Constructing risk adjustment models for percutaneous coronary intervention: implications for quality assessment

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Authors
Paulo Sousa, António Sousa Uva, Adriana Belo, Fausto J. Pinto

Abstract

Introduction

Quality standards, and subsequently benchmarking, based on patient outcome data are a rational means of assessing the quality of health care. However, variation in patients' baseline clinical risk precludes direct comparison of outcomes across operators, institutions and health care plans. In the years since the advent of interventional cardiology, there has been an enormous increase in the volume of activity and number of operators and centers performing percutaneous coronary intervention (PCI), together with considerable developments in the techniques, materials and adjunctive therapy associated with PCI. PCI outcomes depend on various factors, particularly patient characteristics and disease severity. The use of risk adjustment models to quantify differences in patient outcomes in interventional cardiology has been shown to provide a reliable and balanced comparison of performance and to lead to improvements in quality and safety in this area.

Objectives

The aim of this study was to develop a risk adjustment model for in-hospital major adverse cardiac and cerebrovascular events (MACCE) and for a single adverse event (in-hospital mortality) following PCI, using data from a national multicenter registry.

Methods

This was a cohort study of all patients who underwent PCI in the centers that participate in the National Registry of Interventional Cardiology of the Portuguese Society of Cardiology between June 30, 2003 and June 30, 2006, in a total of 10,399 procedures.

Results

Factors associated with in-hospital MACCE included: age > 80 years; female gender; acute myocardial infarction; cardiogenic shock; renal failure; severely reduced ejection fraction; three or more diseased vessels; use of intra-aortic balloon pump; no stenting; and urgent/emergent PCI. The same variables were associated with the adverse event of in-hospital mortality. The area under the receiver operating characteristics (ROC) curve and the Hosmer-Lemeshow goodness-of-fit statistic, for both multivariate prediction models, were 0.83 and 0.69 (in-hospital MACCE) and 0.93 and 0.53 (in-hospital mortality), respectively, which indicates that these models have good discrimination and real clinical value and were well calibrated.

Conclusions

A risk adjustment model for in-hospital MACCE and for in-hospital mortality after PCI was successfully developed using a large national multicenter registry. This is a powerful tool for quality assessment and represents a significant step towards credible and reliable comparison of results between providers.

Keywords
Risk adjustment; Quality assessment; Interventional cardiology; Patient safety; Clinical outcomes