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Association Between Public Reporting of Outcomes With Procedural Management and Mortality for Patients With Acute Myocardial Infarction

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ABSTRACT

BACKGROUND Public reporting of procedural outcomes may create disincentives to provide percutaneous coronary intervention (PCI) for critically ill patients.

OBJECTIVES This study evaluated the association between public reporting with procedural management and outcomes among patients with acute myocardial infarction (AMI).

METHODS Using the Nationwide Inpatient Sample, we identified all patients with a primary diagnosis of AMI in states with public reporting (Massachusetts and New York) and regionally comparable states without public reporting (Connecticut, Maine, Maryland, New Hampshire, Rhode Island, and Vermont) between 2005 and 2011. Procedural management and in-hospital outcomes were stratified by public reporting.

RESULTS Among 84,121 patients hospitalized with AMI, 57,629 (69%) underwent treatment in a public reporting state. After multivariate adjustment, percutaneous revascularization was performed less often in public reporting states than in nonreporting states (odds ratio [OR]: 0.81, 95% confidence interval [CI]: 0.67 to 0.96), especially among older patients (OR: 0.75, 95% CI: 0.62 to 0.91), those with Medicare insurance (OR: 0.75, 95% CI: 0.62 to 0.91), and those presenting with ST-segment elevation myocardial infarction (OR: 0.63, 95% CI: 0.56 to 0.71) or concomitant cardiac arrest or cardiogenic shock (OR: 0.58, 95% CI: 0.47 to 0.70). Overall, patients with AMI in public reporting states had higher adjusted in-hospital mortality rates (OR: 1.21, 95% CI: 1.06 to 1.37) than those in nonreporting states. This was observed predominantly in patients who did not receive percutaneous revascularization in public reporting states (adjusted OR: 1.30, 95% CI: 1.13 to 1.50), whereas those undergoing the procedure had lower mortality (OR: 0.71, 95% CI: 0.62 to 0.83).

CONCLUSIONS Public reporting is associated with reduced percutaneous revascularization and increased in-hospital mortality among patients with AMI, particularly among patients not selected for PCI. (J Am Coll Cardiol 2015;65:1119–26)

Primary percutaneous coronary intervention (PCI) is a widely accepted treatment for acute myocardial infarction (AMI) (1,2). Public reporting of hospital outcomes associated with this procedure has been implemented in several states (Massachusetts [2003 to the present], New York [1991 to the present], and Pennsylvania [2002 to 2010]) over the past 2 decades. Additional states are

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ABBREVIATIONS AND ACRONYMS

AMI = acute myocardial infarction

CI = confidence interval

ICD-9-CM = International Classification of Diseases-Ninth Revision-Clinical Modification

IQR = interquartile range

NIS = nationwide inpatient sample

NSTEMI = non-ST-segment elevation myocardial infarction

OR = odds ratio

PCI = percutaneous coronary intervention

STEMI = ST-segment elevation myocardial infarction

currently considering or have recently implemented public reporting programs, with the intent of improving clinical performance for patients receiving this therapy (3). Evidence suggests that public reporting of outcomes may lead to improvements in the quality of care for cardiovascular procedures (4). However, it may also create disincentives for physicians to provide care for the most critically ill patients, as mortality in such individuals remains high despite treatment with appropriate guideline-based care (5–9).

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Prior investigations have demonstrated that Medicare patients presenting with AMI are less likely to undergo percutaneous revascularization in a state that participates in public reporting of hospital outcomes, despite a consensus that such therapy is indicated (1,2,10). The decreased rate of PCI observed in public reporting states was not associated with an increase in overall mortality, leading to speculation that public reporting of risk-adjusted mortality primarily reduced futile or otherwise unnecessary procedures. Subgroup analysis of the same cohort, however, demonstrated a greater likelihood of death following a ST-segment elevation myocardial infarction (STEMI) for Medicare patients treated in public reporting states than for those in nonreporting states (10). Whether this phenomenon is occurring across all ages and insurance payers is unknown.

The present study sought to evaluate the association between public reporting with procedural management and outcomes among a diverse population of patients with AMI. To do so, we used the Nationwide Inpatient Sample (NIS) to identify a representative sample of myocardial infarction patients that included all ages and multiple payers.

METHODS

POPULATION. The NIS is an annual database derived from a sample of all nonrehabilitation hospital stays in the United States. The population within this database was stratified based on the presence or absence of public reporting of PCI outcomes. Subjects hospitalized in Massachusetts and New York comprised the public reporting group, whereas those hospitalized in Connecticut, Maine, Maryland, Rhode Island, and Vermont served as the control cohort of regional states that do not publicly report PCI outcomes, consistent with prior analyses (10). Pennsylvania and New Jersey were excluded from this analysis as they have been collecting but inconsistently reporting outcomes to the public during the period under investigation. Furthermore, Pennsylvania has been inconsistently contributing data to the NIS during the study period. Among hospitalizations identified in these states, we identified all patients with a primary discharge diagnosis of AMI from 2005 to 2011, using the International Classification of Diseases - Ninth Revision - Clinical Modification (ICD-9-CM) codes. Acute myocardial infarction was defined as a primary discharge diagnosis of non-ST-segment elevation myocardial infarction (NSTEMI; codes 410.71 and 410.91) or STEMI (codes 410.11 to 410.61 and 410.81). Subjects who were hospitalized at facilities that did not offer PCI were excluded from analysis. Furthermore, patients transferred out of a given facility also were excluded to ensure an accurate assessment of in-hospital outcomes.

MEASUREMENTS. Demographic characteristics, including patient age, sex, and race, were derived from the dataset. High-risk features that could complicate procedural management such as cardiac arrest (code 427.5) and cardiogenic shock (code 785.51) were also assessed. To evaluate procedural management of patients with this diagnosis, the dataset was queried for procedural codes for percutaneous coronary intervention (ICD-9-CM codes 00.66, 17.55, 36.01, 36.02, 36.05, 36.06, and 36.07) and surgical revascularization via coronary artery bypass grafting (ICD-9-CM codes 36.10 to 36.19).

ANALYSIS. Summary statistics were reported as mean ± SD for continuous variables or medians and interquartile ranges (IQR) for non-normally distributed continuous data. To account for variation due to sampling, discharge weights were applied to the dataset based on methods established by the Healthcare Cost and Utilization Project (11). Unadjusted comparisons were made using the Proc Survey Logistic feature, which accounts for the complex survey design of NIS data. Adjusted logistic regression models with clustering by hospital were subsequently created that included age, sex, race, and 29 comorbid medical conditions identified by the risk adjustment model developed by the Agency for Healthcare Research and Quality (Online Table 1). This model was then used to assess the relationship between public reporting and percutaneous revascularization, which represents the most common modality for revascularization in myocardial infarction patients. To determine whether the association between public reporting and likelihood of percutaneous revascularization differed based on the risk profile of patients, we introduced interaction terms