

## Predictors of Acute Myocardial Infarction

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### Clinical Question

What elements of a patient's chest pain history are the best predictors for ruling in/out acute myocardial infarction (MI)?

### Evidence-Based Answer

The most useful element for ruling in acute MI is chest pain with radiation to both arms, followed by radiation to the right arm. The most useful elements for ruling out acute MI are pleuritic chest pain, sharp pain, and pain reproduced by palpation. (Strength of Recommendation = A, based on two systematic reviews and one cohort study.)

### Evidence Summary

A systematic review of 64 published studies and one unpublished study (N not reported) reviewed bedside diagnosis of MI in adults presenting to the emergency department with chest pain unrelated to trauma and unexplained by radiography.<sup>1</sup> The diagnosis of acute MI was determined by elevated cardiac isoenzymes and electrocardiography (ECG) changes. Factors that most reliably predicted acute MI were pain radiation to the right arm or shoulder (sensitivity = 15% to 41%; specificity = 94% to 95%; positive likelihood ratio [LR+] = 4.7; 95% confidence interval [CI], 1.9 to 12) and radiation to the left arm (sensitivity = 34% to 55%; specificity = 76%; LR+ = 1.8; 95% CI, 1.1 to 2.8). Factors associated with a decreased likelihood included pleuritic pain (sensitivity = 3% to 6%; specificity = 74% to 82%; LR+ = 0.2; 95% CI, 0.2 to 0.3), sharp pain (sensitivity = 8% to 16%; specificity = 59% to 70%; LR+ = 0.3; 95% CI, 0.2 to 0.5), and positional pain (sensitivity = 3% to 11%; specificity = 75% to 87%; LR+ = 0.3; 95% CI, 0.2 to 0.5).

A systematic review of 14 studies (N = 32,241) compared elements of acute chest pain in patients presenting to the emergency

department or admitted to the hospital for suspected MI.<sup>2</sup> The diagnosis was determined by cardiac enzymes, ECG changes, or discharge diagnosis. Characteristics that most reliably predicted acute MI were pain radiation to both arms (LR+ = 7.1; 95% CI, 3.6 to 14), radiation to the right shoulder (LR+ = 2.9; 95% CI, 1.4 to 6.0), pain in the chest or left arm (LR+ = 2.7; CI not reported), and radiation to the left arm (LR+ = 2.3; 95% CI, 1.7 to 3.1). Factors associated with decreased likelihood included pleuritic chest pain (LR+ = 0.2; 95% CI, 0.2 to 0.3), pain reproduced by palpation (LR+ = 0.2 to 0.4; CI not reported), sharp or stabbing pain (LR+ = 0.3; 95% CI, 0.2 to 0.5), and positional pain (LR+ = 0.3; 95% CI, 0.2 to 0.4).

A prospective observational cohort study (N = 893) examined clinical features of acute MI in patients presenting to the large urban emergency department of a teaching hospital.<sup>3</sup> The characteristic that most reliably predicted acute MI was pain radiation to both arms or shoulders (sensitivity = 38.2%; specificity = 90.6%; LR+ = 4.1; 95% CI, 2.5 to 6.5). The factor associated with a decreased likelihood was a tender chest wall (sensitivity = 92%; specificity = 28%; LR+ = 0.3; 95% CI, 0.1 to 1.1).

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