

Risk adjustment in health outcomes assessment: the “new paradigm” on performance evaluation

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Aims

a) How to develop a multivariate prediction model for major adverse cardiac events (MACE) after Percutaneous Coronary Intervention (PCI), using the National Registry of PCI's of Portuguese Society of Cardiology.

b) To emphasise the role of risk adjustment methodology to validate comparisons of health outcomes among operators and/or institutions.

c) To encourage the inclusion of risk adjustment methodology to account for patient differences, when we measure quality/performance of health care.

Background

a) Patients are currently more informed and demanding, HC expenditures are rising and public accountability contributes to emphasise the culture of quality/performance evaluation.

b) The establishment of quality/performance standards based on patient outcomes data is a rational mean of differentiating the quality and performance evaluation of health care in the marketplace.

c) Variation in patient's baseline clinical risks precludes the direct comparison of outcomes across operators, institutions and health care plans.

Why Risk Adjustment is important

a) RA is important to assess quality and performance, because, in average, patients with more health-related risks cost more to treat and have poorer results than their healthier counterparts.

b) Assessing patient related factors is crucial to legitimate comparisons of health outcomes across different patients, treatments, providers, health plans, or population.

General applications of Risk Adjustment

a) Identify and define, in a more rigorous way, quality/performance indicators;

b) Define capitation values;

c) Establish credible and equity Benchmarking values;

d) To legitimate comparisons of health outcomes across different patients, treatments, providers, health plans, or population;

e) Health planning based on solid knowledge either of the population characteristics or of the health care delivered profile.

About this study: Why Interventional Cardiology ?

a) Cardiovascular disease is one of the principal causes of mortality and morbidity with considerable social and economic costs;

b) Improvements in cardiac catheterization techniques has resulted in exponential rise in the number of procedures

c) There is a growing body of evidence showing adverse events arising from PCI's are due to a series of factors, particularly the **patient's risk characteristics**.

d) Data are available (National registry of PCI'S)

Other Studies

- Block PC, et al. Identification of variables needed to Risk Adjust Outcomes of coronary interventions: Evidence-Based Guidelines for efficient data collection. J Am Coll Cardiol 1998; 275:281.
- Maynard C, et al. Adjusting for patient differences in predicting hospital mortality for PCI in the Clinical Outcomes Assessment Program. Am Heart J 2003; 145:658-64;
- Shaw RE, et al. American College of Cardiology – National Cardiovascular Data Registry (ACC-NCDR) Experience: 1998-2000. J Am Coll Cardiol 2002; 39: 1104-1112.
- Moscussi M, et al. Relationship between operator volume and adverse outcomes in contemporary percutaneous coronary intervention practice. J Am Coll Cardiol 2005; 46: 625-632.
- D. Grayson, et al. Multivariate prediction of major adverse cardiac events after 9914 percutaneous coronary intervention in the North West of England. Heart 2006;92:658-663.

Research design and population

- Observational study with retrospective analysis (Case-control study)
- All patients who underwent PCI and are included in the Portuguese PCI Registry, between 01 June 2003 and 31 May 2006 (n=10461 pts)
- Case Group** (4.7%)
Patients who underwent PCI and suffered an intra-hospital adverse event.
- Control group** (95.3%)
Patients who underwent PCI and were free of events in the same period.

Variables in Study

Dependent - Compound variable (MACCE'S) Adverse events defined in this study

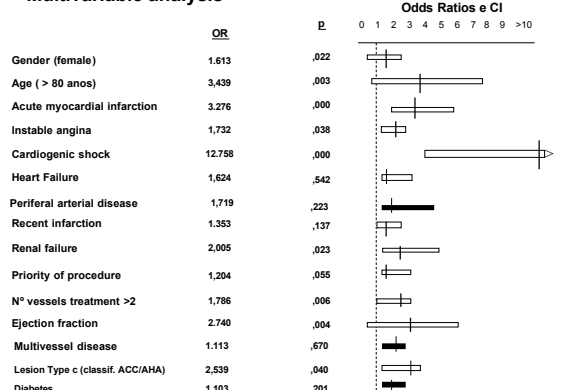
- Death (of any cause)
- AMI
- Urgent need for new revascularization (be it PCI or CABG)
- Stroke

Independents - Those that characterise the individuals and therapeutics treatment (and are included in the PCI's Registry

Strategy of data analysis

- Descriptive data analysis (cleaning the database; identify and classifying missing values; get knowledge about population patterns)
- Univariate analysis was done crossing the independent with the dependent variable (identifying the variables that have the strongest statistical association with MACCE'S)
- In order to adjust all variables, a multivariable model of analysis was used, including multiple logistical regression.
- Statistical program © SPSS 14
- Association measure *Odds ratio*
- Level of significance of 0,05 ($\alpha=0,05$) and CI= 95%

Multivariable analysis



Discussion of results

- Most of the variables found are similar to those observed in other studies with larger samples
- ROC curve and the Hosmer-Lemeshow goodness of fit statistic were calculated to assess the performance and calibration of the model (0.76 and 0.121, respectively), indicating good discrimination power.
- This becomes more important once these results point in a direction that is confirmed by the available evidence and because the data collected was based in the platform of the Euro Heart Surveys (ESC) .

Challenges in the future

a) Possibility of developing a Risk adjustment model based on clinical and administrative/economic data with the purpose of analysing both dimension, effectiveness and efficiency.

b) To test the model in other populations, national or European because the data collected was based on a platform of the Euro Heart Surveys that used the CARDS standards (*Cardiology Audit and Registration Data Standards*) which ensure that comparable data are collected throughout Europe.

Conclusions

a) Considering that coronary artery disease affects millions of patients worldwide, with consequent mortality and morbidity, with economic and social burden, evaluation of the results of PCI's using credible data is a crucial tool for quality improvement and performance evaluation.

b) To guarantee that these studies are carried appropriately, risk adjusted models should be developed to assess the results and help to understand and explain the differences observed.