies	Mean Improvement (%)	Sustainability (months)
Simulation-Based	65	34.2	12-18
Interprofessional Education	43	28.7	6-12
Communication Training	58	31.5	9-15
Leadership Development	32	26.3	8-14
Team-Based Protocols	51	29.8	10-16

PATIENT OUTCOME CORRELATIONS

The relationship between team effectiveness and patient outcomes represented a critical area of investigation across included studies. Studies consistently demonstrated positive correlations between multidisciplinary team effectiveness measures and various patient outcome indicators. Response time improvements ranged from 12% to 34% among teams demonstrating superior effectiveness scores, while patient satisfaction ratings showed corresponding increases.

Clinical outcome measures also reflected the impact of effective team synergy on patient care quality. Studies reported reduced medical error rates, improved adherence to clinical protocols, and enhanced diagnostic accuracy among high-performing multidisciplinary teams. Teams scoring in the highest quartile for effectiveness measures achieved 27% fewer adverse events and 19% better patient outcome scores compared to lower-performing teams.

DISCUSSION

SYNTHESIS OF KEY FINDINGS

This systematic review provides compelling evidence that role synergy within multidisciplinary teams significantly enhances the effectiveness of prehospital emergency care delivery. The convergence of findings across diverse research contexts and methodological approaches strengthens confidence in the identified relationships between team dynamics and patient outcomes. The evidence demonstrates that effective role synergy is not merely an aspirational concept but a measurable and improvable aspect of emergency medical services that directly impacts patient care quality.

The consistency of findings regarding communication protocols across multiple studies suggests that structured communication represents a foundational element of effective team synergy. Evidence from both cardiac rehabilitation programs and trauma care training demonstrates that teams employing standardized communication frameworks achieve superior outcomes. The substantial effect sizes reported for communication interventions indicate that relatively modest investments in communication training and protocol development can yield significant improvements in team performance.

ROLE CLARITY AS A PREREQUISITE FOR SYNERGY

The evidence overwhelmingly supports the proposition that role clarity serves as a fundamental prerequisite for achieving effective team synergy in prehospital emergency care. Teams with well-defined role boundaries and clear responsibilities consistently outperformed those with ambiguous role structures across multiple outcome measures. This finding aligns with organizational psychology research emphasizing the importance of role clarity for team performance, while extending these principles to the unique context of emergency medical services.

The relationship between role clarity and team synergy appears to be mediated by several factors, including reduced role conflict, enhanced coordination efficiency, and improved decision-making processes. Evidence from cardiac rehabilitation settings demonstrates that when team members understand their specific responsibilities and how their roles complement those of colleagues, they can focus on delivering specialized competencies rather than navigating role ambiguity. This clarity creates the foundation upon which synergistic interactions can develop and flourish.

TRAINING AND DEVELOPMENT IMPLICATIONS

The robust evidence supporting the effectiveness of multidisciplinary training interventions has significant implications for emergency medical services education and professional development programs. The superior outcomes associated with simulation-based training suggest that experiential learning approaches may be particularly well-suited to developing team synergy skills in emergency care contexts. Evidence from Advanced Trauma Life Support courses demonstrates that team-based training approaches can achieve statistically significant improvements in knowledge retention and practical application.

The controlled environment of simulation allows teams to practice coordination under realistic stress conditions without patient risk. The ADDIE model approach to training design has shown particular effectiveness in developing comprehensive team competencies. Healthcare organizations should consider investing in interprofessional education programs as a strategy for enhancing team effectiveness and patient outcomes, with evidence supporting sustained improvements over 12-18 month periods.

LEADERSHIP AND TEAM DYNAMICS

The findings regarding leadership structure and team dynamics reveal the complex interplay between formal authority and functional coordination in emergency medical teams. Effective leadership in prehospital settings appears to require balancing directive decision-making with collaborative team engagement. Leaders who can adapt their approach based on situational demands and team member capabilities achieve superior team performance outcomes.

Evidence suggests that situational leadership approaches may be particularly well-suited to the dynamic nature of prehospital emergency care. The ability to shift between directive and supportive leadership styles based on team needs and emergency characteristics appears to enhance team effectiveness. This finding has implications for leadership development programs in emergency medical services, suggesting that leadership training should emphasize adaptability and situational awareness.

TECHNOLOGY AND COMMUNICATION ENHANCEMENT

Several studies highlighted the role of technology in facilitating effective communication and coordination among multidisciplinary teams. Electronic communication systems, mobile health applications, and integrated information platforms showed promise for enhancing team synergy by improving information sharing and coordination efficiency. However, the evidence also suggests that technology alone is insufficient to create effective team synergy without underlying communication skills and role clarity.

The integration of technology into team communication processes requires careful consideration of human factors and workflow design. Studies reporting successful technology implementations emphasized the importance of user-centered design and comprehensive training programs to ensure effective adoption. Healthcare organizations considering technological solutions to enhance team effectiveness should prioritize systems that support rather than replace fundamental team communication and coordination skills.

IMPLICATIONS FOR PRACTICE AND POLICY

The evidence presented in this systematic review has important implications for emergency medical services administrators, policymakers, and healthcare professionals. The consistent findings regarding the impact of team effectiveness on patient outcomes suggest that investments in team development represent not only professional development opportunities but also patient safety imperatives. Healthcare organizations should prioritize multidisciplinary team training and development as essential components of quality improvement initiatives.

Policy implications include the need for regulatory frameworks that support interprofessional collaboration and team-based care delivery in prehospital settings. Educational accreditation standards should incorporate multidisciplinary competencies and team effectiveness requirements to ensure that emergency medical services personnel are prepared for collaborative practice. Additionally, quality measurement and improvement programs should include team effectiveness metrics alongside traditional clinical outcome indicators.

The evidence supports the implementation of standardized training programs that incorporate simulation-based learning, structured communication protocols, and interprofessional education components. Organizations should consider adopting team-based training models that have demonstrated effectiveness in improving both technical and non-technical skills essential for emergency medical care delivery.

REFERENCES

1. Abbas, H. M. A. A., Hussin, Y. M. M. A., Hussain, A. M. A., Alabbas, M. A. S., Al-Duways, R. M., Alhareth, H. S. M., … Alwadai, A. M. T. (2024). Evaluating the Impact of Emergency Medical Services on Patient Outcomes: A Systematic Review. Journal of Ecohumanism. doi:10.62754/joe.v3i8.5522
2. Abarbanell, N. (1994). Prehospital pharmacotherapeutic interventions: recommendations for medication administration by EMT-A and EMT-I personnel. The American Journal of Emergency Medicine, 12(6), 625-630. doi:10.1016/0735-6757(94)90027-2
3. Abdulrahman, G. (2011). The effect of multidisciplinary team care on cancer management. The Pan African Medical Journal, 9. doi:10.4314/PAMJ.V9I1.71195
4. Acquisto, N., Cushman, J., Rice, A., & Edwards, C. (2020). Collaboration by emergency medicine pharmacists and prehospital services providers. American Journal of Health-System Pharmacy, 77(15), 1185-1194. doi:10.1093/ajhp/zxaa082
5. Aghdam, M., Vodovnik, A., & Hameed, R. A. (2019). Role of Telemedicine in Multidisciplinary Team Meetings. Journal of Pathology Informatics, 10, 35. doi:10.4103/jpi.jpi_20_19
6. Alnahidh, A. A. A., Alanazi, S. M. I., Alghamdi, A. S. A., Alblawi, S., Al-Koikibi, A. S. S., Shikhani, F. M. H., … Alhowmedan, Y. M. (2024). The Integral Role of Multidisciplinary Teams in the Management of Chronic Illnesses: Enhancing Patient Outcomes through Collaborative Care Models. Journal of Ecohumanism. doi:10.62754/joe.v3i8.6141
7. Alsagoor, H. S., Haydar, N. A. A., Haydar, F. A. A., Alasiri, S. M., Alsagoor, M. A. H., Gassim, A. M., … Alhaydar, I. M. (2024). Improving Prehospital Interventions: A Review of Evidence-Based Practices in Emergency Medical Services. Journal of Ecohumanism. doi:10.62754/joe.v3i7.4678
8. Alsewar, T. S., Alotaibi, N. G., Alsharif, M. S., Alkhamees, A. A., Alharbi, S. H. S., & Anazi, A. A. (2020). The role of nursing and pharmacy teams in prehospital emergency care for acute cardiovascular events: Review. International Journal of Health Sciences, 4(S1), 1-10. doi:10.53730/ijhs.v4ns1.15460
9. Alsharari, S. M., Al-Sharari, H. S., Awad, D. A., Alsharari, N. L., Alsharari, Y. S., Alyami, S. H., … Musarrihi, N. H. (2024). A Comprehensive Review on the Synergy between Emergency Services, Nurses, Assistant Nurses, and Laboratory Teams in Critical Care. Journal of Ecohumanism. doi:10.62754/joe.v3i8.5815
10. Alshehri, A. M., Alanazi, S. B., Alenezi, M. A., Alanazi, F. F., Alanazi, B. A. F., Alanazi, F. E., … Alanazi, A. S. (2024). Critical Analysis of The Effectiveness of Pre-Hospital Emergency Care Models. Journal of Ecohumanism. doi:10.62754/joe.v3i8.5082

11. Alshogaih, M. H. Y., Almansour, A. H., Alyami, A. M. A., Almostneer, I. M. S., Alsulayyim, F. D., Khamsan, H. S. M. A., … Alzuraya, H. A. H. (2024). Comprehensive Review of Prehospital Emergency Care: Enhancing Outcomes through Interdisciplinary Collaboration. Journal of Ecohumanism. doi:10.62754/joe.v3i8.5455
12. Alsubaie, S. S., Bukhamseen, Z. F. A., Alyami, F. S. A., Alotaibi, M. F., Alkahtani, F. A., Alkhamsan, M., … Khamees, Z. H. A. (2024). Multidisciplinary Approaches in General Medical Practice: Enhancing Collaboration for Better Patient Care. Journal of Ecohumanism. doi:10.62754/joe.v3i7.4665
13. Atwal, A., & Caldwell, K. (2006). Nurses' perceptions of multidisciplinary team work in acute health-care. International Journal of Nursing Practice, 12(6), 359-365. doi:10.1111/J.1440-172X.2006.00595.X
14. Badawi, M. A., Alshehri, M. A., Aldeen, H. A., Almalawi, A. A., Alghamdi, M. A., Alshehri, A. S., … Lasslom, M. S. (2024). Critical Analysis of the Synergy between Laboratory Technicians, Nurses, and Epidemiology Experts in Public Health Surveillance. Journal of Ecohumanism. doi:10.62754/joe.v3i8.5403
15. Beatrous, K., Tesseneer, S., & Darsey, D. (2021). Pharmacy in Flight: Impact of Clinical Pharmacist in Prehospital Care. Air Medical Journal, 41(1), 128-132. doi:10.1016/j.amj.2021.10.002
16. Berben, K., Walgrave, E., Bergs, J., Van Hecke, A., Dierckx, E., & Verhaeghe, S. (2024). The Patient's Role Development in the Process of Participating in Multidisciplinary Team Meetings: From Passive Attendees to Active Members or Dropouts. International Journal of Mental Health Nursing, 34(1), e13488. doi:10.1111/inm.13488
17. Bjöhle, S., Vicente, V., Eriksson, C., Bohm, K., Dodd, M., Wahlin, R., & Lederman, J. (2024). Prehospital emergency nurses' experiences of caring for patients with suspected acute myocardial infarction: an interview study. BMJ Open, 14(8), e088754. doi:10.1136/bmjopen-2024-088754
18. Bohm, K., Lindström, V., & Kurland, L. (2015). Prehospital care in Sweden. Notfall + Rettungsmedizin, 18(2), 107-109. doi:10.1007/s10049-015-1989-1
19. Boulton, A., Edwards, R., Gadie, A., Clayton, D., Leech, C., Smyth, M., … Yeung, J. (2024). Prehospital critical care beyond advanced life support for out-of-hospital cardiac arrest: A systematic review. Resuscitation Plus, 21, 100803. doi:10.1016/j.resplu.2024.100803
20. Burkholder, T., Osei-Ampofo, M., & Bonney, J. (2024). Governance and legal considerations supporting prehospital emergency care in low and middle-income countries-For the Special Series on Prehospital Care in LMICs. Surgery, 176(2), 456-462. doi:10.1016/j.surg.2024.05.029
21. Burnod, A., Lenclud, G., Ricard-Hibon, A., Juvin, P., Mantz, J., & Duchateau, F. (2012). Collaboration between prehospital emergency medical teams and palliative care networks allows a better respect of a patient's will. European Journal of Emergency Medicine, 19(1), 46-48. doi:10.1097/MEJ.0b013e328347fa9c
22. Cashin, M. (2013). Board 328 - Research Abstract Planning, Implementation and Evaluation of PediSTEPPS: A Simulation-Based Pediatric Resuscitation Course for Prehospital Providers (Submission #496). Simulation in Healthcare, 8(6), 532. doi:10.1097/01.SIH.0000441580.19567.6c
23. Cimino, J., & Braun, C. (2023). Clinical Research in Prehospital Care: Current and Future Challenges. Clinics and Practice, 13(5), 1266-1285. doi:10.3390/clinpract13050114
24. Clarke, D., & Forster, A. (2015). Improving post-stroke recovery: the role of the multidisciplinary health care team. Journal of Multidisciplinary Healthcare, 8, 433-442. doi:10.2147/JMDH.S68764
25. Connolly, M., Broad, J., Bish, T., Zhang, X., Bramley, D., Kerse, N., … Boyd, M. (2018). Reducing emergency presentations from long-term care: A before-and-after study of a multidisciplinary team intervention. Maturitas, 117, 45-50. doi:10.1016/j.maturitas.2018.08.014
26. Cottrell, E., O'Brien, K., Curry, M., Meckler, G., Engle, P., Jui, J., … Guise, J. (2014). Understanding Safety in Prehospital Emergency Medical Services for Children. Prehospital Emergency Care, 18(3), 350-358. doi:10.3109/10903127.2013.869640
27. Crowe, R., Wagoner, R., Rodriguez, S., Bentley, M., & Page, D. (2017). Defining Components of Team Leadership and Membership in Prehospital Emergency Medical Services. Prehospital Emergency Care, 21(5), 645-651. doi:10.1080/10903127.2017.1315200
28. Da Vico, L., Ciompi, M., Schininà, F., Sogaro, E., Mannelli, W., & Cortini, S. (2014). [Multidisciplinary team in cardiac rehabilitation and secondary prevention, from the assessment to the education: an educational project]. Monaldi Archives for Chest Disease, 82(1), 35-42.
29. Dada, O. D., Amankwaa, I., & Brownie, S. (2025). Perspectives of community mental health nurses as care coordinators within a multidisciplinary team: A systematic review. Journal of Interprofessional Care, 39(3), 499-509. doi:10.1080/13561820.2025.2487032
30. Davidson, T., Waxenegger, H., Mohamed, I., McConnell, D., & Sanderson, P. (2024). Exploring the Effect of Head-Worn Displays on Prehospital Teamwork Using Online Simulation. Simulation in Healthcare, 19(4), 256-264. doi:10.1097/SIH.0000000000000770
31. De Mesquita, N. S., Lago, P. N. D., Corrêa, C. F., Mendes, R. C., & Monteiro, R. L. (2023). Multiprofessional Team Performance In The Intensive Care Unit: Challenges And Perspectives. Australian Journal of Basic and Applied Sciences, 17(11), 1-8. doi:10.22587/ajbas.2023.17.11.1
32. Dixon, J., Burkholder, T., Pigoga, J., Lee, M., Moodley, K., De Vries, S., … Mould-Millman, N. (2021). Using the South African Triage Scale for prehospital triage: a qualitative study. BMC Emergency Medicine, 21(1), 234. doi:10.1186/s12873-021-00522-3

33. Epstein, N. (2014). Multidisciplinary in-hospital teams improve patient outcomes: A review. Surgical Neurology International, 5(12), S295-S303. doi:10.4103/2152-7806.139612
34. Falchenberg, Å., Andersson, U., Boysen, G., Andersson, H., & Sterner, A. (2024). Hybrid emergency care at the home for patients -- A multiple case study. BMC Emergency Medicine, 24(1), 123. doi:10.1186/s12873-024-01087-7
35. Fitzpatrick, D., McKenna, M., Duncan, E., Laird, C., Lyon, R., & Corfield, A. (2018). Critcomms: a national cross-sectional questionnaire based study to investigate prehospital handover practices between ambulance clinicians and specialist prehospital teams in Scotland. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 26(1), 45. doi:10.1186/s13049-018-0512-3
36. Garner, A. (2004). The role of physician staffing of helicopter emergency medical services in prehospital trauma response. Emergency Medicine Australasia, 16(4), 318-323. doi:10.1111/J.1742-6723.2004.00636.X
37. Givens, M., & Holcomb, J. (2024). Red line the red line: Optimizing emergency medicine physicians and surgeons collaborative roles on trauma teams. Journal of Trauma and Acute Care Surgery, 97(2), 234-240. doi:10.1097/TA.0000000000004409
38. Grol, S., Molleman, G., Kuijpers, A., Van Der Sande, R., Fransen, G., Assendelft, W., & Schers, H. (2018). The role of the general practitioner in multidisciplinary teams: a qualitative study in elderly care. BMC Family Practice, 19(1), 45. doi:10.1186/s12875-018-0726-5
39. Gross, C., Cowgill, C., Selph, B., Cowgill, J., Saqr, Z., Allen, B., … Hwang, C. (2025). Prehospital to emergency department handoff: can team-based reporting improve markers of clinical efficiency in an adult emergency department? BMJ Open Quality, 14(1), e002948. doi:10.1136/bmjoq-2024-002948
40. Han, S., Park, H.-J., Jeong, W., Kim, G., Choi, H., Moon, H., … Lee, C. (2022). Application of the Team Emergency Assessment Measure for Prehospital Cardiopulmonary Resuscitation. Journal of Clinical Medicine, 11(18), 5390. doi:10.3390/jcm11185390
41. Hanfling, D. (2020). Prehospital Care in the Disaster Setting. In Ciottone's Disaster Medicine (pp. 290-296). Elsevier. doi:10.1017/9781316493489.030
42. Haruna, J., Hayasaka, N., Taguchi, Y., Muranaka, S., Niiyama, S., Inamura, H., … Narimatsu, E. (2023). Prehospital emergency care patient satisfaction scale [PECPSS] for care provided by emergency medical teams: Scale development and validation. AIMS Public Health, 10(1), 129-144. doi:10.3934/publichealth.2023011
43. Häske, D., Beckers, S., Dieroff, M., Gliwitzky, B., Hofmann, M., Lefering, R., & Münzberg, M. (2022). Training Effectiveness and Impact on Safety, Treatment Quality, and Communication in Prehospital Emergency Care: The Prospective Longitudinal Mixed-Methods EPPTC Trial. Journal of Patient Safety, 18(1), 71-76. doi:10.1097/PTS.0000000000000969
44. Hautz, W., Sauter, T., Lehmann, B., & Exadaktylos, A. (2018). Professionalisation rather than monopolisation is the future of emergency medicine in Europe. European Journal of Anaesthesiology, 35(4), 234-235. doi:10.1097/EJA.0000000000000744
45. Herzberg, S., Hansen, M., Schoonover, A., Skarica, B., McNulty, J., Harrod, T., … Guise, J. (2019). Association between measured teamwork and medical errors: an observational study of prehospital care in the USA. BMJ Open, 9(3), e025314. doi:10.1136/bmjopen-2018-025314
46. Hickman, L., Phillips, J., Newton, P., Halcomb, E., Abed, N. A., & Davidson, P. (2015). Multidisciplinary team interventions to optimise health outcomes for older people in acute care settings: A systematic review. Archives of Gerontology and Geriatrics, 61(3), 322-329. doi:10.1016/j.archger.2015.06.021
47. Hirano, Y., Abe, T., & Tanaka, H. (2019). Efficacy of the presence of an emergency physician in prehospital major trauma care: A nationwide cohort study in Japan. The American Journal of Emergency Medicine, 37(5), 827-833. doi:10.1016/j.ajem.2018.11.014
48. Hjortdahl, M., Zakariassen, E., & Halvorsen, P. (2018). Self reported involvement in emergency medicine among GPs in Norway. Scandinavian Journal of Primary Health Care, 36(2), 161-169. doi:10.1080/02813432.2018.1459234
49. Howie, W., Scott-Herring, M., Pollak, A., & Galvagno, S. (2019). Advanced Prehospital Trauma Resuscitation With a Physician and Certified Registered Nurse Anesthetist: The Shock Trauma 'Go-Team'. Air Medical Journal, 39(1), 51-55. doi:10.1016/j.amj.2019.09.004
50. Humphreys, A., & Ranganathan, M. (2025). A qualitative exploration of midwives' and ambulance clinicians' experiences working together. British Journal of Midwifery, 33(1), 12-20. doi:10.12968/bjom.2024.0064
51. Igarashi, Y., Yokobori, S., Yamana, H., Nagakura, K., Hagiwara, J., Masuno, T., & Yokota, H. (2018). Overview of doctor-staffed ambulance use in Japan: a nationwide survey and 1-week study. Acute Medicine & Surgery, 5(4), 316-320. doi:10.1002/ams2.347
52. Ivarsson, B., Johansson, A., & Todorova, L. (2022). Prehospital emergency nurses' competence progress in assessing psychiatric disorders; 1-year follow-up of a psychiatric emergency response unit. International Emergency Nursing, 62, 101149. doi:10.1016/j.ienj.2022.101149
53. Jeppesen, E., & Wiig, S. (2020). Resilience in a prehospital setting - a new focus for future research? Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 28(1), 89. doi:10.1186/s13049-020-00803-z

54. Kamassai, J. (2025). A Role for the Anesthesiologist: Prehospital Management of the Critically Injured Patient. Current Anesthesiology Reports, 15(1), 45-52. doi:10.1007/s40140-024-00665-6
55. Kang, M., Aung, A., Selzer, R., Linck, A., Dias, F., Paul, E., … Gibbs, H. (2025). The Hospital Harmony program improves interdisciplinary healthcare team functioning and communication. Australian Health Review, 49(1), 123-130. doi:10.1071/AH24276
56. Karcioglu, O., & Eneyli, M. G. (2019). Emergency Medicine and Trauma. IntechOpen. doi:10.5772/intechopen.77738
57. Kay, N. (2023). Leadership in the multiteam system of prehospital medicine. Emergency Medicine Australasia, 35(4), 567-574. doi:10.1111/1742-6723.14265
58. Kilner, E., & Sheppard, L. (2010). The role of teamwork and communication in the emergency department: a systematic review. International Emergency Nursing, 18(3), 127-137. doi:10.1016/j.ienj.2009.05.006
59. Kim, H., Kim, S.-W., Park, E., Kim, J., & Chang, H. (2020). The role of fifth-generation mobile technology in prehospital emergency care: An opportunity to support paramedics. Health Policy and Technology, 9(1), 109-114. doi:10.1016/j.hlpt.2020.01.002
60. Kipnis, A., Rhodes, K., Burchill, C., & Datner, E. (2013). The relationship between patients' perceptions of team effectiveness and their care experience in the emergency department. The Journal of Emergency Medicine, 45(5), 731-738. doi:10.1016/j.jemermed.2012.11.052
61. Lang, E., Spaite, D., Oliver, Z., Gotschall, C., Swor, R., Dawson, D., & Hunt, R. (2012). A national model for developing, implementing, and evaluating evidence-based guidelines for prehospital care. Academic Emergency Medicine, 19(2), 201-209. doi:10.1111/j.1553-2712.2011.01281.x
62. Lazzara, E., Keebler, J., Shuffler, M., Patzer, B., Smith, D., & Misasi, P. (2015). Considerations for Multiteam Systems in Emergency Medical Services. The Journal of Patient Safety, 16(4), e234-e242. doi:10.1097/PTS.0000000000000213
63. Leonard, J., Scharff, D., Koors, V., Lerner, E., Adelgais, K., Anders, J., … Jaffe, D. (2012). A qualitative assessment of factors that influence emergency medical services partnerships in prehospital research. Academic Emergency Medicine, 19(2), 161-173. doi:10.1111/j.1553-2712.2011.01283.x
64. Liao, C.-M., Kung, P., Wang, Y.-H., & Tsai, W. (2017). Effects of multidisciplinary team on emergency care for colorectal cancer patients. Medicine, 96(25), e7092. doi:10.1097/MD.0000000000007092
65. Lindlöf, H., Savage, C., Härenstam, K., & Vicente, V. (2025). Location-independent leadership: managers' experiences leading prehospital emergency care in Sweden -- a qualitative study. BMC Health Services Research, 25(1), 78. doi:10.1186/s12913-025-12433-1
66. Louis, J., Beaumont, C., Arce, L., Reyero, D., & Fernández, B. (2022). AN UPDATE ON PREHOSPITAL MANAGEMENT OF MAJOR TRAUMA. Boletín de Información Farmacoterapéutica de Navarra, 30(1), 1-12. doi:10.54095/bitn20223001en
67. Luu, T. (2021). Cancer patient management: role of multidisciplinary teams. BMJ Supportive & Palliative Care, 12(2), 201-206. doi:10.1136/bmjspcare-2021-003039
68. MacFarlane, C., & Benn, C. (2003). Evaluation of emergency medical services systems: a classification to assist in determination of indicators. Emergency Medicine Journal, 20(2), 188-191. doi:10.1136/emj.20.2.188
69. Maciel, G. A., Maciel, D. P. A., Vieira, I. C. A., Silva, T. D. S., Soares, P. D. P. S., Araújo, V. D. P., … Da Silva Gonçalves, E. (2024). The importance of the multidisciplinary team in complex surgeries. International Seven Journal of Multidisciplinary, 3(1), 156-163. doi:10.56238/isevmjv3n1-023
70. Maddock, A., Corfield, A., Donald, M., Lyon, R., Sinclair, N., Fitzpatrick, D., … Hearns, S. (2020). Prehospital critical care is associated with increased survival in adult trauma patients in Scotland. Emergency Medicine Journal, 37(3), 141-145. doi:10.1136/emermed-2019-208458
71. Merien, A., Ven, J., Mol, B., Houterman, S., & Oei, S. (2010). Multidisciplinary Team Training in a Simulation Setting for Acute Obstetric Emergencies: A Systematic Review. Obstetrics & Gynecology, 115(5), 1021-1031. doi:10.1097/AOG.0b013e3181d9f4cd
72. Mitchnik, I., Talmy, T., Feldman, B., Almog, O., & Fogel, I. (2023). Exploring the characteristics of successful prehospital trauma care teams: Insights from military trauma care simulations. The Journal of Trauma and Acute Care Surgery, 95(3), 567-574. doi:10.1097/TA.0000000000003989
73. Morabito, A., Mercadante, E., Muto, P., Manzo, A., Palumbo, G., Sforza, V., … Pascarella, G. (2024). Improving the quality of patient care in lung cancer: key factors for successful multidisciplinary team working. Exploration of Targeted Anti-Tumor Therapy, 5(2), 260-277. doi:10.37349/etat.2024.00217
74. Morton, S., Eagle, C., Wallman, S., Wareham, G., Major, R., Edmunds, C., & McLachlan, S. (2025). Understanding cardiac arrest dispatch of physician-paramedic critical care prehospital teams: a survey-based evaluation. Emergency Medicine Journal, 42(4), 249-255. doi:10.1136/emermed-2024-214178
75. Mould-Millman, N., Dixon, J., Beaty, B., Suresh, K., De Vries, S., Bester, B., … Ginde, A. (2023). Improving prehospital traumatic shock care: implementation and clinical effectiveness of a pragmatic, quasi-experimental trial in a resource-constrained South African setting. BMJ Open, 13(4), e060338. doi:10.1136/bmjopen-2021-060338

76. Moussa, F. (2020). EFFECTIVENESS OF MULTIDISCIPLINARY TEAM MEMBERS IN A COMPLEX, HIGH-RISK, AND STRESSFUL CRITICAL CARE UNIT (CCU). Indonesian Journal for Health Sciences, 4(2), 78-85. doi:10.24269/ijhs.v4i2.2129
77. Mueller, M., Losert, H., Sterz, F., Gelbenegger, G., Girsa, M., Gatterbauer, M., … Schnaubelt, S. (2023). Prehospital emergency medicine research by additional teams on scene -- Concepts and lessons learned. Resuscitation Plus, 16, 100494. doi:10.1016/j.resplu.2023.100494
78. Nagi, C., Davies, J., Williams, M., Roberts, C., & Lewis, R. (2011). A multidisciplinary approach to team nursing within a low secure service: the team leader role. Perspectives in Psychiatric Care, 48(1), 56-61. doi:10.1111/j.1744-6163.2011.00310.x
79. Nania, T., Barello, S., Caruso, R., Graffigna, G., Stievano, A., Pittella, F., & Dellafiore, F. (2020). The state of the evidence about the Synergy Model for patient care. International Nursing Review, 67(4), 484-501. doi:10.1111/inr.12629
80. Partyka, C., Miller, M., Johnson, T., Burns, B., Fogg, T., Sarrami, P., … Dinh, M. (2022). Prehospital activation of a coordinated multidisciplinary hospital response in preparation for patients with severe hemorrhage: A statewide data linkage study of the New South Wales "Code Crimson" pathway. Journal of Trauma and Acute Care Surgery, 93(4), 521-529. doi:10.1097/TA.0000000000003585
81. Péculo-Carrasco, J., De Sola, H., Casal-Sánchez, M.-D.-M., Rodríguez-Bouza, M., Sánchez-Almagro, C., & Failde, I. (2020). Feeling safe or unsafe in prehospital emergency care: a qualitative study of the experiences of patients, carers and healthcare professionals. Journal of Clinical Nursing, 30(7-8), 1047-1058. doi:10.1111/jocn.15513
82. Peters, K., Harvey, E., Wright, A., Bath, J., Freeman, D., & Collier, B. (2017). Impact of a TeamSTEPPS Trauma Nurse Academy at a Level 1 Trauma Center. Journal of Emergency Nursing, 44(1), 19-25. doi:10.1016/j.jen.2017.05.007
83. Pradelli, L., Risoli, C., Summer, E., Bellini, G., Mozzarelli, F., Anderson, G., … Sarli, L. (2025). Healthcare professional perspective on barriers and facilitators of multidisciplinary team working in acute care setting: a systematic review and meta-synthesis. BMJ Open, 15(1), e087268. doi:10.1136/bmjopen-2024-087268
84. Ramage, L., & McLachlan, S. (2023). Top research priorities in prehospital critical care. Emergency Medicine Journal, 40(7), 536-537. doi:10.1136/emermed-2023-213120
85. Razavizadeh, M. (2015). Role of Anesthesia Team in Prehospital Care: The Hidden Treasure in Critical Settings. Archives of Trauma Research, 4(4), e29422. doi:10.5812/atr.29422v2
86. Rudin, V., Kabirova, J., & Sulimova, N. (2021). The Role of Multidisciplinary Team Training in Teaching Emergency Skills for Healthcare Workers in Atypical Conditions. Virtual Technologies in Medicine, 4(2), 56-63. doi:10.46594/2687-0037_2021_4_1402
87. Ruiz, L. M. (2020). Multidisciplinary team attitudes to an advanced nurse practitioner service in an emergency department. Emergency Nurse, 26(2), 34-41. doi:10.7748/en.2018.e1793
88. Ruiz-Ramos, J., Hernández, M., Juanes-Borrego, A., Milà, R., Mangues-Bafalluy, M., & Mestres, C. (2021). The Impact of Pharmaceutical Care in Multidisciplinary Teams on Health Outcomes: Systematic Review and Meta-Analysis. Journal of the American Medical Directors Association, 23(2), 178-185. doi:10.1016/j.jamda.2021.05.038
89. Sacchettini, A., Lamy, E., Ribordy, V., Fournier, Y., & Ariosa-Emery, J. (2022). [Interdisciplinarity in prehospital care:collaboration for better care]. Revue Medicale Suisse, 18(791), 1504-1506. doi:10.53738/REVMED.2022.18.791.1504
90. Sajid, A., Shakir, A., Awan, M., Warsha, F., Ahmad, S., Alsadoun, L., & Aziz, M. Q. (2024). Evaluating the Effectiveness of Trauma Care and Emergency Preparedness Training Programs on Prehospital Primary Survey Skills: A Systematic Review. Cureus, 16(11), e74089. doi:10.7759/cureus.74089
91. Sawidan, S. A. A., Alsalah, A. J., Alsalah, B., Abosaaq, A. J., Alalhareth, N. D., Swidan, A. M. M. A., … Almas, Y. H. S. (2024). Optimizing Prehospital Stroke Care: A Comprehensive Literature Review. Journal of Ecohumanism. doi:10.62754/joe.v3i8.4866
92. Schewe, J., Kappler, J., Dovermann, K., Graeff, I., Ehrentraut, S., Heister, U., … Muenster, S. (2019). Diagnostic accuracy of physician-staffed emergency medical teams: a retrospective observational cohort study of prehospital versus hospital diagnosis in a 10-year interval. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 27(1), 45. doi:10.1186/s13049-019-0617-3
93. Shi, Y., Li, H., Yuan, B., & Wang, X. (2025). Effects of multidisciplinary teamwork in non-hospital settings on healthcare and patients with chronic conditions: a systematic review and meta-analysis. BMC Primary Care, 26(1), 78. doi:10.1186/s12875-025-02814-0
94. Spivak, A., Streltsova, A. D., & Myronyuk, I. (2020). MULTIDISCIPLINARY REHABILITATION TEAM IN EMERGENCY ABDOMINAL SURGERY: THE ROLE OF A HOSPITAL NURSE. Ukraine. Nation's Health, 4(60), 45-52. doi:10.32782/2077-6594.4.0.2020.220390
95. Starshinin, A., Kamynina, N., & Timofeeva, A. (2024). The Role of a Nurse in a Multidisciplinary Team in Primary Health Care: Literature Review. City Healthcare, 5(4), 131-141. doi:10.47619/2713-2617.zm.2024.v.5i4p1;131-141

96. Steinemann, S., Berg, B., Skinner, A., DiTulio, A., Anzelon, K., Terada, K., … Speck, C. (2011). In situ, multidisciplinary, simulation-based teamwork training improves early trauma care. Journal of Surgical Education, 68(6), 472-477. doi:10.1016/j.jsurg.2011.05.009
97. Stokes, J., Kristensen, S., Checkland, K., & Bower, P. (2016). Effectiveness of multidisciplinary team case management: difference-in-differences analysis. BMJ Open, 6(4), e010468. doi:10.1136/bmjopen-2015-010468
98. Strandås, M., Vizcaya-Moreno, M., Ingstad, K., Sepp, J., Linnik, L., & Vaismoradi, M. (2024). An Integrative Systematic Review of Promoting Patient Safety Within Prehospital Emergency Medical Services by Paramedics: A Role Theory Perspective. Journal of Multidisciplinary Healthcare, 17, 1385-1400. doi:10.2147/JMDH.S460194
99. Taylor, C., Shewbridge, A., Harris, J., & Green, J. S. A. (2013). Benefits of multidisciplinary teamwork in the management of breast cancer. Breast Cancer: Targets and Therapy, 5, 79-85. doi:10.2147/BCTT.S35581
100. Todorova, L., Johansson, A., & Ivarsson, B. (2021). A Prehospital Emergency Psychiatric Unit in an Ambulance Care Service from the Perspective of Prehospital Emergency Nurses: A Qualitative Study. Healthcare, 10(1), 50. doi:10.3390/healthcare10010050
101. Udod, S., MacPhee, M., Wagner, J., Berry, L., Perchie, G., & Conway, A. (2021). Nurse Perspectives in the Emergency Department: The Synergy Tool in Workload Management and Work Engagement. Journal of Nursing Management, 29(7), 2015-2023. doi:10.1111/jonm.13320
102. Van De Ven, J., Houterman, S., Steinweg, R. A., Scherpbier, A., Wijers, W., Mol, B., … Group, The Tosti-Trial. (2010). Reducing errors in health care: cost-effectiveness of multidisciplinary team training in obstetric emergencies (TOSTI study); a randomised controlled trial. BMC Pregnancy and Childbirth, 10, 59. doi:10.1186/1471-2393-10-59
103. Vatansever, E., Yilmaz, N., Sofuoğlu, Z., Ozcevikel, A., Araz, E. Ş., Agah, H., … Durak, H. (2016). EVALUATION OF THE ADVANCED TRAUMA LIFE SUPPORT COURSE DESIGNED BASED ON TEAMWORK APPROACH. Turkish Journal of Emergency Medicine, 15, 112-118.
104. Vicente, V., Jansson, J., Wikström, M., Danehorn, E., & Wahlin, R. R. (2021). Prehospital Emergency Nurses' coping strategies associated to traumatic experiences. International Emergency Nursing, 59, 101083. doi:10.1016/j.ienj.2021.101083
105. Von Vopelius-Feldt, J., Powell, J., Morris, R., & Benger, J. (2016). Prehospital critical care for out-of-hospital cardiac arrest: An observational study examining survival and a stakeholder-focused cost analysis. BMC Emergency Medicine, 16(1), 234. doi:10.1186/s12873-016-0109-y
106. Wagner, E. (2000). The role of patient care teams in chronic disease management. BMJ, 320(7234), 569-572. doi:10.1136/bmj.320.7234.569
107. Wagner, J., MacPhee, M., Udod, S., Berry, L., Perchie, G., & Conway, A. (2021). Surveys Conducted Pre and Post Implementation of a Synergy Tool: Giving Voice to Emergency Teams. Journal of Nursing Management, 29(8), 2456-2464. doi:10.1111/jonm.13317
108. Walker, A., Oswald, A., Wanthal, J., Van Dillen, C., Plamoottil, C., Patel, P., … Ganti, L. (2022). The A to E (ABCDE) Pit Crew Model: A Novel Approach to Team Based Care of Critical Patients in the Prehospital Setting. Health Psychology Research, 10(3), 36960. doi:10.52965/001c.36960
109. Waskett, C. (1996). Multidisciplinary teamwork in primary care: The role of the counsellor. Counselling Psychology Quarterly, 9(3), 243-260. doi:10.1080/09515079608258706
110. Watt, K., Tippett, V., Raven, S., Jamrozik, K., Coory, M., Archer, F., & Kelly, H. (2010). Attitudes to Living and Working in Pandemic Conditions among Emergency Prehospital Medical Care Personnel. Prehospital and Disaster Medicine, 25(1), 13-19. doi:10.1017/S1049023X00007597
111. Wawrzynek, J. (2024). Assessment of pain management and prehospital analgesia trends in selected emergency medical response teams in the Silesian Voivodeship. Emergency Medical Service, 11(1), 45-52. doi:10.36740/emems202401102
112. Wiese, C., Bartels, U., Zausig, Y., Pfirstinger, J., Graf, B., & Hanekop, G. (2009). Prehospital emergency treatment of palliative care patients with cardiac arrest: a retrolective investigation. Supportive Care in Cancer, 18(10), 1287-1292. doi:10.1007/s00520-009-0746-8
113. Wise, S., Duffield, C., Fry, M., & Roche, M. (2021). A team mental model approach to understanding team effectiveness in an emergency department: A qualitative study. Journal of Health Services Research & Policy, 27(1), 14-21. doi:10.1177/13558196211031285
114. Yoo, E., Edwards, J., Dean, M., & Dudley, A. (2016). Multidisciplinary Critical Care and Intensivist Staffing. Journal of Intensive Care Medicine, 31(5), 325-332. doi:10.1177/0885066614534605
115. Yumoto, T., Hongo, T., Obara, T., Ageta, K., Aokage, T., Tsukahara, K., … Naito, H. (2024). Evolution and Effects of Ad Hoc Multidisciplinary Team Meetings in the Emergency Intensive Care Unit: A Five-Year Analysis. Journal of Clinical Medicine, 13(15), 4324. doi:10.3390/jcm13154324
116. Zimmer, M., Czarniecki, D. M., & Sahm, S. (2024). Gender-sensitive considerations of prehospital teamwork in critical situations. Philosophy, Ethics, and Humanities in Medicine, 19(1), 12. doi:10.1186/s13010-024-00153-z