

# Ambulance Diversion Raises Risk of MI Mortality

BY M. ALEXANDER OTTO

FROM THE ANNUAL RESEARCH MEETING OF ACADEMYHEALTH

SEATTLE – Patients having acute myocardial infarctions are more likely to die if their nearest emergency department is temporarily refusing new patients, according to a study that linked acute myocardial infarction outcomes to hospital diversion logs in four California counties, and that was presented at the meeting.

Acute myocardial infarction death rates are about 3% higher if the closest emergency department is on 12 or more hours of diversion on the day of the acute event.

## VITALS

**Major Finding:** Acute MI death rates are about 3% higher if the ED closest to the patient is on 12 or more hours of diversion.

**Data Source:** A case-crossover study.

**Disclosures:** Dr. Shen said she has no disclosures. The study was funded by the Robert Wood Johnson Foundation, the National Institutes of Health, and the University of California, San Francisco.

Treatment delays could be the reason, but patients in the study were typically accepted by another ED within a mile. Another possible explanation is that diverted patients were less likely to end up at EDs with readily available and potentially lifesaving catheterization labs, said lead investigator Yu-Chu Shen, Ph.D., an economist at the Naval Postgraduate School in Monterey, Calif.

She and her colleague found a non-significant trend toward increased mortality for diversion periods shorter than 12 hours, as well as “an increase of 0.2 percentage points for every hour increase in diversion.

“This is the first multisite, multicounty study that really quantifies the association” between diversion and acute MI mortality “on a large scale,” Dr. Shen said.

The findings are based on Medicare claims data for 11,625 acute MI patients in Los Angeles, San Francisco, San Mateo, and Santa Clara counties who were treated in 2000-2005 at about 150 emergency departments. The researchers compared mortality outcomes when patients were able to be treated at the nearest emergency department with outcomes when their nearest ED was on diversion, typically because there were no inpatient beds available for

## VIEW ON THE NEWS

### Diversion Should Be Last Option

The message for physicians is to “do everything you can to keep [the ED] open,” Dr. Edward Livingston said.

“This shows a broad spectrum of hospitals in different kinds of environments with the same problem,” which suggests it is a truly systemic problem, and “not just a problem of one particular facility or region,” he said.

“Hospitals have different thresholds for closing. Some close at the drop of a hat; others wait until they absolutely” have no choice. Each hospital seems to have its own cri-

teria, but the study shows “it’s really in the patient’s best interest for hospitals to do everything possible to stay open,” he added.

“We may need criteria that we all agree on for what makes you close. We all ought to agree that those thresholds should be really high,” Dr. Livingston said.

DR. LIVINGSTON is chairman of the GI and endocrine surgery division at the University of Texas, Dallas. He is a contributing editor at JAMA, which published the study, and a consultant for Texas Instruments.

new admissions or the catheterization lab was full.

The approximately 3%, statistically significant increase in death rates when hospitals were on 12 or more hours of diversion held true across 30- and 90-day mortality, as well as 9- and 12-month mortality.

For instance, 15% of the 3,541 patients who were able to be admitted to their nearest ED died within 30 days of their acute myocardial infarction; 19% of

the 2,060 whose nearest ED was on 12 or more hours of diversion died within a month, which translated to a regression-adjusted increase of 3.24% (95% confidence interval, 0.60-5.88).

Similarly, when patients’ nearest EDs were accepting new patients, 87% were admitted to a hospital with a catheterization lab; when the nearest hospital was on at least 12 hours of diversion, the number fell to 78%, Dr. Shen said (JAMA 2011;305:2440-7).

# Rule Predicts Which ED Patients Need an Immediate ECG

BY MIRIAM E. TUCKER

FROM THE ANNUAL MEETING OF THE SOCIETY FOR ACADEMIC EMERGENCY MEDICINE

BOSTON – A simple, validated rule based on age and presenting symptoms was highly sensitive at identifying which emergency department patients need an immediate triage 12-lead ECG to identify ST-segment elevation myocardial infarction in a study population of more than 3 million patients.

According to current guidelines from the American College of Cardiology and the American Heart Association, “ECG should be performed within 10 minutes of ED arrival for all patients with chest discomfort or other symptoms suggestive of STEMI” (Circulation 2004;110:588-636). “These are common-sense guidelines, but we often get caught up in the latter part,” said Dr. Seth Glickman of the University of North Carolina at Chapel Hill, noting that about one-third of patients with STEMI do not have a complaint of chest pain.

The study data came from a statewide public health surveillance system in North Carolina comprising about 8.1 million ED visits from 2007-2008. The patients were

divided into a derivation cohort in 2007 and a validation cohort in 2008. After the exclusion of those aged 18 years or younger, those with missing data, and all injury, bleeding, or pregnancy-related visits, the final data set included 1,685,633 visits in 2007 and 1,889,545 in 2008.

Of the 6,464 STEMI patients, 78% presented with chest pain. However, this varied dramatically by age. Although more than 90% of the 18- to 49-year-old group diagnosed with STEMI had chest pain, only 53% of those aged 80 years and older did. In contrast, the frequency of other chief complaints increased steadily with age, including dyspnea, syncope, weakness, abdominal pain, and altered mental status, Dr. Glickman said.

Using those factors, the investigators derived the following simplified rule: Immediate ECG is required for patients aged 30 years and older with chest pain; those aged 50 years and older with shortness of breath, altered mental status, upper extremity pain, weakness, or syncope; and patients aged 80 years and older. The rule is meant to identify those who should be prioritized for immediate ECG, not the total group of patients who may ultimately receive one, Dr. Glickman noted.

In the validation cohort, this rule was 92.7% sensitive (95% confidence interval, 91.8-93.5), was 74% specific (CI, 74.0-74.1), had a positive predictive value of 0.62% (CI, 0.60-0.64), and had a negative predictive value of 99.98% (CI, 99.98-99.98).

Regarding the 80-plus population, “clearly, there’s an opportunity to use clinical judgment in the rule. But on the flip side, I can say that the chief complaints of the advanced elderly who are diagnosed with STEMI are so across the map that it is challenging to develop a more specific rule,” he said, adding that he and his associates are working on incorporating other elements into the mod-



Using the simplified triage rule, patients aged 30-49 who present with chest pain get immediate ECGs.

el such as abdominal pain and nausea, which are also common complaints in very elderly patients.

In response to a question about gender, Dr. Glickman said that they tried the rule with and without gender and it performed similarly, even though women are less likely to present with chest pain. “The real dominant factor in the model was age, which trumps gender across the entire spectrum. We thought it would be a lot easier to implement a rule that wasn’t gender-specific in the ambulance or the triage setting.”

## VITALS

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**Data Source:** A statewide public health surveillance system in North Carolina comprising about 8.1 million ED visits during 2007-2008.

**Disclosures:** This study was funded by the American Heart Association Pharmaceutical Roundtable, the Robert Wood Johnson Foundation, the North Carolina Bio-Preparedness Collaborative, and Department of Homeland Security Office of Health Affairs. Dr. Glickman has no other personal disclosures.