

## Have AMI Outcomes Improved Over the Past 10 Years?

Masoudi FA, Foody JA, Havranek EP, et al. Trends in acute myocardial infarction in 4 US states between 1992 and 2001: clinical characteristics, quality of care, and outcomes. *Circulation* 2006;114:2806–14.

### Study Overview

**Objective.** Describe trends in clinical characteristics, eligibility and rates of treatment, and mortality in a community-based population of older patients hospitalized with acute myocardial infarction (AMI).

**Design.** Retrospective cohort study.

**Setting and participants.** 20,550 Medicare patients aged  $\geq 65$  years who were hospitalized in 4 U.S. states (Alabama, Connecticut, Iowa, and Wisconsin) with a confirmed discharge diagnosis of AMI over 4 time periods: 1992–1993, 1995, 1998–1999, and 2000–2001. Five quality measures were assessed: aspirin given within 24 hours of presentation,  $\beta$  blocker given within 24 hours of presentation, aspirin prescription at discharge,  $\beta$ -blocker prescription at discharge, and prescription of an angiotensin-converting enzyme (ACE) inhibitor among patients with documented left ventricular systolic dysfunction (ejection fraction  $< 0.4$ ).

**Main outcome measures.** The main outcome measures were proportion of patients who met treatment criteria for the 5 quality measures, treatment with guideline-based medications, and outcomes of hospitalization, including adjusted 1-year mortality and length of stay.

**Main results.** From 1992–2001, the mean age of the study population increased progressively, patients had more comorbidities, and fewer patients met ideal candidate criteria over time. Although treatment rates increased significantly for aspirin,  $\beta$  blockers, and ACE inhibitors from 1999–2001, discharge prescriptions were not provided to 12.6%, 19.7%, and 25.2% of ideal candidates, respectively, in 2000–2001. Crude 1-year mortality increased for each year studied; however, compared with 1992–1993, adjusted 1-year mortality declined (relative risk in 1995, 0.94 [95% confidence interval {CI}, 0.88–1.01]; relative risk in 1998–1999, 0.91 [95% CI, 0.85–0.98]; relative risk in 2000–2001, 0.87 [95% CI, 0.81–0.94]).

**Conclusion.** Quality of care and adjusted 1-year mortality for Medicare patients with AMI have improved significantly

from 1997–2001. However, absolute mortality remains high, fewer patients are ideal for guideline-based therapy, and thus more treatment strategies are needed for this older population.

### Commentary

Substantial resources have been used to improve the quality of AMI care; however, the effect of these efforts has yet to be characterized on a large scale. Using standardized quality measures, Masoudi et al found that the rates of aspirin,  $\beta$ -blocker, and ACE inhibitor treatment during hospitalization and prescriptions at discharge have improved over a 10-year period. However, this study also begins to describe the changing clinical characteristics of the elderly population over time. Specifically, the Medicare population with AMI has begun presenting to the hospital at an older age with more comorbid conditions and more often with non-ST-segment elevation MI. In addition, fewer patients are ideal candidates for guideline-based therapy. Although quality has improved over time, there remain significant gaps in care regarding aspirin,  $\beta$ -blocker, and ACE inhibitor prescriptions at discharge for AMI patients.

Although relevant endpoints were properly analyzed over a long period of time, there are some limitations. First, the detection of AMI changed over time (eg, cardiac biomarkers have been modified), and this may explain some of the population trends in clinical characteristics and mortality. A European study showed that case identification of AMI with troponin led to an older patient cohort with more comorbid conditions and higher crude mortality rates [1]. Second, better documentation of both quality measures and comorbid conditions could also explain some of the findings. As the Centers for Medicare and Medicaid Services and the Joint Commission on Accreditation of Healthcare Organizations have moved toward mandatory reporting of AMI quality measures, documentation of the “standard of care” by physicians may have improved. Also, computers and medical information systems may have made it easier for coders to obtain data on comorbid conditions and medications prescribed. However, that being said, dissemination of knowledge is hopefully the most likely explanation for decreasing mortality and better quality of AMI care.

### Applications for Clinical Practice

The population of patients hospitalized with AMI is changing. Patients are older, have more comorbid conditions, and are less likely to be eligible for guideline-based therapy. Although rates of guideline-based therapy have improved, a quality gap still remains. Not only does this point to the need to identify strategies to improve outcomes in this patient group, it has important implications for performance measurement. Current guideline-based quality performance measures are derived from previous studies of patients who had different clinical characteristics than what we may be seeing

now. It is essential, especially in light of pay-for-performance, that proper risk-adjustment is applied to these performance measures so that all hospitals will be evaluated fairly.

—Review by Robert L. Huang, MD

### Reference

1. Salomaa V, Koukkunen H, Ketonen M, et al. A new definition for myocardial infarction: what difference does it make? *Eur Heart J* 2005;26:1719–25.

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