

Cardiac magnetic resonance can also assess myocardial perfusion with pharmacological stress. This can be used as an alternative to CCTA in the assessment of patients in the observe zone following ECG and hs-cTn assessments, particularly in those with advanced, established CAD, in whom assessments of myocardial perfusion and viability may provide more useful information than CCTA. Some additional information on CMR, single-photon emission computerized tomography (SPECT) perfusion imaging and stress echocardiography is provided in the [Supplementary data online](#).

Depending on local expertise and availability, other forms of stress imaging (e.g. SPECT, nuclear, stress echo) can be used to assess patients in the observe zone.

3.5. Differential diagnosis for acute chest pain

Several cardiac and non-cardiac conditions that may mimic ACS should be considered in the differential diagnosis of acute chest pain as part of the clinical assessment. More information about the differential diagnosis of acute chest pain is provided in the sections on MINOCA and Type 2 MI and in the [Supplementary data online, Table S5](#).

4. Initial measures for patients presenting with suspected acute coronary syndrome | Initial treatment

4.1. Pre-hospital logistics of care

Individuals experiencing acute chest pain in the community represent an undifferentiated population, often presenting *ad hoc* to first medical responders in the pre-hospital setting. These patients should undergo immediate risk assessment and triage following local protocols established within the emergency medical service (EMS) ([Figures 7 and 8](#)).

If the first responding medical professional suspects ACS, a 12-lead ECG should be acquired and analysed as soon as possible. It is recommended that all medical and paramedical personnel caring for ACS patients within the EMS setting have access to defibrillation equipment and are trained in basic cardiac life support. Patients with suspected ACS are initially categorized on the basis of the 12-lead ECG and triaged into two initial treatment pathways: (i) one for patients with an ECG consistent with STEMI (persistent ST-segment elevation or equivalent ECG patterns) ([Figure 7](#)); and (ii) one for patients without ST-segment elevation or equivalent ECG patterns (suspected NSTEMI-ACS) ([Figure 8](#)). The initial ECG-guided risk stratification should also trigger treatment decisions in the pre-hospital setting, including the choice of target hospital, and serve to determine the sequence of initial investigations and interventions (including pharmacological), in particular, the timing of ICA.

An initial diagnosis of suspected STEMI portends a higher risk of immediate, life-threatening complications (e.g. ventricular fibrillation [VF]). Accordingly, there is an indication for initiating an emergency reperfusion strategy and direct transfer to a centre with 24/7 PCI capabilities. Patients who present with an ECG without ST-segment elevation (or equivalent ECG patterns) but have ongoing ischaemic symptoms should undergo pre-hospital triage in accordance with protocols for patients in the STEMI pathway, since they also face immediate risks, including ventricular arrhythmias.

4.1.1. Time to treatment

Time to treatment is vital for the care of patients triaged to the STEMI pathway. Components of the total ischaemic time, contributors to delays in initial management, and the selection of reperfusion strategy for STEMI patients are shown in [Figure 7](#). Treatment times reflect the efficiency and quality of care of a system taking care of patients with suspected STEMI. The multidisciplinary STEMI treatment pathway should be subject to continuous clinical audit in order to assess the treatment times for individual patients and identify opportunities for healthcare improvement through quality indicators (QIs). If projected QIs are not met, interventions are needed to improve the performance of the system.

Recognition of ischaemic symptoms by individuals in the community has pivotal importance in activation of the out-of-hospital pathway, and this is especially relevant to first responders without healthcare training. The recommended action should be to contact the EMS rather than to self-present to an ED or primary care clinician.

The time from symptom onset to 'first call for help' is associated with socioeconomic factors and sex.¹²⁸ In order to avoid delays through failure to recognize and act on symptoms of a 'heart attack', community education initiatives should target less well-served groups (i.e. those from deprived communities, ethnic minority groups) and use targeted public health messaging (i.e. avoiding stereotyped messaging that underpins a negative bias based on sex, ethnicity, or social background, and using language and images that will resonate with those groups). System delays are representative of the quality of care and it is recommended to measure these as QIs.

4.1.2. Healthcare systems and system delays

For patients with suspected STEMI, the system delay (the time from when the patient contacts the healthcare system to reperfusion) is amenable to improvement by organizational measures, whereas patient delay is multifactorial. System delay is a predictor of mortality in STEMI patients treated with primary PCI (PPCI).^{129–131} When a working diagnosis of STEMI is made in the pre-hospital setting (EMS), immediate activation of the catheterization laboratory team reduces treatment delays and mortality.^{132–136}

When a STEMI working diagnosis is made by the EMS in the pre-hospital setting and the patient is triaged for emergency invasive management, they should bypass the ED and go straight to the catheterization laboratory. Bypassing the ED is associated with a significant saving in the time from FMC to wire crossing and may be associated with improved survival.^{137–139} For patients presenting to a non-PCI centre with a suspected STEMI, the 'door-in to door-out time'—defined as the duration between arrival of the patient at the hospital to discharge of the patient in an ambulance 'en route' to the PCI centre—is also an important clinical performance measure, and a door-in to door-out time of ≤ 30 min is recommended to expedite reperfusion therapy.¹⁴⁰

4.1.3. Emergency medical services

At a national level, an EMS with an easily recalled and well-publicised unique medical dispatching number (112 for most European Union countries) is important to speed-up system activation. Parallel circuits for the referral and transport of patients with suspected STEMI that bypass the EMS should be avoided. The ambulance system plays a critical role in the early management of patients with suspected STEMI, including immediately establishing the initial diagnosis, triage, and treatment.^{129,141}

Ambulances in the EMS must be equipped with ECG recorders, defibrillators, telemetry devices, and at least one person trained in advanced life support. The quality of the care provided depends on the