Trends in Acute Myocardial Infarction
Incidence, Detection, and Treatment
Based on the 2015 50 Top Cardiovascular Hospitals Study

Each year, the Truven Health 100 Top Hospitals® program releases its 50 Top Cardiovascular Hospitals study, identifying the 50 highest performing cardiovascular hospitals in the nation. This independent, quantitative study uses objective analytics and public data to determine the nation’s highest performing hospitals with cardiovascular service lines.

As with all 100 Top Hospitals studies, the 50 Top Cardiovascular Hospitals research is founded on a balanced scorecard concept, which measures performance across patient outcomes and satisfaction, as well as operational and financial efficiencies.

As part of the annual study, additional research by Truven Health Analytics™ experts is often conducted on important cardiovascular care topics, based on the data and analytics collected and reviewed for the study’s findings.

This year, this research focused on recent trends in the detection and treatment of acute myocardial infarctions (AMI), or heart attacks.

More specifically, the research included in this brief analyzed Medicare Provider Analysis and Review (MEDPAR) data between 2002 and 2013 and investigated AMI trends in two distinct study diagnosis groups — STEMI and NSTEMI.

- STEMI — ST segment elevation myocardial infarction, with the ST segment referring to a specific part of an EKG (electrocardiogram) tracing. In STEMI, the coronary artery is completely blocked and cardiac muscle dies.
- NSTEMI — Non-ST segment elevation myocardial infarction. In NSTEMI, only part of the coronary artery is blocked.

STEMI is a more severe type of AMI than NSTEMI and is associated with a higher short-term death rate. Approximately 60 to 65 percent of STEMIs occur in patients age 65 or older, and patients 65 and older account for up to 80 percent of all AMI-related deaths.¹

Rate of AMI Incidence
As demonstrated in Figure 1, our analysis shows that the overall rate of STEMI has decreased by approximately 50 percent, from 29 to 14 per 10,000 aged Medicare Part A beneficiaries. Improved awareness of coronary risk factors and related interventions appear to be associated with the decline in STEMI rates. Those factors include:

- Patient lifestyle changes²³
- Use of statins¹
- Elective interventions, such as percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG) for patients at risk for AMI
At the same time, more sensitive tests are detecting NSTEMI AMIs that were not previously identified. Traditionally, AMI has been identified by a combination of lab tests for cardiac biomarkers (creatine phosphokinase or CPK) and EKG findings. Now, however, measurement of troponin proteins in the blood has been found to be more specific than CPK measurement.

As testing has shifted from CPK to troponin, increased numbers of NSTEMI AMIs have been detected. Due to that increased sensitivity in testing, the American College of Cardiology Foundation (ACCF) estimates that 30 to 40 percent of patients who would have been diagnosed with unstable angina based on CPK results are now being diagnosed with NSTEMI.³

These developments and their impact on diagnoses make it difficult to interpret the true NSTEMI rate change.

Figure 1: AMI Rate per 10,000 Aged Medicare Part A Beneficiaries

Notes: Unspecified is diagnosis code 410.91. Rate is based on the number of inpatient AMI admissions per 10,000 aged Medicare Part A recipients during a federal fiscal year. Patients transferred to another acute care facility are excluded to avoid double counting. Only patients 65 and older are included in the rate.

Rate of AMI-Related Death

Figure 2 illustrates declines in both STEMI- and NSTEMI-related death rates from approximately 17 percent to 11.4 percent and from 8.6 percent to 5.5 percent, respectively, over the past 12 years of data studied. A number of factors are driving down hospital death rates, including:

- Emphasis on faster “door-to-balloon time” (referring to angioplasty procedures)⁵
- Better education of the population to receive immediate medical attention for signs of AMI
- Improved emergency medical service (EMS) protocols⁷
- Hospital/provider adherence to best-practice guidelines for the treatment of AMI patients⁸
- Better coordination of services when transferring patients to hospitals with reperfusion/revascularization capabilities
An important note is that the introduction of troponin testing has not only increased the number of NSTEMIs, but it has changed the case mix to include patients with lower risks of death.

**Figure 2: AMI Inpatient Death Rates for Aged Medicare Part A Beneficiaries**

![Graph showing AMI death rates](image)

Notes: Unspecified AMIs are those where type was not documented. The high death rate on Day 1 for these patients suggests that type may not be recorded for patients with very early deaths.

**Trends in Treatment**

Figures 3 and 4 demonstrate that there has been a marked increase in the percent of STEMI patients receiving PCI (from 39 percent in 2002 to 72 percent in 2013) and a smaller increase in the percentage of NSTEMI patients receiving PCI (from 21 percent in 2002 to 32 percent in 2013).

Research studies have been conclusive in proving the success of performing immediate revascularization on the majority of STEMI patients. But both invasive and conservative best-practice approaches continue to exist for NSTEMI patients, depending on patient characteristics.

**Figure 3: STEMI Treatment Trends in Aged Medicare Part A Beneficiaries**

![Graph showing STEMI treatment trends](image)
The remainder of our research focused on STEMI AMIs, which have a higher short-term risk of death compared with NSTEMI AMIs. Our research looked for variations in STEMI treatment and outcomes in different regions, based on U.S. Census divisions, for federal fiscal year 2012-2013. All rates are unadjusted for patient demographics and comorbid conditions.

Figure 5 shows that both PCI use and patient death rates in STEMI cases vary by region of the country.

An increased use of PCIs in certain areas could be due to practice pattern differences and regional efforts to improve access to PCI. Lower use of PCIs in other areas may reflect less access to facilities performing PCI — due to fewer facilities performing PCI, greater geographic distance to hospitals performing PCI, or lower transfer rates from hospitals that do not perform PCI to those that are PCI-capable. Differences could also reflect patient factors that would influence treatment choice.

We are unable to determine whether the use of PCI is correlated with lower death rates due to the procedure itself, or due to the characteristics of the patients who are selected for PCI as treatment.
Figure 5: STEMI Treatment and Outcomes for Aged Medicare Part A Beneficiaries Based on Census Divisions

Note: All rates are unadjusted for patient demographics and comorbid conditions.

PCI Use and Death Rate: Differences Between Winning Benchmark Hospitals and Non-Winning Hospitals

We also analyzed treatment and outcome trend differences, based on data from federal fiscal year 2012-2013, between those hospitals named to the 50 Top Cardiovascular Hospitals list in the past four years and those who were not named award-winning hospitals during that same time period.

In each of the three hospital classes used in the 50 Top Cardiovascular Hospitals study, award-winning hospitals have slightly higher rates of PCI use in STEMI than hospitals that have not been designated a 50 Top Cardiovascular Hospitals winner.
Likewise, we looked at the differences in STEMI AMI death rates between winning hospitals and non-winning hospitals, and found that 50 Top Cardiovascular Hospitals winners have lower death rates. This is not surprising, as risk-adjusted death rate for AMI is one measure used for winning hospital selection criteria.
Conclusions
In summary, our research into AMI trends provided a number of insights, including that STEMI incidence rates have decreased between 2002 and 2013 for aged Medicare beneficiaries. It is difficult, however, to interpret the NSTEMI incidence trend due to the increased sensitivity of the troponin test over CPK testing.

Unadjusted death rates for STEMI are also decreasing. Unadjusted NSTEMI death rates appear to be decreasing, but this may also reflect different case mix due to patients identified with a more sensitive troponin test.

Since 2002, there has been a large increase in the percentage of STEMI patients receiving PCI. There has been a much smaller increase in the percentage of NSTEMI patients receiving PCI. These findings appear to reflect changing best-practice guidelines in the treatment of these conditions.

We also found that there is geographic variation in both the use of PCI in STEMI patients, as well as death rates.

Finally, hospitals who have won the 50 Top Cardiovascular Hospitals award in the last four years are slightly more likely to perform PCI for STEMI than non-winners during this timeframe. The winning hospitals also have lower unadjusted death rates than their non-winning peers.

Additional findings from the recent 50 Top Cardiovascular Hospitals study, and other Truven Health 100 Top Hospitals studies, can be found at 100tophospitals.com.

References


