

# Does Pulmonary Artery Catheterization Increase the Risk of Death in Patients with Acute Coronary Syndromes?

Cohen MG, Kelly RV, Kong DF, et al. Pulmonary artery catheterization in acute coronary syndromes: insights from the GUSTO IIb and GUSTO III trials. *Am J Med* 2005;118:482–8.

## Study Overview

**Objective.** To determine whether pulmonary artery catheterization (PAC) is associated with higher 30-day mortality in patients with acute coronary syndromes.

**Design.** Prospective cohort study.

**Setting and participants.** Two large cohorts of patients who had participated in the GUSTO IIb and GUSTO III clinical trials for therapies related to acute myocardial infarction were evaluated in this study. These patients came from many clinical centers across the United States and Europe.

**Main outcome measure.** 30-day mortality rate.

**Main results.** Of the 26,437 patients available for analysis, 735 (2.8%) underwent PAC. Patients who underwent PAC were older with more significant comorbidities and were more likely to be seriously ill. U.S. patients were 3.8 times more likely to undergo PAC than those from other countries. Mortality at 30 days was higher for patients with PAC (adjusted odds ratio, 6.4 [95% confidence interval, 5.4–7.6]). Mortality rates for those who received PAC were generally higher in most subgroups, with the exception of patients who had cardiogenic shock (odds ratio, 0.99 [95% confidence interval, 0.80–1.23]).

**Conclusion.** PAC use is associated with markedly higher mortality rates among patients with acute myocardial infarction. Whether this higher mortality is causal (ie, PAC use causes death) or due to PAC use simply being a marker of greater severity of illness is unclear.

## Commentary

The pulmonary artery catheter (also known as the Swan-Ganz catheter), is used in critically ill patients to monitor hemodynamic parameters. While it provides important clinical information, the risks associated with catheter placement are substantial, and it is unclear whether the benefits outweigh the risks.

Cohen and colleagues found that PAC increased the odds

of death nearly eightfold. Because PAC is usually used in critically ill patients who have a higher risk of death, the investigators built multivariable regression models to determine the adjusted risk of death from PAC. Even after adjusting for severity of illness, those who underwent PAC were 6 times more likely to die than those who did not.

Does this study offer convincing evidence that PAC use is harmful? It does not. Given that PAC is considered when patients' clinical situations are dire, it is possible that unmeasured confounders are playing a role. If one patient's clinical condition deteriorates, physicians may choose to use PAC to better guide clinical management. If another similarly ill patient's clinical condition begins to improve, physicians would likely choose not to use PAC. However, adjustment for severity of illness would classify these patients similarly and would suggest that PAC is associated with worse outcomes.

Results from the study also suggest that PAC may simply be a marker of more severe illness. Among patients with cardiogenic shock, there was no difference in mortality among those who received PAC and those who did not. In this critically ill group, patients who received PAC and those who did not were likely similar, so PAC did not seem harmful.

The only way to better understand the impact of PAC on outcomes for critically ill patients is through a randomized controlled trial. Until then, physicians are likely to make choices on whether to use PAC based on subtle clinical differences that are not available in the medical chart and cannot be adjusted for in statistical models.

## Applications for Clinical Practice

Does the use of PAC increase the risk of death? Despite their rich clinical database, Cohen and colleagues could not

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adequately adjust for differences between those who did and those who did not undergo PAC. The lack of mortality difference among those with cardiogenic shock suggests that either there is no selection bias among this very ill subgroup of patients or this is the one cohort in whom the risks and

benefits of PAC are comparable. A randomized controlled trial is needed to better understand the risks and benefits of PAC.

*—Review by Ashish K. Jha, MD, MPH*

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