Diversion of ambulances associated with increased risk of death for heart-attack patients

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Among Medicare patients with heart attack in 4 California counties, diversion of ambulance traffic by the nearest emergency department for 12 hours or more was associated with an increased risk of death for up to one year, according to a study in the June 15 issue of *JAMA*.

Recent reports have described the state of emergency departments (EDs) in the United States as reaching a breaking point, with the ED system experiencing increased utilization but decreased capacity. These trends have led to problems for patients, such as longer waiting times, overextended staff and disruptions to ambulance services, according to background information in the article. Ambulance diversion, a practice in which EDs are temporarily closed to ambulance traffic due to overcrowding or lack of available resources, might be especially problematic for patients experiencing time-sensitive conditions, such as acute myocardial infarction (AMI; heart attack). There is little empirical evidence to show whether diversion is associated with worse patient outcomes.

Yu-Chu Shen, Ph.D., of the Naval Postgraduate School, Monterey, Calif., and National Bureau of Economic Research, Cambridge, Mass., and Renee Y. Hsia, M.D., M.Sc., of the University of California, San Francisco conducted a study to examine whether temporary ED closure on the day a patient experiences AMI is associated with increased mortality. The study included 13,860 Medicare patients with AMI within

4 California counties (Los Angeles, San Francisco, San Mateo, and Santa Clara) whose admission date was between 2000 and 2005. Data included 100 percent Medicare claims data that covered admissions between 2000 and 2005, linked with date of death until 2006, and daily ambulance diversion logs from the same 4 counties. The researchers indentified 149 EDs as the nearest ED to these patients. Among the outcomes measured were the percentage of patients with AMI who died within 7 days, 30 days, 90 days, 9 months, and 1 year from admission (when their nearest ED was not on diversion and when that same ED was exposed to less than 6, 6 to less than 12, and 12 or more hours of diversion out of 24 hours on the day of admission).

Between 2000 and 2006, the average daily diversion duration was 7.9 hours. The analysis included 11,625 patients, and among these patients, 3,541, 3,357, 2,667, and 2,060 were admitted for AMI when their closest ED was not exposed to diversion and was exposed to less than 6 hours, 6 to less than 12 hours, and 12 or more hours, respectively. There were 1,034 patients (29 percent) in the no diversion category who died within 1 year of ED admission, and the number of patients who died within 1 year of admission in the less than 6 hours, 6 to less than 12 hours, and 12 or more hours diversion categories were 1,028 (31 percent), 794 (30 percent), and 731 (35 percent), respectively.

There were differences in treatment patterns for patients once admitted: the number of patients receiving catheterization was 42 percent among those in the 12 hours or greater ED diversion exposure category vs. 49 percent in the no diversion category; and number of patients receiving percutaneous coronary intervention (procedures such as balloon angioplasty or stent placement used to open narrowed coronary arteries) was 24 percent in 12 hours or greater exposure category vs. 31 percent in the no diversion category.

Analysis of data indicated that there were no statistically significant

differences in mortality rates between no diversion status and when the exposure to diversion was less than 12 hours. However, exposure to 12 or more hours of diversion, compared to no diversion, was associated with higher mortality rates at 30-days (19 percent vs. 15 percent); 90-days (26 percent vs. 22 percent); 9-months (33 percent vs. 28 percent); and 1-year (35 percent vs. 29 percent).

"These findings point to the need for more targeted interventions to appropriately distribute system-level resources in such a way to decrease crowding and diversion, so that patients with time-sensitive conditions such as AMI are not adversely affected. It is important to emphasize that while demand on emergency care is increasing as evidenced by increasing utilization, supply of emergency care is decreasing. If these issues are not addressed on a larger scale, ED conditions will deteriorate, having significant implications for all," the authors write.

They add that possible policy options to improve such care could include patient flow initiatives that have been implemented in many counties and states with success. "Diversion bans have been implemented in various regions, with the first statewide ban on diversion in Massachusetts in 2009. Early evaluation of this recent legislation has not revealed any negative outcomes for patients, at least when measured by waiting times. To prevent adverse consequences for patients, however, it is critical that such policies are implemented in conjunction with hospital-level changes beyond the ED that improve inpatient capacity and patient flow."

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