

## INTERVENTIONAL COUNCIL OPINIONS

# Public Reporting of Mortality After PCI in Cardiac Arrest and Cardiogenic Shock



## An Opinion From the Interventional Council and the Board of Governors of the American College of Cardiology

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Current reporting standards imply that death after percutaneous coronary intervention (PCI) in a patient with cardiac arrest or cardiogenic shock is a PCI complication for the hospital and the interventionist (1). However, in many cases, PCI is a bystander event, and most of the mortality in this population is due to neurological complications of anoxic brain injury or multiorgan failure despite receiving optimal care and achieving a perfect PCI result.

Physicians are expected to save lives, and in an era of transparency and ever-increasing scrutiny (2), public reporting of death as a PCI complication in such cases is flawed and fundamentally incorrect and sends the wrong message to the public.

The American College of Cardiology National Cardiovascular Data Registry (NCDR) program and the Cath/PCI registry are outstanding endeavors to maintain data, improve quality metrics, and provide transparency to the public (1). The passage of the Patient Protection and Affordable Care Act in 2010 increased the focus on public reporting and quality improvement. Recently, the National Quality Forum endorsed risk-adjusted total in-hospital PCI mortality and 30-day all-cause risk-standardized PCI mortality rates with ST-segment elevation myocardial infarction (STEMI) and/or cardiogenic shock for public reporting (3).

Although the Interventional Council and the Board of Governors of the American College of Cardiology (ACC) support the NCDR as a repository for physician performance data rather than data collected through

insurance claims, we are very concerned that public reporting and “pay for performance” using risk-adjusted total PCI mortality rate may have unintended consequences on the welfare of our citizens. There is the potential of risk-averse behaviors that negatively affect the patients with the most to gain from the PCI procedure, especially in patients with out-of-hospital cardiac arrest (OHCA) and acute cardiogenic shock (4). Patients with OHCA and return of spontaneous circulation have an approximately 10-fold higher mortality rate than noncardiac arrest patients with STEMI (5). Moreover, it is doubtful that current risk modeling can adequately adjust for these extremes of risk. This creates concerns that higher volumes of cardiac arrest and cardiogenic shock patients can adversely affect individual operator and institutional outcomes. This is particularly important in the context of lower volume centers where patients appropriately treated can have an outsized effect on mortality rates (6). Public reporting and “pay for performance” using lower mortality rates as a benchmark, inadvertently place clinicians in the difficult situation of having to choose between what may be in their patient’s interest and what may be best for their own quality metrics or their hospital-reported outcomes. We are also concerned that some hospitals might “game” the system by transferring high-risk patients to other institutions to improve their own quality metrics.

Importantly, there is little evidence that public reporting improves outcomes. In fact, several studies evaluating the effect of public reporting on the PCI

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mortality rates in New York State, Massachusetts, and Pennsylvania suggest that risk-averse behaviors related to these quality initiatives may actually negatively affect patient outcomes. The 3 public reporting states rank 42nd, 48th, and 50th for the use of PCI for acute myocardial infarction, a guideline-supported indication (7). Furthermore, the adjusted PCI mortality rate for patients presenting with STEMI is 35% higher in states with public reporting compared with those without public reporting. This is in part related to lower use of angiography and PCI in patients with STEMI (61.8% vs. 68%, odds ratio: 0.73; 95% confidence interval: 0.59 to 0.89;  $p = 0.002$ ) including patients with either cardiogenic shock or cardiac arrest (41.5% vs. 46.7%; odds ratio: 0.79; 95% confidence interval: 0.64 to 0.98;  $p = 0.03$ ) compared with states that do not publicly report mortality outcomes. This lower use of revascularization and higher mortality rates for cardiac arrest patients in states with public reporting was echoed in an analysis of 84,121 patients from the Nationwide Inpatient Sample database (8). Interestingly, in Massachusetts, the rates of PCI were similar to other nonreporting states before public reporting, but began to diverge after public reporting was implemented, strongly implicating public reporting for a decline in optimal care. Moreover, being identified as a “negative outlier” in the risk-adjusted mortality rate in Massachusetts has been associated with a significant decline in predicted mortality in subsequent years, suggesting that risk-averse behaviors may have led to the exclusion of critically ill patients (9,10). Finally, propensity-adjusted mortality rate for patients with cardiogenic shock was greater (1.5-fold higher in New York State than other states) and appears to be related to an underuse of angiography and PCI in these highest risk patients (11). Based on such concerns, cardiogenic shock was excluded from the registry risk-adjusted mortality rate reporting in New York State in 2008, and in 2006 compassionate-use criteria were added for patients to improve risk prediction, in Massachusetts.

Given these limitations in public reporting and “pay for performance” using the PCI mortality rate, we endorse the recommendations of the American Heart Association (AHA):

*OHCA cases should be tracked but not publicly reported or used for overall PCI performance ranking, which would allow accountability for their management but would not penalize high-volume cardiac resuscitation centers (CRCs) for following the 2010 AHA Guidelines for cardiopulmonary resuscitation (CPR) and emergency*

*cardiac care (ECC). Until an adequate risk adjustment model is created to account for the numerous out-of-hospital and in-hospital variables that impact survival more than the performance of PCI, we believe that categorizing OHCA STEMI-PCI cases separately from other STEMI-PCI cases should occur. These patients should not be included in public reporting (5).*

These recommendations are echoed in the 2013 ACC/AHA ST-segment elevation myocardial infarction (STEMI) guidelines, stating that “It is important for organizations that collect and publicly report STEMI and PCI data to consider resuscitated out-of-hospital cardiac arrest patients separately from their hospital and individual operator quality ‘scorecards’ because such patients, even with optimal care, have a much higher mortality rate” (12).

Cardiologists, especially interventional cardiologists, have serious concerns regarding the use of risk-adjusted mortality rate as a quality metric for public reporting and the current NCDR risk-adjustment methodology. This was first evident in a survey of New York State cardiologists in which 86% did not agree that the current risk-adjustment methodology model was sufficient to avoid penalizing physicians who perform higher risk interventions (13). The Interventional Council of the ACC conducted a national survey of interventionists in October 2015 and received 1,297 responses; 86% did not want public reporting of mortality rates after percutaneous coronary intervention (PCI) in cardiac arrest patients and 76% for cardiogenic shock (Online Figures 1 and 2). This is leading some centers to consider other registries for quality metrics other than the NCDR.

Although the resuscitated comatose patient after cardiac arrest (14) is easier to categorize, there is greater difficulty in defining which cases of cardiogenic shock should be excluded from public reporting. A universal agreement on the best definition of cardiogenic shock as well as an explicit agreement on which type of shock to exclude is urgently needed. Although the NCDR should continue to collect data and focus on process metrics on all PCI patients, we request urgent action and propose excluding the following patient groups from risk-adjusted PCI mortality rate in the NCDR Cath/PCI: 1) the resuscitated comatose patient after cardiac arrest (14); and 2) cardiogenic shock (transient shock probably does not require exclusion, but cardiogenic shock at the start of the PCI procedure in a patient with cardiac arrest or sustained/salvage shock in patients on pressors and

#### ABBREVIATIONS AND ACRONYMS

**ACC** = American College of Cardiology

**AHA** = American Heart Association

**NCDR** = National Cardiovascular Data Registry

**OHCA** = out-of-hospital cardiac arrest

**PCI** = percutaneous coronary intervention

**STEMI** = ST-segment elevation myocardial infarction

mechanical left ventricular support as defined in the NCDR Cath/PCI registry should be excluded) (1).

Furthermore, we propose that these recommendations be considered in subsequent focused ACC/AHA/Society for Cardiac Angiography and Interventions updates for the management of STEMI and PCI.

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**KEY WORDS** cardiac arrest, cardiogenic shock, public reporting

**APPENDIX** For supplemental figures, please see the online version of this article.