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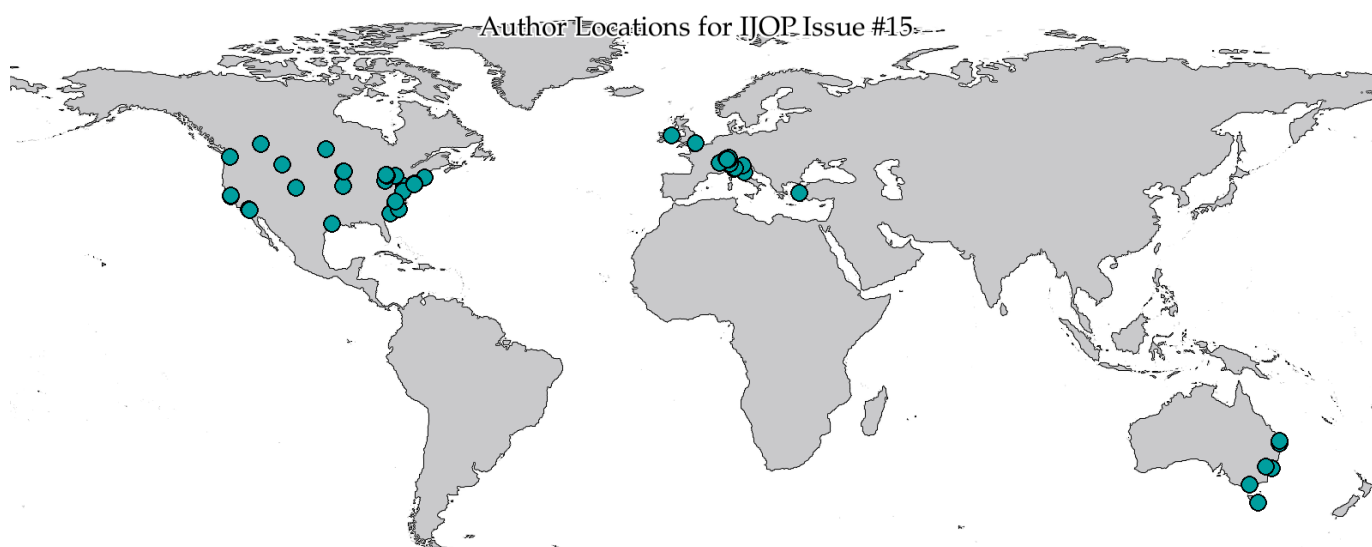
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EDITORIALS

WHEN HEALTHCARE BECOMES A TARGET: THE IMPACT OF HYBRID WARFARE ON PREHOSPITAL EMERGENCY CARE

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ABSTRACT

Hybrid warfare increasingly targets civilian healthcare infrastructure through cyber operations, infrastructure sabotage, disinformation, and energy disruption. Paramedics operate at the frontline of these system-level threats, positioned at the intersection of emergency healthcare delivery, public safety, and societal resilience. This editorial examines how hybrid warfare directly and indirectly affects paramedic practice and prehospital emergency care systems.

Drawing on recent international examples, the paper highlights how secondary system failures, including disrupted communications, loss of digital documentation, impaired rostering, supply chain interruption, and reduced hospital throughput, fundamentally alter paramedic decision-making and operational safety in the field. Growing dependence on integrated digital platforms, combined with reduced analogue redundancy and a workforce trained primarily in technology-enabled environments, increases vulnerability during prolonged disruption.

The editorial argues that recognizing hybrid warfare as a core concern for paramedicine is essential for patient safety, professional preparedness, and resilient prehospital emergency care systems.

RESEARCH REPORTS

PREHOSPITAL PROTOCOLS FOR TRANSCUTANEOUS PACING IN THE UNITED STATES: A CROSS-SECTIONAL DESCRIPTIVE ANALYSIS

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ABSTRACT

Objectives: Transcutaneous pacing (TCP) has a Class IIb recommendation from the American Heart Association (AHA) for the treatment of hemodynamically unstable bradycardia. Recent studies highlight a high rate of treatment failure and known difficulties verifying electrical capture (“false electrical capture”) and mechanical capture. This study aimed to characterize the current recommendations within US prehospital TCP protocols.

Methods: A convenience sample of 260 prehospital protocols were selected from publicly available resources. Two trained abstractors were assigned to each; pre-specified categorical variables and free-text responses were recorded. The latter were coded using content analysis. Responses were analyzed using descriptive statistics and reported as frequencies and proportions.

Results: 228 protocols completed paired abstraction, 177/228 (78%) were accessible and mentioned TCP. The most frequent indication was symptomatic bradycardia 172/177 (97%). Electrical capture was mentioned in 116/177 (66%) with false electrical capture discussed in only 8/177 (5%). Pulse palpation was the primary method for capture confirmation 123/177 (69%). Indications discordant with AHA guidelines included cardiac arrest 23/177 (13%) and seizures 18/177 (10%). Overall, 70/177 (40%) protocols were assessed to completely match, 65/177 (37%) partially match, and 41/177 (23%) did not match AHA guidelines for TCP.

Conclusions: Prehospital TCP protocol indications varied, with 77% partially or completely matching AHA guidelines for TCP. Nevertheless, guideline-discordant recommendations remained. False electrical capture was rarely mentioned. Further research should systematically assess TCP implementation including methods to assess and confirm capture, and whether guideline adherence in prehospital protocols improves outcomes and reduces TCP failure.

RESEARCH REPORTS

URBAN PARAMEDICS' PERSPECTIVES ON WORKPLACE LEARNING: A THEMATIC ANALYSIS

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ABSTRACT

Background: In the most desperate and urgent situations, the public relies on the skills and expertise of paramedicine professionals. Due to the high-stress nature of responding to medical emergencies, paramedicine has a psychological cost, particularly when educational programs have a short duration and leave candidates feeling inadequately trained (Hazzard, 2016).

Purpose: We determined that further research was required to focus on the educational pipeline and to ensure that paramedicine candidates are prepared for the contextual challenges of the workplace. We highlight gaps in the education process followed in preparing paramedics for service. The overall objective of this research was to develop an understanding of how candidates learn to become paramedics, draw meaning from the work, and sustain performance in an occupation characterized by high stress and/or risk.

Methods: We conducted semi-structured interviews (n=18) with paramedics to develop a greater appreciation of the key aspects of learning in their workplace(s). Braun and Clarke's (2006; 2009) thematic analysis provided the framework to deconstruct the interview transcripts, code and develop themes, and put forth thick and rich descriptions of the learning situations described, to better understand how professional practice was developed. Our study is informed by theories of workplace learning, an umbrella term that involves understanding how people learn to solve workplace problems.

Results: We found three types of learning that paramedicine candidates apply both before and during the performance of their duties. We found that paramedics learned through a variety of situations with varying levels of outside direction, self-initiation, and reflection. We end by offering recommendations for improvements to scholars, professional paramedicine programs, and practitioners.

Conclusion: While current paramedicine training programs are effective at teaching the necessary medical skills to paramedic candidates, we found that paramedicine professionals engage in significant experiential learning to supplement their required training in order to sustain effective job performance.



RESEARCH REPORTS

EXPERIENCED AGENCIES, FASTER CHUTE TIMES: DETERMINANTS OF EMS RESPONSE IN THE UNITED STATES

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Keywords: NEMSIS, response time, chute, ambulance, agency, experience, fixed effects, emergency medical services, EMS, paramedicine

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ABSTRACT

Why do emergency medical units respond more rapidly to some dispatched calls than others? This study examines over 355 million emergency medical services (EMS) activations recorded in the National Emergency Medical Services Information System (NEMSIS) database between 2018 and 2023. The results show that teams operating in the top 5% of agencies by call volume—representing the most experienced systems—initiate response more quickly and post consistently shorter chute times.

Experienced responders more quickly recognize the nature of the call, develop confidence in both the likely course of events and their own ability to manage it, and initiate mobilization with minimal hesitation. As these behaviors are repeated, they become embedded in routines, coordination, and shared expectations. In this way, experienced responders shape agency-level culture from the ground up, contributing to persistent differences in performance across agencies, captured in agency-level fixed effects.

RESEARCH REPORTS

ASSOCIATION BETWEEN STROKE CENTER AND COUNTY-LEVEL EMERGENCY MEDICAL SERVICES BYPASS POLICIES AND PROPORTION OF STROKE PATIENTS RECEIVING THROMBOLYTIC THERAPY

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Keywords: prehospital, stroke, thrombolysis, health policy, emergency medical services, EMS, paramedicine

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ABSTRACT

Objective: Over the past two decades, numerous policy efforts have been made to improve management in acute stroke, including stroke center policy and EMS bypass policy. The effect of these policies on clinical outcomes such as thrombolysis are yet not understood on a national scale. Our objective is to identify the association between thrombolysis and stroke center policy, and furthermore, the synergistic effect of stroke center policy and EMS bypass policy on thrombolysis rates.

Methods: We conducted a retrospective observational study using a 20% national sample of Medicare beneficiaries diagnosed with ischemic stroke from 2007 to 2014. We estimated the difference-in-differences (DID) to determine the stroke center policy effect on thrombolysis rates, and to determine the stroke center and EMS bypass policy effect together on thrombolysis rates.

Results: Overall, counties that implemented a stroke center policy had a significant increase in thrombolysis compared to counties who did not have a stroke center policy (RR = 1.42, 95% CI [1.12, 1.80], $p = 0.004$) in the pre-policy period. There was no significant association in stroke policy counties with increasing thrombolysis rate in only the post-policy period compared to no stroke center policy counties. There was an increase in thrombolysis rate overall and in the post policy period among counties that implemented both an EMS bypass and stroke center policy compared to counties that did not implement any policy (RR = 1.48, 95% CI [1.19, 1.84], $p < 0.001$).

Conclusions: Counties with both stroke center policy and EMS bypass policy had significantly higher thrombolysis rates after policy implementation. This is likely the first analysis of the effect of stroke policies on thrombolysis using the largest ever national stroke database.

RESEARCH REPORTS

ACCEPTANCE AND PERCEPTIONS OF MOTHERS AND PROVIDERS ON PARAMEDIC-LED MIDWIFERY SERVICES IN MATERNAL CARE DESERTS

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ABSTRACT

Background: Maternal care deserts, characterized by limited or no access to essential maternity services, contribute to high maternal and infant morbidity and mortality rates. While emergency medical service and community paramedicine have expanded preventive and perinatal services in other countries, U.S.-based research on integrating paramedics into maternal health delivery remains limited, particularly in underserved areas.

Purpose: The purpose of this study was to explore the level of acceptance, perceived benefits, and challenges of paramedics providing midwifery-type services in maternal care deserts in the Commonwealth of Virginia. Specifically, we investigated the perspectives of expecting mothers and paramedics regarding the perceived acceptability of expanding paramedics' roles to address the growing maternal care crisis in underserved areas.

Methods: We used a qualitative phenomenological design and recruited participants through digital outreach and complete semi-structured interviews that lasted 30-60 minutes via Zoom. Interviews were recorded with consent and transcribed. The primary investigator analyzed data using thematic analysis with manual coding and codebook development.

Results: The study included 23 participants (12 paramedics, 11 mothers) from maternal care deserts in Virginia. Five themes emerged: acceptance, perceptions of paramedic-led midwifery (PLM), barriers, benefits, and implementation needs.

Conclusion: Paramedic-led midwifery is a community-supported approach to improving care in maternal care deserts. Findings underscore the need for enhanced training, policy change, and collaboration. With intentional implementation, paramedic-led midwifery holds promise as a model to advance maternal health equity in underserved U.S. regions.

RESEARCH REPORTS

COMPARATIVE DIAGNOSTIC ACCURACY OF LARGE LANGUAGE MODELS FOR STEMI CLASSIFICATION: AN EXPLORATORY STUDY USING DE-IDENTIFIED EMERGENCY DEPARTMENT CASES

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Keywords: STEMI, artificial intelligence, ECG interpretation, prehospital diagnosis, machine learning, cardiac care, emergency medical services, EMS, paramedicine

Disclosures: The authors declare no conflicts of interest or disclosures. Artificial intelligence tools were evaluated as the subject of this retrospective study and were used only to classify de-identified cases as “STEMI” or “not STEMI” for research purposes; no AI output was used for patient care, diagnosis, treatment, or clinical decision-making. The authors reviewed all AI outputs and performed the analysis and interpretation.

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ABSTRACT

Background: Early and accurate identification of ST-Elevation Myocardial Infarction (STEMI) in the prehospital setting would reduce morbidity and mortality (Rao et al. 2025). Artificial Intelligence (AI) tools may assist emergency medical personnel by providing rapid electrocardiogram (ECG) interpretation and differential diagnosis (Chen et al. 2022; Nallamothu et al., 2015).

Objective: To evaluate the diagnostic accuracy of ChatGPT-4.0, Gemini 2.5 Pro, and a hybrid model combining ECG-GPT + ChatGPT-4.0 in classifying STEMI versus non-STEMI cases based on ECG and clinical data inputs.

Methods: Fifty-six consecutive de-identified cases (28 STEMI, 28 non-STEMI) from Staten Island University Hospital EMR (1/2025-6/2025) were analyzed. Each case included demographics, vital signs, chief complaints, and a representative 12-lead ECG. The three AI models were independently asked to classify each case as STEMI or not STEMI.

Results: For the STEMI cohort (n=28), detection rates were: ChatGPT-4.0 21.4%, Gemini 2.5 Pro 67.9%, and ECG-GPT + ChatGPT hybrid 71.4%. For the non-STEMI cohort (n=28), correct classification rates were: ChatGPT-4.0 92.9%, Gemini 2.5 Pro 28.6%, and ECG-GPT + ChatGPT hybrid: 96.4%. The ECG-GPT + ChatGPT hybrid model demonstrated the highest diagnostic accuracy at 83.9%.

Conclusion: While ChatGPT-4.0 showed high specificity, it lacked sensitivity for STEMI detection. Gemini 2.5 Pro improved sensitivity but yielded higher false positives. The hybrid ECG-GPT + ChatGPT model outperformed both standalone models, suggesting that multimodal AI integration may enhance triage accuracy for prehospital care. Despite the small population size and limitations associated with this, these results propose a viable means to hypothesize that AI may have potential in assisting responders with early STEMI identification. Future improvements in model precision could support the implementation of AI-based triage systems in emergency response settings, reducing time to treatment and improving outcomes by aiding direct cardiac catheterization lab transfers without unnecessary delays (Garvey et al., 2012; Squire et al., 2014).

RESEARCH REPORTS

DIAGNOSIS FEEDBACK: A PROSPECTIVE SURVEY ON PARAMEDIC PERSPECTIVES AND CLINICAL IMPACT

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ABSTRACT

Introduction: Paramedics rarely receive formal feedback on patient outcomes following handover, despite evidence that such information may support learning, confidence, and reflective practice.

Objective: To evaluate whether emergency department (ED) diagnosis feedback influences paramedics' perceived sense of closure, confidence managing similar cases, reflective practice, and perceived diagnostic skill.

Methods: This prospective, predominantly quantitative survey was conducted among paramedics in a mid-sized urban setting, between April and December 2018. Paramedics who requested their patient's final ED diagnosis (n = 317) were provided with diagnosis feedback and invited to complete online surveys at one week and three months. Quantitative data were analyzed descriptively, and optional free-text responses were reviewed to identify recurring themes.

Results: Of the 317 paramedics who received diagnosis feedback, 46.4% completed the one-week survey and 32.2% completed the three-month survey. At one week, 86% reported a sense of closure about the call, and over 80% agreed that feedback increased their confidence for similar cases and prompted clinical reflection. At three months, 91% reported improved differential diagnostic skills, and 96% stated they would use feedback regularly if available. A minority reported added stress or anxiety when their field impression differed from the ED diagnosis. Qualitative comments reinforced these results, describing feedback as a helpful educational tool that provided confidence and closure.

Conclusion: Paramedics perceived ED diagnosis feedback as a valuable educational tool that may support reflective practice, confidence managing similar cases, and perceived diagnostic skill. These findings suggest that structured diagnosis feedback may serve as a meaningful component of paramedic professional development.

RESEARCH REPORTS

APPLYING THE MODIFIED LOS ANGELES PREHOSPITAL STROKE SCREEN TO A RETROSPECTIVE COHORT OF CHILDREN

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ABSTRACT

Introduction: Childhood acute ischemic stroke is rare but increasingly recognized, with a variety of causes including thromboembolism, arteriopathy, prothrombotic states, systemic illness, and trauma. Childhood stroke is frequently under-recognized, causing delays in seeking care and delays in diagnosis. Prehospital stroke scales have been widely validated in adults. The Modified Los Angeles Prehospital Stroke Screen (mLAPSS) is one tool used in the prehospital setting but not validated in children. Our goal was to determine in a retrospective cohort whether children with acute stroke had a positive mLAPSS score.

Methods: We performed a retrospective case series of patients less than 18 years old with a final diagnosis of acute ischemic stroke admitted to our pediatric hospital between 2014 and 2024. Demographics, presenting symptoms, mode of hospital arrival, hospital results and interventions, and final diagnosis were recorded. We attempted to determine mLAPSS criteria from earliest patient contact available, whether pre-hospital or emergency department records.

Results: Seventy patients with 82 stroke episodes were evaluated during the study period. Of those with past medical history, the most common were a cardiac defect or sickle cell disease. Median time from symptom onset to presentation was one day. Half of the patients presented by private vehicle. The most common symptom was a new focal weakness, but the majority of patients had more than one symptom. Documentation of grip strength and arm drift was uncommon. Only one patient had clear documentation of all three components of the mLAPSS. The etiology of stroke was uncertain in 27%, hypercoagulable in 23%, moyamoya or sickle cell disease in 23%, systemic disease in 15%, and cardiac disease in 12%.

Conclusion: While focal weakness, headache, and seizures were routinely documented in children with a final diagnosis of AIS, specific criteria of the mLAPSS, especially arm drift and grip strength, were rarely documented on initial examination.

RESEARCH REPORTS

A TIME-DRIVEN, ACTIVITY-BASED COSTING ANALYSIS OF ALTERNATIVE ED TRANSPORT OPTIONS: TREATMENT-IN-PLACE AND TRANSPORT TO ALTERNATIVE DESTINATION

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Keywords: treatment-in-place, transport to alternative destination, time-driven, activity-based costing, emergency medicine, mobile integrated health, community paramedicine, emergency medical services, EMS, paramedicine

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ABSTRACT

Background: Reducing acute care utilization (i.e., Emergency Department (ED) visits and hospitalizations) is critical to reducing total costs of care. Offering alternatives to ED transport for many lower acuity Emergency Medical Services (EMS) calls is a promising pathway toward reducing acute care use. We used a Time-Driven Activity-Based Costing (TDABC) method to analyze the costs of implementing two Alternative Care Pathways (ACPs) for EMS treatment that seek to reduce ED transport: treatment-in-place and transport to an alternative destination in a midwestern ambulance service.

Methods: Publicly available costs per unit of time were determined for needed equipment and personnel resources, including a fully staffed and equipped ambulance, an emergency physician, an ED nurse, and an emergency dispatcher. Process maps were developed to estimate resource times for four treatment outcomes: usual care (transport to the ED), treat-in-place, transport to an alternative destination, and an unsuccessful ACP attempt with transport to the ED. Costs were estimated for each treatment outcome.

Results: The least expensive pathway was treat-in-place, costing \$1,559 per intervention, followed by transport to an alternative destination (\$2,151), and usual care (\$3,677). Thus, each successful completion of treat-in-place could offset the costs associated with 6.5 attempted but failed ACP interventions (that culminated in ED transport). Each successful transport to an alternative destination offset 4.7 attempted but unsuccessful ACP interventions.

Conclusions: ACP implementation can result in substantial cost savings, though results will need to be validated in other settings.



RESEARCH REPORTS

TRACTION SPLINT USAGE IN PREHOSPITAL EMERGENCY MEDICAL SERVICES: A CROSS-SECTIONAL ANALYSIS OF PERSONNEL KNOWLEDGE, APPLICATION FREQUENCY, AND ERGONOMIC CHALLENGES IN THE FIELD

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Keywords: ergonomics, femur fracture, prehospital emergency care, skill retention, traction splint, emergency medical services, EMS, paramedicine

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ABSTRACT

Introduction: Femur fractures are potentially life-threatening injuries requiring effective prehospital immobilization. Traction splints (TS) are standard equipment for this purpose, yet their infrequent use raises concerns about skill decay. This study aimed to assess the self-reported knowledge, frequency of use, and practical difficulties encountered by Turkish 112 Emergency Medical Services (EMS) personnel when applying traction splints, while acknowledging the limitations of self-reported data.

Methods: A cross-sectional study was conducted with 263 prehospital healthcare personnel across Izmir, Turkey. Data were collected via a structured survey covering demographic characteristics, traction splint (TS) training, self-reported knowledge, usage frequency, and ergonomic challenges. Categorical variables were analyzed using the Chi-Square test.

Results: Over half of the participants (52.9%, n=139) reported never having used a TS in their career. A significant difference was found between professional groups and self-reported knowledge levels ($p < .001$). Over 50% of physicians and paramedics rated their knowledge as "Very good," while most emergency medical technicians (EMTs) described theirs as "Moderate." The most frequently reported challenge during application was "patient positioning/access difficulty" (52.5%, n=138). Only 10.6% (n=28) of participants found the device "very suitable" ergonomically.

Conclusion: The traction splint is a low frequency piece of equipment, carrying a high risk of skill decay. The findings highlight significant ergonomic limitations in field use and disparities in perceived competency among professional groups. To ensure effective application when needed, targeted simulation based training---especially for EMTs---and the design of ergonomic equipment adapted to real world field conditions are strongly recommended.

RESEARCH REPORTS

CHARACTERISTICS OF RESPONSES FROM AN AUSTRALIAN EMERGENCY MEDICAL SERVICE THAT RESULTED IN NON-CONVEYANCE: A RETROSPECTIVE CROSS-SECTIONAL STUDY

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ABSTRACT

Rates of non-conveyance (referred to as a patient refusal or non-transport in areas outside of Australia), defined as paramedic discharge of a patient in the community rather than transporting them to hospital, are increasing. These episodes of care require complex decision-making from paramedics to ensure patients' needs are appropriately addressed in a timely manner. Knowledge of non-conveyance case characteristics may be useful to direct the focus of research that aims to inform and design effective, patient-centric models of ambulance healthcare delivery.

A retrospective, observational cross-sectional study describing characteristics of non-conveyance cases occurring within an Australian ambulance service setting between 1 January 2019 and 31 December 2020.

Of 1,533,453 adults attended and assessed, $n=193,970$ (12.6%) were not conveyed to the hospital. Dispatch initially prioritized 43.7% of non-conveyed cases as requiring an emergency (lights and sirens) response. Older people, aged 65 years and above, accounted for 44% of all non-conveyed patients. Pain was the most frequently recorded diagnosis, and less than 1% of all patients not conveyed were recorded as being referred to an alternative form of healthcare service.

This study provides insight into characteristics of ambulance cases in an Australian jurisdictional ambulance service setting which resulted in non-conveyance during the impacts of the COVID-19 epidemic. These findings can be used to focus future investigations that aim to understand how evolving models of ambulance healthcare delivery can safely meet the needs of patients requesting ambulance services and enhance operational efficiency.

RESEARCH REPORTS

PERCEPTIONS AND EXPECTATIONS OF ACADEMIC KNOWLEDGE IN SWISS PARAMEDICINE (SWISS PEAK): A NATIONAL CROSS-SECTIONAL SURVEY OF EMS PROFESSIONALS

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Keywords: Switzerland, academic development, attitudes, professionalization, workforce development, education, emergency medical services, EMS, paramedicine

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ABSTRACT

Objectives: Paramedic education in Switzerland remains strictly vocational despite ongoing academic development internationally. This study examined Swiss emergency medical services (EMS) professionals' attitudes toward selected opportunity- and threat-related items concerning academic development and whether these attitudes varied by academic degree status and the perceived applicability of prior academic training to current practice.

Methods: A national cross-sectional online survey was conducted among Swiss EMS professionals. A de novo questionnaire assessed questionnaire-defined opportunity and threat dimensions related to academic development, covering selected perceived benefits and concerns. After psychometric refinement, Opportunity and Threat scale scores (0–100) were used to derive a Dominance Index (D = Opportunity - Threat) and four attitudinal profiles (High/Low Opportunity High/Low Threat). Group differences and associations with academic degree status and perceived applicability of prior academic training were examined using t-tests, χ^2 -tests, correlations, and logistic regression.

Results: Among 590 respondents, mean Opportunity and Threat scores were 75.5 and 29.9, respectively, yielding a mean Dominance Index of +45.6. Overall, 79.3% were Opportunity-leaning, 10.0% Neutral, and 10.7% Threat-leaning; 74.1% fell into the High-Opportunity/Low-Threat profile. Respondents with an academic degree (16.6%) showed higher Opportunity and lower Threat scores than respondents without an academic degree, resulting in a higher Dominance Index (mean difference +12.7). Among respondents with an academic degree, 69.6% reported that their studies were applicable to current practice, but perceived applicability showed no clear association with attitudinal orientation ($r = -0.16$, 99% CI [-0.41, 0.12]).

Conclusion: In this national convenience sample, respondents endorsed the opportunity-related items captured by the questionnaire more strongly than the threat-related items. Differences by academic degree status were modest, and the perceived applicability of prior academic training showed no clear association with attitudinal orientation. These findings inform ongoing discussion of how academic development, paramedic education, and professional roles may evolve within Swiss EMS.

REVIEWS

WHEN GUIDELINES MEET THE ROAD: A CFIR-INFORMED SYSTEMATIC REVIEW OF IMPLEMENTATION IN AMBULANCE SERVICES

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ABSTRACT

Introduction: Clinical practice guidelines are central to safe, consistent, and evidence-informed ambulance care, yet their implementation is rarely straightforward. Ambulance services operate across complex, time-sensitive, and geographically dispersed settings, where organizational capacity, local context, and workforce engagement can influence whether guidelines are adopted and sustained in practice. This review aimed to identify and synthesize the barriers and facilitators influencing the implementation of clinical practice guidelines in ambulance services, and to map these determinants using the Consolidated Framework for Implementation Research (CFIR).

Methods: This systematic review followed Joanna Briggs Institute methodology for mixed-methods systematic reviews and was registered with PROSPERO (CRD42024580204). Searches were conducted in MEDLINE (PubMed), CINAHL, EMBASE, Cochrane Library, JBI Database, Scopus, and Web of Science. Qualitative, quantitative, and mixed-methods studies published in English within the past 20 years were included. Data were extracted and mapped to the domains of the CFIR.

Results: Forty-two studies were included, revealing substantial variability in CPG implementation contexts and outcomes. Key barriers included resource limitations, protocol complexity, and organizational resistance, especially in rural and under-resourced areas. Facilitators identified included leadership engagement, effective communication, adaptable protocols, and targeted education. The most frequently reported determinants were within the CFIR's 'Inner Setting' and 'Process' domains.

Conclusion: The implementation of clinical practice guidelines in ambulance services depends on more than the quality of the guideline itself. Successful uptake requires organizational readiness, local adaptation, leadership support, workforce engagement and sustained implementation planning. By mapping implementation determinants to the CFIR, this review provides a structured evidence base to guide future implementation strategies, policy development and research in ambulance services.



REVIEWS

COMMUNITY PARAMEDICINE AND MOBILE INTEGRATED HEALTH FOR CARDIOVASCULAR RISK AND HEART FAILURE: AN ANALYSIS AND SYNTHESIS OF EVIDENCE ON OUTCOMES

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ABSTRACT

The objective of this narrative review was to synthesize evidence on how community paramedicine and mobile integrated health programs have been implemented to assess and manage cardiovascular risk and heart failure in community and home-based settings, and to assess reported effects on health care utilization, adherence-related outcomes, and feasibility of care delivery. PubMed/MEDLINE was searched for English-language, human-subject literature published from January 2016 through January 2026, with the final search completed February 28, 2026. Eligible studies described community paramedicine or mobile integrated health interventions addressing cardiovascular risk assessment, heart failure-related monitoring, or cardiopulmonary post-discharge care in community or home-based settings and reported patient-level clinical, utilization, adherence, feasibility, or implementation outcomes. Studies focused exclusively on non-cardiovascular conditions, emergency response-only care, protocols, conference abstracts, non-peer-reviewed reports, or program descriptions without outcomes were excluded. The search identified 44 PubMed/MEDLINE records, and citation linking identified 12 additional records. Twenty-nine sources were included, including eight core empirical studies prioritized for model-based synthesis. No formal risk-of-bias tool was applied; study quality was considered narratively according to design, comparison group, sample size, follow-up duration, outcome definition, and potential confounding. Three intervention models predominated: post-discharge home-based follow-up, community-based screening and linkage, and high-utilizer home-visit programs. Post-discharge follow-up demonstrated heterogeneous effects on utilization, with more consistent reductions in targeted, higher-risk populations and programs with defined visit frequency and escalation pathways. Screening programs showed improvements in intermediate cardiovascular risk factors and modest reductions in emergency medical services use, although downstream utilization effects were variable. Feasibility of paramedic-led cardiovascular assessment and follow-up was consistently demonstrated. Results highlight the need for future research to clarify the effectiveness of community paramedicine and mobile integrated health programs in cardiovascular care. Key limitations include single-database searching, single-reviewer screening, and absence of formal risk-of-bias assessment.



CASE REPORTS

CPR-INDUCED CONSCIOUSNESS FROM THE PATIENT PERSPECTIVE: A CASE REPORT

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Keywords: consciousness, cardiopulmonary resuscitation, out-of-hospital cardiac arrest, emergency medical services, EMS, paramedicine

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ABSTRACT

Background: Cardiopulmonary resuscitation-induced consciousness (CPRIC) is increasingly recognized during high-quality chest compressions, but the patient's lived experience is under-reported.

Case: A 70-year-old man collapsed from witnessed ventricular fibrillation (VF) arrest. Bystanders began CPR within two minutes; EMS arrived at ten minutes. During compressions he displayed eye opening, groaning, lateral rolling, and purposeful localization that intermittently impeded compressions. Airway adjuncts were limited by trismus; bilateral nasopharyngeal airways and two-person bag-valve-mask ventilation were used. Three 200 J shocks were delivered; return of spontaneous circulation occurred approximately 17 minutes after collapse.

Patient perspective: Post-event he described vivid, dream-like awareness of being restrained and struggling to breathe described as "almost like being buried alive" without sound or ability to communicate. He recalled sharp left tibial pain with intraosseous access, the road journey, and emergency department handover.

Outcomes: Coronary angiography showed no obstructive disease. An implantable cardioverter-defibrillator was placed. He was discharged neurologically intact.

Conclusion: Patients may form explicit and distressing memories during CPR and early post-ROSC. Anticipatory communication, rapid recognition of interfering CPRIC, and titrated sedation/analgesia may improve care while preserving CPR quality. Systems should include structured follow-up to address psychological sequelae.

SPECIAL REPORTS

QUALITY IMPROVEMENT IN CRIME SCENE ACCESS TRAINING FOR EMS FIRST RESPONDERS

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ABSTRACT

This article evaluates the effectiveness of specialized training for Emergency Medical Services personnel (EMS) and first responders in managing crime scenes without compromising forensic integrity. EMS personnel involved in this study came from Italian pre-hospital services. They were involved in two distinct simulation-based events.

The authors adopted a multidisciplinary approach to develop an evaluation grid that highlights problems, risks, and opportunities for staff training. The authors analyzed case reports and historical cases to create scenarios. The authors emphasize the need for a standardized solution to equip a wide range of first responders to handle crime scenes. Additionally, a VR (Virtual Reality) solution was tested to educate students. The article identifies critical gaps in crime scene recognition, contamination prevention, and inter-agency communication when first responders lack dedicated preparation.

The primary findings concern EMS first responders' ability to recognize and manage potential crime scenes. Comparing two simulation cohorts – untrained crews and trained crews – correct scene recognition increased from 28.5% to 60%. Accurate notification to the Dispatch Center and timely law-enforcement request rose from 36% in untrained teams to 80% in trained teams. Evidence handling benefited as well. Teams that moved victims while preserving evidence increased from 25% to 76.6%. Correct egress from the scene – considered scenario-dependent – reached 80% in the suicide scenario, 60% in the sexual-assault scenario, and 20% in the domestic-violence scenario. Together, these results indicate that structured, multidisciplinary training strengthens scene recognition, inter-agency communication, and preservation of forensic integrity during EMS operations. Without proper training, EMS first responders are at risk of compromising crime scenes and safety. Structured programs that combine theory, simulation, and inter-agency collaboration could improve these aspects. Priority training areas include dispatch communication, safety, evidence handling, and documentation. This study lays the groundwork for standardized national protocols and advocates for expanded use of Virtual Reality (VR) training technologies.