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Examining gender inequity in treatment using administrative data: The importance of appropriate statistical techniques

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Objectivos (Objectives):

Administrative data routinely collected at hospitals are attractive for researchers: they are large, often exhaustive, and of relatively easy access. However, they are not intended for research and they lack of the clinical details of observational studies or clinical trials. Researchers thus face a trade-off between using large but incomplete databases versus using detailed but often poorly representative ones.

One of the major limitations of missing information in administrative data is that endogeneity cannot be corrected due to the non-observability of some patients' characteristics. For example, if one seeks to evaluate the impact of a given treatment on patient's health, the treatment decision is not random in real practice. In the "real world", patients are selected into treatment arms based on their expected outcome. Hence, the explanatory variable (treatment) is endogenous, as it is explained by the dependent variable (outcome). This problem is reduced if one can control for a large array of patients' characteristics to estimate the differences between the treated and the untreated. Unfortunately, this is not the case with administrative data, and appropriate statistical techniques are required to reduce this problem.

The case of gender differences in the use and impact of invasive treatments for cardiovascular disease (percutaneous coronary intervention – PCI – and coronary artery bypass grafting – CABG) provides an interesting illustration for this issue. Results from the literature generally show a lower use of invasive treatment among women, usually explained by the women's lower resistance to treatment. Hence, the treatment decision is deemed as related to the expected outcome, leading to a lower treatment of women. In the present study, we simultaneously estimate the differences in in-patient mortality between men and women and their different use of treatment, using administrative data. We examine how outcomes vary whether we account for endogeneity or not related to unobservable characteristics.

Metodologia (Methodology):

We study patients admitted for cardio-vascular disease at NHS hospitals in Portugal for the 2000-2006 period. Our sample includes 259,519 discharges from 57 hospitals. First, we consider a simple probit model to measure the impact of invasive treatment on in-patient mortality, with in-patient mortality as dependent binary variable (0/1), controlling for the patient's age and comorbidities. Then, we estimate the impact of treatment controlling for

endogeneity through the use of a recursive bivariate model, which consists in assuming that allocation to treatment is non-random and endogenous to mortality. Mortality and treatment are considered as two latent variables from a bivariate normal distribution, assuming correlation between the error terms of both variables.

Resultados (Results):

Without accounting for endogeneity, women have a 3% higher likelihood of dying during hospitalization after PCI, for a 6% lower mortality ratio when controlling for endogeneity. Similar variations are observed for CABG: women appear as more resistant to treatment when accounting for endogeneity. In addition, the recursive bivariate model shows a higher inequality against women for both PCI and CABG than the probit model.

Conclusões (Conclusions):

If, as expected, we consider that unobservable factors refer to unobservable severity, the common observation of higher women's mortality is likely to be due to their higher severity of disease among treated patients. Also, women need to be more severely affected to be treated, hence gender inequality is under-estimated in simplest models. Our study thus indicates the relevance of using appropriate statistical techniques when relying on administrative data for clinical research.