

Acute cardiovascular care in the emergency department and beyond: a call for interdisciplinary collaboration in clinical research

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Providing optimal care to patients in the emergency department (ED) requires teamwork and interdisciplinary collaboration. This need holds true for patients with a wide range of conditions, particularly those with acute cardiovascular (CV) diseases. With increasing life expectancy of the population in many countries, the rising proportion of ED visits by older patients with multiple medical comorbidities is resulting in longer ED stays for diagnosis, treatment, and disposition.¹ CV conditions are among the most common presentations among elderly patients presenting to the ED.² But even relatively minor complaints can lead to prolonged ED stays in an elderly patient with several co-morbidities, which, for example, require laboratory testing or imaging in order to decide whether a patient can be safely discharged home. In Europe, ED visit rates have been rising at an annual growth rate of up to 8.5% between ~2001 and 2011 according to an Organisation for Economic Co-operation and Development report.³ For the USA, an emergency medicine taskforce recently projected an increase of ED visits to an estimated 159 million visits by the year 2030, with the highest rate of use among patients >75 years of age.⁴

The ED plays a central role in the triage, diagnostic work-up, and short-term treatment of these patients with the goal to only hospitalize those who require care that cannot be provided in the ED or in the outpatient setting (Figure 1). For example, ED observation units and home hospitals can represent alternatives to inpatient admissions for a variety of conditions, such as acute heart failure, atrial fibrillation, and low-risk pulmonary embolism, even in elderly patients.⁵ The latter offers hospital-level care for a range of lower acuity conditions with physicians and nurses treating patients at home following initial assessment in the ED.⁶ Such efforts, in turn, require close collaboration among team members within the ED and also with inpatient and outpatient colleagues from other specialties, including cardiology. Within the ED, the roles of specialized healthcare providers (e.g. nursing, allied health practitioners, pharmacists) and the increasing demand and complexity of ED

care necessitate research focused on optimizing management of patients with both acute and chronic CV conditions at (or before) their arrival in the ED and beyond. Innovative, interdisciplinary approaches to care delivery are now accepted and essential.

Key success stories illustrate transformations of care and, in some cases, dramatically improved outcomes of patients with acute CV conditions, such as acute coronary syndromes, ST-elevation myocardial infarction (STEMI), and acute pulmonary embolism.^{7–9} Specifically, STEMI care has evolved from thrombolytics given in the intensive care unit setting in the 1980s to now comprehensive systems of care in many countries. These systems consist of education of the lay public in symptom recognition and Emergency Medical Service (EMS) activation, pre-hospital providers diagnosing STEMI at the scene to transporting patients directly to a cardiac catheterization facility, and even bypassing the ED in an effort to reduce time to percutaneous coronary intervention.⁷ Such improvements in patient management have been based on diverse research, including epidemiology, biomarkers, imaging, drug development, interventional therapies, as well as implementation strategies and ongoing clinician education. The evolution of the evidence to create such meaningful clinical change would not have been possible without the collaboration of diverse teams of researchers from different disciplines and countries. Despite these successes, ongoing challenges in acute care delivery and additional opportunities to improve the outcomes of patients with acute CV conditions necessitate interdisciplinary research and innovation.¹⁰

Current challenges in acute CV care delivery in emergency medicine and gaps in evidence vary between countries and depend to some extent on how established emergency medicine is as a specialty in each country and which providers and resources are available in the ED. ED crowding and its impact on care of all patients, including those with acute CV conditions, represent a major challenge in many countries during the post-COVID era. Additional gaps in knowledge include the identification of and therapeutic approaches for patients with acute

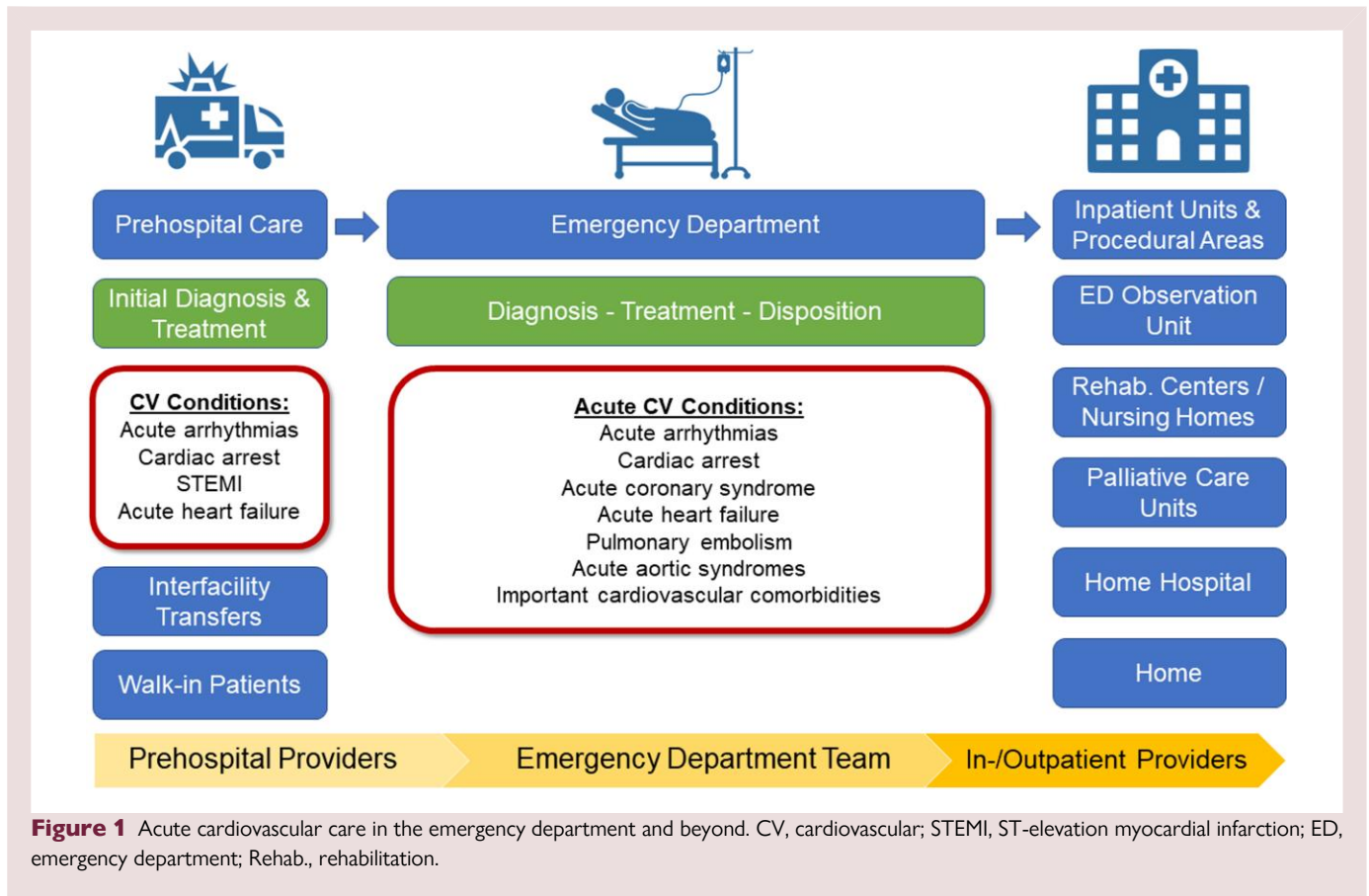


Figure 1 Acute cardiovascular care in the emergency department and beyond. CV, cardiovascular; STEMI, ST-elevation myocardial infarction; ED, emergency department; Rehab., rehabilitation.

heart failure who could safely be managed in an outpatient setting; novel approaches to the early detection and optimal management of cardiogenic shock; innovations in point-of-care testing (both laboratory and imaging); the impact of diagnostic and therapeutic strategies on patient-reported outcomes in acute CV conditions across the age spectrum; the effectiveness and safety of utilizing treatment algorithms and electronic decision support in the management of acute CV conditions in the ED and ED observation units; and the cost-effectiveness of diagnostic and management strategies in acute CV conditions.

These challenges necessitate collaborative research efforts that involve clinicians with different expertise and specialties. Considerations for successful interdisciplinary clinical research investigations are summarized in [Table 1](#). Similarly, professional societies have the opportunity to collaborate beyond the borders of their own specialty to develop consensus statements and guidelines. Including members from other specialties who provide care to the same patients ensures the recommendations consider the complete journey of patients through health care, are more relevant to multiple disciplines, and enable broader acceptance, dissemination, and adoption. Inviting experts from other specialties to join professional societies, writing groups, committees, and editorial boards, and speak at scientific meetings, further facilitates collaboration, mutual learning, and innovation. For example, the European Society of Cardiology (ESC), the ESC Association of Acute Cardiovascular Care, the Australian National Heart Foundation, and the Cardiac Society of Australia and New Zealand have embraced such 'open door', collaborative policies.

The importance of interdisciplinary research is reflected in this month's special issue which recognizes the role that emergency medicine focused research plays in acute CV care. Innovations in pre-hospital and in-hospital care for cardiac arrest patients are highlighted

in two articles. Andelius *et al.*¹¹ report on the association between arrival of smartphone-activated volunteer responders before EMS arrival and bystander defibrillation in 1271 patients with out-of-hospital cardiac arrest in Denmark and Sweden. In addition, a collaborative survey by four European medical associations describes the management of comatose survivors of out-of-hospital cardiac arrest at 247 European hospitals.¹² Data from this cross-sectional survey comprise both ED and inpatient management, as well as available resources, such as echocardiography. Machine learning approaches enable the detection of left ventricular systolic dysfunction in ED patients in an investigation by De Michieli *et al.*¹³ Zuin *et al.*¹⁴ report on the prognostic importance of mean arterial pressure in patients with intermediate to high risk acute pulmonary embolism. Point-of-care ultrasound is an essential diagnostic tool in the ED. Imanishi *et al.*¹⁵ assessed the association of invasive haemodynamic measurements with B-line count on lung ultrasound in adults hospitalized with acute heart failure in Japan. Furthermore, Poppe *et al.*¹⁶ investigated the feasibility of a simplified four-view transoesophageal echocardiography protocol in the ED. The use of simulation plays a progressively important role in medical education, especially in the acute care setting. This month's educational article describes approaches to cardiac critical care teaching using simulation.¹⁷ And finally, readers will be puzzled by a mysterious 'STEMI' presentation in the "Spot the diagnosis" section.

This issue emphasizes the European Heart Journal - Acute Cardiovascular Care's sustained interest in excellence in acute CV care though inclusion of diverse and relevant science. The journal is a key platform for emergency medicine focused acute CV research and interdisciplinary investigation.

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Table 1 Opportunities and key strategies for interdisciplinary, clinical research collaborations

Opportunities	Key strategies
<p>• Patient focused:</p> <ul style="list-style-type: none"> Investigate management strategies and therapies that impact patient care/outcomes across the continuum of health care starting with the emergency visit Address the broad range of outcomes of importance to patients <p>• Research focused:</p> <ul style="list-style-type: none"> Research question and study endpoints relevant beyond one specialty Improved study design quality through input from investigators with diverse expertise and background Increased research quality Reduction in project time and errors Improved problem-solving capability <p>• Mutual education/learning:</p> <ul style="list-style-type: none"> Continuous team improvement with learning from other team members <p>• Scientific translation and impact:</p> <ul style="list-style-type: none"> Improved relevance of joint discipline guidelines Reduction in implementation time 	<ul style="list-style-type: none"> Understanding and respect of each team member's expertise, interests, and concerns Shared understanding of problems, solutions, and goals of research Diverse leadership of research projects Clear communication Transparency and fairness regarding project-related work, funding, and authorship

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Data availability

The data underlying this article are available in the article.

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