

# ED Crowding Worsens Outcomes of Potential ACS

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SEATTLE — Patients who present with potential acute coronary syndrome might be most vulnerable to the downside of emergency department crowding, according to a small, single-center study at an academic medical center.

These patients eventually have worse outcomes, said Dr. Jesse Pines, who presented an analysis of 7 years of data from an ongoing prospective cohort study at the Hospital of the University of Pennsylvania, in Philadelphia, which has 55,000 annual patient visits. Dr. Pines, associate director of health care policy research at the university's emergency medicine department, spoke at the annual meeting of the American College of Emergency Physicians.

While there have been many studies of the impact of emergency department crowding and boarding (keeping patients who need inpatient care in emergency department rooms or hallways when the hospital has no beds to spare), few have focused specifically on patients with potential acute coronary syndrome, Dr. Pines said. And yet, there are 6 million ED visits a year for chest pain. Studies have shown that early treatment is very beneficial in ACS, so Dr. Pines and his colleagues wanted to gauge the impact of crowding or boarding—which can cause treatment delays—on potential ACS. Because ACS is difficult to identify, delays could have particularly crucial impacts on long-term outcomes.

Dr. Pines and his colleagues analyzed data from 6,869 patients who were older than 30 years and presented with

chest pain. Fifty-seven percent (3,915) were women, and 69% (4,739) were African American. The mean age was 52 years.

Data were collected on patient characteristics and Thrombolysis in Myocardial Infarction scores, and outcomes were recorded for the 30 days following admittance to the hospital or discharge. The primary outcome was any cardiovascular event from 6 hours after arrival at the ED to 30 days out. Validated crowding measures were assigned at triage.

The researchers also took stock of process of care measures, including whether patients received an electrocardiogram within 10 minutes of arrival and whether they were prescribed aspirin and  $\beta$ -blockers in the ED.

Overall, 33% of the patients had an ECG, 57% received aspirin, and 80% were given  $\beta$ -blockers. Thirty-three percent of patients were treated and discharged, and 67% were admitted.

There were 301 cardiovascular complications in the overall cohort of 6,869 patients. Seventy-two patients died within 30 days.

The authors also tracked rehospitalization rates; so far, data are complete for 3,806 of the 6,869 patients. Ten percent (389) were readmitted within 30 days of the initial ED visit.

The median for patient-care hours was 98. This is the sum of all the hours that all the patients at that time had spent in the ED. Basically, if all patients were given a timer

when they arrived, the patient-care hours would be all the hours on all the timers at any point, according to Dr. Pines. The ED occupancy rate was 60%, the number of patients in the waiting room was eight, and nine admitted patients were boarding in the ED.

The adjusted analysis showed that two factors were independently associated with increased incidence of cardiovascular complications in patients presenting with

potential ACS: more than 12 patients in the waiting room, and total patient-care hours greater than 142, said Dr. Pines.

He and his colleagues also found that for all chest pain patients, increased ED occupancy rate, higher number of patients waiting, and higher total patient-care hours led to an increased risk of complications.

Because crowding seemed to affect both potential ACS and a subset of patients (12%, or 824 patients) who had unstable angina or myocardial infarction, it could be that crowding itself is not the problem but a symptom of overall hospital dysfunction, said Dr. Pines.

The hospital tends to function well for very sick patients, who are easily diagnosed and treated, he said. But it appears to do less well for patients whose conditions are less easily identified—particularly those with potential ACS.

Because ED crowding appears to be predictive of increased complications in those patients, Dr. Pines said, “to improve therapy of potential ACS, we should improve the crowding.”

**Two factors were linked to increased cardiovascular complications: more than 12 patients in the waiting room, and total patient hours greater than 142.**

## ‘False-Positive’ Cath Lab Activation for STEMI Up to 14%

BY MARY ANN MOON  
Contributing Writer

The prevalence of unnecessary activation of a cardiac catheterization laboratory for suspected ST-segment elevation myocardial infarction ranged from 9.5% to 14% in one Midwestern coronary intervention network, depending on the diagnostic criteria used, researchers reported.

“Upstream” activation of a coronary catheterization lab by the emergency department physician is a key strategy to reducing door-to-reperfusion times in cases of suspected MI.

However, in the press to speed this process, the medical community may have overlooked one adverse consequence: false-positive referrals to percutaneous coronary intervention (PCI) centers, according to Dr. David M. Larson of the Minneapolis Heart Institute, Abbott Northwestern Hospital, and his associates.

This is “a significant concern” because unnecessary coronary angiography is a risk to the patient and “may impose a burden on limited human and physical catheterization laboratory resources,” they noted.

The investigators assessed such false-positives in a study of 1,345 consecutive patients suspected of having ST-segment elevation MI (STEMI) and referred to their regional catheterization lab between 2003

and 2006. The lab covers a network of about 30 medical centers within a 200-mile area, “representing a wide range of hospital sizes and emergency department volumes” in a real-life setting.

The rate of false-positive cath lab activations was 14% in patients who showed no clear “culprit” artery on angiography. Review of their initial ECGs showed that

**According to any of the diagnostic criteria in this study, ‘no fewer than 1 in 11 referrals were considered false positives.’**

24 of these patients (1.8%) did not have ST-segment elevation but instead had ST-segment depression, T-wave inversion, or nonspecific ST changes.

A total of 127 patients with no clear culprit artery also had negative results on tests of cardiac biomarkers and were therefore considered to be free of significant coronary artery disease, for a false-positive rate of 9.5%.

However, 64 patients with no clear culprit artery proved to have positive biomarker tests and were found to have MI due to emboli or spasm, myocarditis, stress cardiomyopathy, or STEMI with no angiographic lesion.

The rate of false-positive cath lab activations was 11.2% in patients who had negative biomarker results. However, 26 of these patients (17%) showed a clear culprit artery on angiography and were diagnosed as having either aborted STEMI or unstable angina.

“Our results indicate that a wide spectrum of etiologies may lead to false-positive catheterization laboratory activation. Many of these include high-risk patients

who may benefit” from angiography even if they don’t proceed to PCI, Dr. Larson and his associates said (JAMA 2007; 298:2754-60).

In an editorial comment accompanying this report, Dr. Frederick A. Masoudi of the Denver Health Medical Center said that prior to this “important” study, little had been known about false-positives in PCI systems, and they were assumed to be “relatively rare.”

According to any of the diagnostic criteria in this study, “no fewer than 1 in 11 referrals were considered false positives,” a proportion that certainly is not trivial, he said (JAMA 2007;298:2790-1).

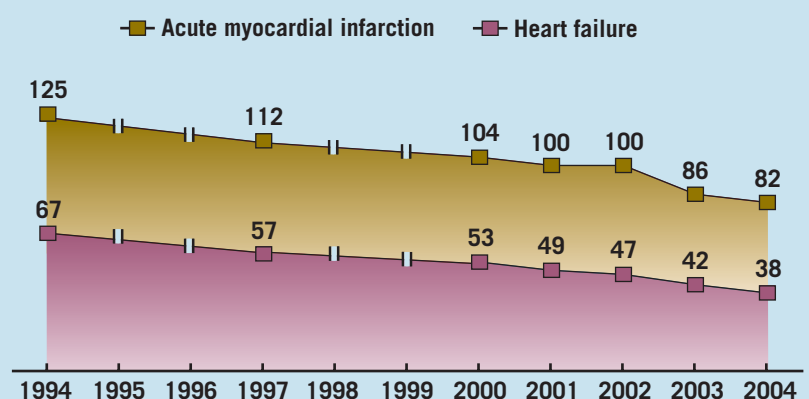
In some of the cases in this study, such as those for whom the electrocardiogram was seemingly misinterpreted, the risks of unnecessary angiography clearly outweighed any potential benefits.

However, in others, “such as those ultimately diagnosed with stress cardiomyopathy or coronary artery spasm, coronary angiography was likely an appropriate diagnostic test even though PCI was ultimately not performed,” Dr. Masoudi noted.

“False-positive catheterization laboratory activation may be another quality metric to monitor for a STEMI program,” the study investigators concluded.

### DATA WATCH

#### Inpatient Mortality From Heart Attack and Heart Failure Declining (per 1,000 admissions)



Source: Healthcare Cost and Utilization Project