Do Patients with Acute Myocardial Infarction Who Arrive via Ambulance Receive Better Quality Care?

Canto JG, Zalenski RJ, Ornato JP, et al. Use of emergency medical services in acute myocardial infarction and subsequent quality of care: observations from the National Registry of Myocardial Infarction 2. Circulation 2002;106:3018–23.

Study Overview

Objective. To examine the impact of emergency medical system (EMS) use on receipt of timely acute reperfusion therapies in patients who present to the hospital with acute myocardial infarction (MI).

Design. Cross-sectional study of a registry patient.

Setting and participants. Patients admitted to U.S. hospitals with a diagnosis of MI and who arrived from the community by either ambulance or self-transportation within 6 hours of symptom onset between June 1994 and March 1998 were eligible. Patients who were in cardiogenic shock or those who were transported from another facility were not included in the study.

Main outcome measures. Time to receipt of acute reperfusion therapy (primary angioplasty or thrombolysis) in eligible patients. Patients' mode of arrival to the hospital represents the main predictor of interest in this study. Those who arrived by ambulance were considered to have used the EMS service. Patients' presenting symptoms, vital signs, mortality risks, baseline cardiac risk profiles, and comorbidities were ascertained using retrospective chart review. Patient demographics, including age, sex, race, and insurance status, also were recorded.

Main results. 322,169 out of 772,586 patients met the presentation and diagnosis inclusion criteria. The authors did not state the number of patients who were eligible for acute reperfusion therapy. EMS service was only used by 53.4% of study patients. After adjusting for patients' demographics, comorbidities, and severity of presenting symptoms, use of the EMS service was associated with faster time interval from door to fibrinolytic therapy (12.1 minutes faster; $P < 0.001$) or to urgent primary angioplasty (31.2 minutes faster; $P < 0.001$). In a secondary analysis, the following groups of patients were less likely to use the EMS service: young patients, male patients, and those at lower mortality risk at presentation. Intriguingly, use of the EMS service was associated with significantly higher mortality even after adjusting for all measured confounders.

Conclusion. Patients with acute MI who arrived via an ambulance had significantly faster receipt of initial reperfusion therapy. Only half of the patients studied used an ambulance for transportation to the hospital, suggesting that this service may be underused by patients with acute MI.

Commentary

Of the 900,000 Americans who experience an MI each year, 125,000 of them die "in the field" before they reach medical attention. Therefore, availability of 911 emergency medical access for patients with symptoms of acute MI has long been part of the guidelines established by the American College of Cardiology and American Heart Association [1]. Use of the EMS system has several potential advantages. First, EMS provides rapid availability of advanced cardiac life support personnel for out-of-hospital cardiac arrest. Second, EMS personnel may obtain a pre-hospital ECG, which may increase the level of readiness in the emergency department before the patient arrives. The authors, therefore, tried to ascertain whether use of the EMS service might speed the provision of potentially life-saving reperfusion therapy in patients with acute MI.

This study's results apparently support the use of EMS service. Patients in this cross-sectional study who arrived via an ambulance were about 55% to 60% more likely to obtain reperfusion therapy within time frames established by national guidelines, even after adjusting for the baseline comorbidities and presenting symptoms. Fibrinolytic therapy was given 12.1 minutes faster and coronary angioplasty was started 31.2 minutes earlier. Unfortunately, methodologic issues in this study prevent us from inferring that the EMS service was directly responsible for the improvement in these process measures. It is possible that sicker patients are more likely to activate the EMS service and these patients generally garner greater and speedier attention in the emergency department upon their arrival, regardless of their mode of arrival. In other words, use of the EMS service may simply be a marker for severity. This finding is suggested by the observation that patients who arrived by the ambulance had greater mortality than those who did not. This apparently contradictory observation remains statistically signifi-

cant even after adjusting for confounders measured in the study. Since it is reasonable to assume that use of the EMS service should not directly increase the mortality risk of these patients, one must infer that other unmeasured confounders are at play here. Thus, it is entirely possible that the improved process measure seen in this study could have been the result of residual confounding. Finally, the recruitment of patients into the data registry also could have introduced bias. Patients who did not call 911 and died before reaching the hospital would not have been accounted for. It is unclear how this bias could have affected the authors' conclusions.

Application for Clinical Practice

While there is good rationale for recommending patients with symptoms consistent with acute coronary syndromes to activate an EMS service [2], the present study has not conclusively shown that the use of the EMS service shortens the time interval for reperfusion therapy in eligible patients with acute MI.

–Review by Eric G. Poon, MD

References

1. Ryan TJ, Anderson JL, Antman EM, et al. ACC/AHA guidelines for the management of patients with acute myocardial infarction. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Management of Acute Myocardial Infarction). J Am Coll Cardiol 1996;28:1328–428.
2. Faxon D, Lenfant C. Timing is everything: motivating patients to call 9-1-1 at onset of acute myocardial infarction [editorial]. Circulation 2001;104:1210–1.