Use and misuse of multivariable approaches in interventional cardiology studies on drug-eluting stents: a systematic review

Erika Cavallero, MD, Fabrizio D’Ascenzo, MD, Giuseppe Biondi-Zoccai, MD, Claudio Moretti, PhD, Pierluigi Omedè, MD, Mario Bollati, MD, Davide Castagno, MD, Maria Grazia Modena, MD, Fiorenzo Gaita, MD, and Imad Sheiban, MD

Division of Cardiology, University of Turin, Turin, Italy (DC; EC, FD, FG, IS); Division of Cardiology, University of Modena and Reggio Emilia, Modena, Italy (MGM, GBZ)

Background and Aims - Randomized clinical trials (RCTs) provide the most compelling clinical evidence, but they require important resource and logistic efforts. By contrast, large, cost-free registries may be easily accessed to gather observational, real world data. However, observational studies require complex statistical analyses that often lead to flawed results because of inaccurate methods, especially from a statistic point of view. We aimed to appraise the performance of current multivariable approaches in the estimation of cardiac events after Drug Eluting Stent implantation.

Methods - Pertinent studies published in the literature were searched, selected, abstracted and appraised for quality and validity features.

Results -
6 studies using a logistic regression were included, all of them reporting more than 10 events for covariates and different length of follow up, with an overall low risk of bias.

Most of the 15 studies using a Cox proportional hazard analysis had a different follow up, with less than 10 events for covariates, yielding an overall low or moderate risk of bias.

16 studies using a propensity score without matching were included. The most frequent method for variable selection was logistic regression, with underlying differences in follow-up and less than 10 events for covariate in most of them.

Amongst the 17 studies using a propensity score, matching was usually performed with a nearest-neighbor–matching algorithm.

Calibration appraisal was not reported in the majority of the studies whereas discrimination appraisal was more frequently performed.

Calibration and discrimination appraisal was not performed in most of the studies. Balance was evaluated in 46% of the studies, being obtained for all variables in 48% of them.

Conclusions –
• multivariable analysis is a useful tool to interpret observational data, however it needs a better internal control
• methodological assessment was not related to quality rating of the journal in which the paper was published