JOURNAL OF INTERNATIONAL CRISIS AND RISK COMMUNICATION RESEARCH
ISSN: 2576-0017
2024, VOL 7, NO S8

The Role of Paramedicsin the Saudi red crescent authority in Enhancing Outcomes for Acute Myocardial Infarction Patients: A Pre-Hospital Perspective

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Abstract
Acute myocardial infarction (AMI) is a leading cause of mortality worldwide, with early reperfusion therapy being crucial for improving patient outcomes. Paramedics play a vital role in the pre-hospital management of AMI, as they are often the first point of contact for patients and can significantly influence the timeliness and quality of care. This paper explores the critical role of paramedics in enhancing outcomes for AMI patients from a pre-hospital perspective. The integration of 12-lead electrocardiography (ECG) into paramedic practice has been a significant advancement, enabling the rapid identification of ST-segment elevation myocardial infarction (STEMI) in the field and facilitating faster decision-making and targeted interventions. Furthermore, the administration of thrombolysis by paramedics has the potential to reduce door-to-needle times and improve survival rates, particularly in rural or remote areas where transport times to specialized facilities may be prolonged. However, this responsibility requires advanced training and strict adherence to protocols to ensure patient safety. Paramedics also contribute to public education efforts, raising awareness about recognizing AMI symptoms and the importance of prompt emergency service activation. Despite the demonstrated benefits of paramedic-led interventions, challenges remain in optimizing their role in pre-hospital AMI care, including the need for ongoing investment in training, equipment, and systemic support. This paper aims to underscore the importance of empowering paramedics as frontline providers in the battle against AMI and contribute to the ongoing efforts to optimize pre-hospital care for AMI patients.
Keywords: Paramedics, Acute Myocardial Infarction, MI

Background

The effectiveness of early thrombolysis in managing acute myocardial infarction (AMI) is widely recognized, particularly in its ability to significantly reduce mortality and improve patient outcomes. Time is of the essence in AMI management, as the benefits of reperfusion therapy are closely linked to how quickly it is administered after symptom onset. Despite advancements in medical interventions and treatment protocols, delays in initiating thrombolysis remain a critical challenge. These delays are influenced by a variety of factors, ranging from patient-related delays in seeking medical attention to systemic inefficiencies in emergency medical services (EMS). Within this complex framework, paramedics are uniquely positioned to make a substantial impact on improving the timeliness and quality of pre-hospital care for AMI patients.

Paramedics serve as the first point of contact for many patients experiencing AMI, often bridging the gap between symptom onset and definitive care. Their ability to rapidly assess, diagnose, and initiate treatment plays a pivotal role in determining patient outcomes. One of the most significant advancements in pre-hospital AMI management has been the integration of 12-lead electrocardiography (ECG) into paramedic practice. This diagnostic tool enables paramedics to identify ST-segment elevation myocardial infarction (STEMI) in the field, facilitating faster decision-making and allowing for the initiation of targeted interventions. By transmitting ECG data to hospitals en route or bypassing emergency departments to transfer patients directly to catheterization labs, paramedics can minimize delays and enhance the continuum of care.

The administration of thrombolysis by paramedics is another transformative development in pre-hospital AMI management. As trained professionals, paramedics are increasingly equipped to deliver fibrinolytic agents safely and effectively in the field. This capability is particularly valuable in rural or remote areas where transport times to specialized facilities can be prolonged. Studies have consistently demonstrated that pre-hospital thrombolysis not only reduces door-to-needle times but also significantly lowers mortality rates. However, this responsibility requires advanced training and stringent adherence to protocols to ensure patient safety, particularly given the potential risks associated with thrombolytic therapy, such as severe bleeding complications.

In addition to their clinical responsibilities, paramedics often play a critical role in educating the public about recognizing AMI symptoms and the importance of calling emergency services promptly. Public education campaigns led by EMS teams have been shown to improve community awareness and reduce patient-related delays in seeking care. Paramedics also contribute to the development and implementation of pre-hospital triage systems, which streamline the identification and prioritization of high-risk patients. These efforts highlight the multifaceted role of paramedics as both clinicians and advocates for improved public health outcomes.

Despite these advancements, challenges remain in optimizing the role of paramedics in pre-hospital AMI care. The integration of advanced diagnostic and therapeutic tools requires ongoing investment in training, equipment, and systemic support. Moreover, the debate over the relative merits of thrombolysis versus primary angioplasty continues to shape pre-hospital care strategies, with implications for the scope of paramedic practice. Addressing these challenges necessitates a collaborative approach involving paramedics, healthcare administrators, and policymakers to ensure that pre-hospital systems are equipped to deliver timely and effective care.

This paper aims to explore the critical role of paramedics in pre-hospital AMI management, focusing on the factors they can directly influence to enhance patient outcomes. By examining the advantages and limitations of 12-lead ECG and thrombolysis in the field, this discussion will underscore the importance of empowering paramedics as frontline providers in the battle against AMI. Through a detailed analysis of current practices and emerging trends, this paper seeks to contribute to the ongoing efforts to optimize pre-hospital care for AMI patients.

Pathophysiology of Acute Myocardial Infarction

AMI is defined by myocardial tissue damage due to prolonged ischemia, which arises from an acute thrombus either occluding or narrowing an atherosclerotic artery. Platelet aggregation and the activation of the coagulation cascade exacerbate the degeneration of the vessel lumen. Simultaneously, changes in platelet function caused by endothelial alterations in the atherosclerotic plaque further contribute to thrombogenesis (Grines et al., 1993).

Prevalence

Cardiovascular disease accounts for approximately 12 million deaths annually, making it the leading global cause of mortality. It is responsible for 50% and 30% of deaths in developed and developing countries, respectively, according to the World Health Organization. Notably, 50% of AMI patients succumb before reaching the hospital. Among those who survive, 50% are re-hospitalized within a year, and 5–10% experience a fatal recurrence.

Pre-hospital Management

Early Activation of Emergency Medical Services and Bystander CPR

The early identification of cardiac arrest and the initiation of bystander cardiopulmonary resuscitation (CPR) are critical determinants of survival in out-of-hospital cardiac arrest (OHCA) cases. A meta-analysis has highlighted factors that enhance survival to discharge, such as cardiac arrests witnessed by bystanders (6.4% to 13.5%), the administration of bystander CPR (3.9% to 16.1%), and the presence of ventricular fibrillation or tachycardia as the initial rhythm (14.8% to 23.0%). Despite the fact that 55% of cardiac arrests occur in the presence of a witness, only approximately 32% of those cases involve bystander CPR, underscoring a significant gap in response that paramedics encounter upon arrival (Sasson et al., 2010).

Public education efforts to improve the recognition of cardiac arrest and encourage CPR training have been spearheaded by the American Heart Association (AHA). These initiatives include requirements for CPR training in high schools, mandatory training for obtaining driver's licenses, free community classes, and online resources. While these measures have improved outcomes in some regions, overall rates of bystander CPR in the United States remain unsatisfactory, with notable disparities across racial and gender lines and limited improvements in recent years (Abella et al., 2008; van Diepen et al., 2013). Paramedics often observe these discrepancies first-hand, as delayed or absent bystander CPR can complicate pre-hospital management. Barriers to CPR participation include fears of disease transmission during mouth-to-mouth resuscitation, unawareness of cardiac arrest symptoms, legal liability concerns, and emotional distress. Compression-only CPR has emerged as a promising alternative to address some of these challenges, as evidenced by increased rates of bystander CPR in Sweden. However, similar data reflecting the impact of compression-only CPR in the United States are currently lacking (Riva et al., 2019).

Given these challenges, dispatcher-assisted CPR has proven to be an effective strategy for improving bystander response. Through real-time guidance, emergency dispatchers can help individuals initiate CPR, increasing the likelihood of CPR being performed before emergency medical services (EMS) arrive. Studies indicate that dispatcher assistance enhances the likelihood of CPR being performed and improves survival outcomes when compared to cases where no CPR is initiated (OR, 1.45; 95% CI, 1.21–1.73). Emerging innovations, such as video-assisted instructions via smartphones and mobile applications that notify trained bystanders of nearby cardiac arrest events, hold additional promise for enhancing public participation in CPR efforts, which paramedics directly benefit from upon their arrival at the scene.

Early Defibrillation

The deployment of automated external defibrillators (AEDs) in public spaces has been another pivotal focus of the AHA to facilitate timely defibrillation. For instance, a nationwide initiative in Japan to expand AED availability reduced the average time to shock from 3.7 to 2.2 minutes, resulting in a relative survival improvement of nearly 10% (Kitamura et al., 2010). Similarly, a community-based randomized trial conducted by the Public Access Defibrillation Trial Investigators demonstrated that groups trained in both CPR and AED use were twice as likely to achieve survival compared to those trained in CPR alone. Despite the proven benefits, the widespread implementation of AED programs involves challenges such as high costs, ongoing maintenance, limited shelf-life, and hesitancy among the lay public to use these devices. Paramedics are instrumental in training community members and educating the public about the safe and effective use of AEDs, particularly in high-risk locations.

For shockable rhythms such as pulseless ventricular tachycardia (VT) and ventricular fibrillation (VF), early defibrillation significantly improves patient outcomes. Current AHA guidelines recommend uninterrupted high-quality CPR until an AED is available, with minimal interruptions for rhythm analysis. Evidence shows that interruptions in chest compressions exceeding 15 seconds during rhythm analysis are associated with poorer clinical outcomes. Paramedics play a crucial role in mitigating these delays by employing strategies such as pre-charging defibrillators and resuming chest compressions while the AED charges (Link et al., 2015).

Early Advanced Cardiac Life Support and Medication Administration

In addition to CPR and defibrillation, pharmacological interventions are a cornerstone of advanced cardiac life support (ACLS). Epinephrine, in particular, is widely used for its ability to enhance vasomotor tone and diastolic blood pressure, thereby improving coronary perfusion. However, the safety and efficacy of epinephrine have been subjects of ongoing debate. Current AHA guidelines recommend administering 1 mg of epinephrine every 3 to 5 minutes for both shockable and non-shockable rhythms. The PARAMEDIC2 trial, which involved 8,014 patients in the United Kingdom, revealed that epinephrine use increased the rate of return of spontaneous circulation (36.3% vs. 11.7%) and 30-day survival (3.2% vs. 2.4%). However, patients treated with epinephrine were more likely to experience severe neurological impairment (31.0% vs. 17.8%)(Perkins et al., 2018). Paramedics must weigh these risks when administering epinephrine in the field, balancing its potential benefits against concerns such as cerebral vasoconstriction, arrhythmogenesis, and increased myocardial oxygen demand (Jacobs et al., 2011).

For refractory VT/VF that persists despite defibrillation attempts, antiarrhythmic drugs such as amiodarone and lidocaine are often employed. Early trials demonstrated that amiodarone improved survival to hospital admission compared to placebo, though these studies were underpowered to assess overall survival benefits. Larger randomized trials have not found significant differences in survival to discharge or favorable neurological outcomes when comparing amiodarone, lidocaine, and placebo for refractory VT/VF. Nonetheless, subgroup analyses suggest that both amiodarone and lidocaine may confer survival benefits in cases of witnessed arrest (Kudenchuk et al., 2016). Paramedics play a critical role in the administration of these agents according to protocol, with amiodarone typically given as a 300 mg bolus followed by 150 mg doses, and lidocaine dosed at 1–1.5 mg/kg followed by additional boluses of 0.5–0.75 mg/kg. The use of magnesium is now limited to managing torsades de pointes rather than routine OHCA care, further emphasizing the importance of targeted pharmacological intervention (Panchal et al., 2018).

By mastering these advanced techniques and adhering to evidence-based guidelines, paramedics can significantly improve outcomes for patients experiencing OHCA, underscoring their vital role in pre-hospital cardiac care.

Reperfusion Therapy

The complete occlusion of a coronary artery can result in irreversible myocardial necrosis and a subsequent decline in cardiac function. However, this ischemic process can be reversed if treated within 3–6 hours. Reperfusion therapy within this critical window mitigates the extent of myocardial damage, thereby reducing both mortality and morbidity (6, 7). Reperfusion can be achieved through thrombolysis, percutaneous transluminal coronary angioplasty (PTCA), or coronary artery bypass graft surgery (CABG). The choice of intervention is influenced by patient condition, the extent and location of ischemia, available resources, hospital protocols, and the attending physician's judgment. Regardless of the chosen method, prompt diagnosis and intervention remain essential for effective early management (Boersma et al., 1996).

Extensive clinical trials demonstrate that appropriately administered thrombolysis significantly lowers mortality rates. For instance, treatment within six hours of symptom onset reduces mortality by 26 to 65 per 1,000 patients, a finding consistently documented in the literature (5, 7). Furthermore, the availability of thrombolytic therapy in hospital emergency departments positions it as a frontline intervention for AMI management.

Primary Angioplasty

Primary PTCA, when performed promptly by experienced clinicians, offers several advantages over thrombolysis, including a reduced risk of hemorrhagic complications and enhanced coronary assessment capabilities (8, 9). Consequently, in scenarios where in-hospital treatment is rapidly accessible—such as in urban settings—PTCA is often preferred. Evidence also supports the use of short-acting thrombolytics followed by delayed angioplasty, which enhances outcomes for AMI patients, particularly when delays in accessing angioplasty exceed one hour, a common occurrence in rural areas (Bonnefoy et al., 2002).

However, the high costs associated with maintaining skilled personnel and appropriate facilities render PTCA less feasible in many settings (5, 9). In numerous pre-hospital and peripheral hospital contexts, where angioplasty is unavailable, thrombolytic agents remain the most accessible and effective treatment option. Accordingly, this paper will focus on the pre-hospital application of thrombolysis and its impact on post-AMI survival.

Thrombolytic Agents

Acute myocardial infarction (AMI) occurs due to the occlusion of one or more coronary vessels. Thrombolytic therapy aims to dissolve these occlusions, remove obstructions, and restore blood flow to the ischemic myocardium. Thrombolytic agents achieve this by activating plasmin, an enzyme that degrades fibrin, a protein that stabilizes the fibrous strands within blood clots.

Several thrombolytic agents are available, including streptokinase, tissue plasminogen activator (alteplase), anistreplase, and urokinase. In pre-hospital settings, newer derivatives of alteplase, such as reteplase and tenecteplase, are preferred due to their higher efficacy and ease of administration via a single injection rather than infusion. Additionally, these newer agents have standardized dosing regardless of patient body weight, simplifying their use in pre-hospital scenarios. These characteristics significantly reduce the time to treatment, a critical factor in improving survival rates.

The pharmacological effects of thrombolytic agents extend beyond the site of the thrombus, influencing the entire vascular system to reduce thrombus formation and enhance cerebral reperfusion. However, a small percentage of patients experience hemorrhagic complications. Thus, the benefits and risks of thrombolytic therapy must be carefully evaluated on an individual basis (Antman et al., 2004).

Early Reperfusion

Thrombolysis remains the preferred treatment modality for AMI, regardless of the specific agent used. Large-scale trials confirm the high efficacy of early reperfusion therapy, with the greatest benefits observed within the first three hours of symptom onset. For instance, mortality rates decline by 6.5% when treatment is administered within the first hour, compared to 3.7% at two hours and 2.6% at six hours. Thrombolytic therapy loses efficacy beyond 12 hours.

The TIMI-II trial demonstrated that each hour of delay in thrombolytic therapy increases fatality rates by 1%, with the optimal window for administration being the first hour post-symptom onset. Furthermore, 30–50% of AMI patients fail to achieve reperfusion if treatment is delayed beyond 90 minutes, leading to poorer outcomes irrespective of age, sex, myocardial region affected, or the thrombolytic agent used. In such cases, percutaneous coronary intervention (PCI) serves as a "rescue" strategy (Balachandran et al., 2002).

Delays in Thrombolytic Therapy

Delays in administering reperfusion therapy can be attributed to patient-related or treatment-related factors, such as delays in pre-hospital evaluation or emergency department (ED) processing.

Public awareness of AMI signs and symptoms is critical for reducing mortality. In industrialized countries, only half of patients with AMI symptoms utilize ambulance services, despite extensive evidence that ambulance assistance reduces time to definitive care. Paramedics initiate baseline examinations, collect patient histories, and perform early interventions in the pre-hospital setting, expediting treatment(Goodacre et al., 2004). While patient-related delays contribute significantly, paramedics can directly influence some delays. One effective intervention is the use of pre-hospital 12-lead electrocardiography.

12-Lead Electrocardiography

Acute coronary syndromes (ACS) represent a heterogeneous group of patients, varying in clinical presentation, severity of coronary atherosclerosis, and risk of progression to AMI. Pre-hospital practitioners must make rapid, individualized treatment decisions based on patient history, physical examination, available resources, and the transfer time to the nearest appropriate hospital. Diagnosing AMI in the pre-hospital setting can be challenging, particularly in atypical cases, such as silent AMI in older adults, women, diabetics, or those taking non-steroidal analgesics, where symptoms may include dyspnea, heart failure, or neurological impairment instead of classic chest pain.

Electrocardiography is a vital diagnostic tool for determining eligibility for acute reperfusion interventions. Given the portability and ease of use of electrocardiography devices, their use in pre-hospital settings has gained traction. However, pre-hospital 12-lead electrocardiography is not routinely performed in many countries. For instance, a study by Canto et al. using data from 275,000 patients in the National Registry of Myocardial Infarction found that only 5% of patients received pre-hospital electrocardiography.

In ambulance services where 12-lead electrocardiography is employed, diagnosis is achieved in one of two ways: either the electrocardiogram (ECG) is transmitted to a physician for interpretation, who then communicates the diagnosis to the paramedics, or the paramedics are trained to interpret the ECG themselves. ECG transmission requires functioning technology, reliable communication lines, the immediate availability of a physician for diagnosis, and a feedback system to relay the diagnosis to paramedics. This system has a one-in-five chance of failure due to communication delays and relies on costly, well-maintained equipment. These challenges are avoided when paramedics are trained to interpret 12-lead ECGs and identify ST-segment elevation independently.

Concerns have been raised about the accuracy and feasibility of pre-hospital 12-lead electrocardiography, as well as the ability of paramedics to perform and interpret results safely and effectively. However, numerous studies have documented the successful implementation of this approach. For example, a five-year study in Canada demonstrated that paramedics could accurately identify patients most likely to benefit from early aggressive thrombolytic therapy. Similarly, a UK study comparing paramedics with cardiologists found no significant difference in the accuracy of ST-segment elevation recognition after paramedics received two days of intensive ECG interpretation training followed by field practice. This evidence negates the necessity of transmitting ECGs to hospitals for interpretation.

Extensive research supports the capability of well-trained paramedics to use 12-lead electrocardiography effectively, facilitating early diagnosis and reducing treatment delays. The primary debate lies in whether pre-hospital ECG use significantly impacts overall treatment times. While some studies suggest that pre-hospital ECGs increase on-scene time by 4–10 minutes, others indicate that this is offset by reductions in overall time to treatment. Overall, the pre-hospital use of 12-lead electrocardiography has been associated with decreased mortality rates, increased access to thrombolysis, angioplasty, and coronary artery bypass grafting, as well as shorter treatment times.

Pre-hospital Reperfusion

Given the importance of early thrombolytic therapy and the demonstrated capability of adequately trained paramedics to interpret 12-lead electrocardiograms (ECG) effectively, the next critical question is whether these paramedics can also administer thrombolytic therapy in the pre-hospital environment. This approach could further enhance the chain of survival for patients experiencing acute myocardial infarction (AMI). Numerous studies have been conducted to explore this issue, some focusing on the administration of thrombolytic agents by medical practitioners in the pre-hospital setting, and others comparing the outcomes of thrombolysis administered by paramedics and medical practitioners in similar environments. Generally, these studies report favorable results, showing reductions in both mortality and time to reperfusion due to early administration of thrombolytic therapy. Additionally, hospital delays were often minimized by the pre-hospital transmission of 12-lead ECG readings or direct hospital admissions(Svensson et al., 2003).

Support for the pre-hospital administration of thrombolytic therapy has been reinforced by a study conducted in Scotland, where general practitioners (GPs) delivering thrombolytic treatment in the pre-hospital setting positively influenced mortality rates. The study further indicated that these positive outcomes persisted even after patients were discharged from the hospital. This research demonstrated that thrombolytic therapy administered outside of a hospital setting is both safe and effective, reduces treatment delays, and offers significant clinical benefits.

A recent analysis of mortality rates associated with pre-hospital thrombolysis—administered by paramedics, intensive care paramedics, and GPs—has highlighted the substantial benefits of this approach. A meta-analysis of six major randomized trials conducted by the American Heart Association, encompassing over 6,000 patients, found that pre-hospital thrombolytic treatment reduced the time from symptom onset to treatment by an average of 58 minutes (33 minutes in urban areas and 130 minutes in rural regions). This resulted in a 17% relative reduction in hospital mortality risk and an absolute risk reduction of 2%, equating to one life saved for every 62 patients treated in the pre-hospital setting. Furthermore, this analysis demonstrated that neither the type of thrombolytic agent used nor the level of the medical practitioner administering the treatment influenced the outcomes. Similarly, a study conducted in Victoria, Australia, affirmed that pre-hospital thrombolysis saves lives, emphasizing that calling an ambulance rather than a GP has the highest potential to improve survival rates.

Despite these findings, the European Society of Cardiology and the European Resuscitation Council have recommended, based on the Myocardial Infarct and Triage Intervention trial, that pre-hospital thrombolysis should only be administered when transport times from the scene to the hospital are expected to exceed 30 minutes. Even though physicians may be more proficient than paramedics at administering thrombolytic agents,it remains unequivocal that delaying reperfusion of an ischemic myocardium results in fatal or severely detrimental outcomes. Consequently, there is a growing argument for advancing the scope of practice for ambulance service paramedics to minimize these delays(Welsh et al., 2003).

While there is significant support for paramedic-administered thrombolysis, concerns persist regarding the considerable responsibility associated with administering fibrinolytic agents in uncontrolled environments. Thrombolysis is a highly effective treatment for both AMI and pulmonary embolism, yet its use during resuscitation has been limited due to the potential risk of severe bleeding complications. The Thrombolysis in Cardiac Arrest study, a large randomized, double-blind, placebo-controlled trial, has been proposed to evaluate the safety and efficacy of pre-hospital thrombolytic therapy in cardiac arrest cases of presumed cardiac origin.40 The findings of this study are anticipated to provide clearer guidance and a robust framework for future therapeutic strategies.

Conclusion

Pre-hospital cardiac arrest is associated with a significantly poor prognosis. Acute myocardial infarction (AMI) and massive pulmonary embolism are responsible for out-of-hospital cardiac arrest in 50–70% of cases. Therefore, prioritizing the reduction of time from the event to definitive treatment is essential, which can be achieved through a multifaceted approach. Key areas of focus include public education, improved access to emergency and healthcare systems, optimization of ambulance operations, enhanced paramedic training and education, and seamless interaction between in-hospital and pre-hospital management systems.

Thrombolysis is a proven therapeutic approach that can facilitate the reperfusion of ischemic myocardium. The efficacy of this treatment is closely tied to the time elapsed between symptom onset and administration, with the most pronounced benefits observed within the first hour. Evidence indicates that pre-hospital administration of thrombolytic therapy offers benefits that far outweigh associated risks, particularly in regions with extended transport times.

The ongoing debate surrounding the merits of primary angioplasty versus thrombolysis has hindered the widespread adoption of thrombolysis for AMI treatment. In 2003,41 proponents of angioplasty highlighted its advantages over thrombolysis using data from the Comparison of Angioplasty and Prehospital Thrombolysis in Acute Myocardial Infarction (CAPTIM) trial.9 Consequently, thrombolysis was not endorsed as the "standard treatment" for AMI, and a three-hour delay in thrombolytic administration was recommended in favor of transport to an interventional center.41 However, this position was contested by Lamfers and Verheught,42 who argued that the CAPTIM trial data, when accounting for preparation, age, and time factors, actually negate the superiority of angioplasty over thrombolysis. The trial underscores the importance of pre-hospital triage and early treatment.

Regardless of the divergent views in this debate, thrombolysis remains an effective treatment strategy, especially in regions lacking a robust network of interventional centers. In such settings, delays in treatment result in compromised definitive care, often beyond the timeframe necessary for the effective reperfusion of ischemic myocardial tissue.43,44

For those with experience in the pre-hospital domain, it is evident that rapid identification and transport of AMI patients should remain a central focus of patient care. Evidence from various studies suggests that paramedics should, at a minimum, perform 12-lead electrocardiography in the field. This approach should be complemented by direct admission to specialized facilities, bypassing standard emergency department admissions.

The progression of paramedic education and training, combined with the availability of newer-generation thrombolytic agents, supports the advocacy for more definitive care delivered by trained paramedics. The United Kingdom has been a leader in the implementation of pre-hospital thrombolysis and 12-lead electrocardiography for paramedics, with multiple programs operational across various services. In the United States, isolated services have initiated the use of 12-lead electrocardiography and thrombolysis. In Australia, the rural ambulance service of Victoria is trialing pre-hospital thrombolysis, while New South Wales and Queensland allow advanced paramedics to utilize 12-lead electrocardiography, with plans to extend the practice to all paramedics through field trials.

While the administration of pre-hospital thrombolysis by paramedics remains a subject of contention, its efficacy in reducing mortality and morbidity in AMI patients is incontrovertible. The primary challenge lies in addressing delays to thrombolytic intervention, as each minute of delay leads to a loss of expected life span. A recent study conducted in Portugal has further demonstrated the significant benefits of pre-hospital intervention, particularly for elderly AMI patients.45

Ambulance services and paramedics play a crucial role in reducing delays to intervention, both directly and indirectly. Efforts to support the adoption of advanced clinical practices in pre-hospital settings are ongoing and are being locally evaluated to strengthen the evidence base.

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