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Methodological issues for measuring pharmacotherapy treatment and its calibration with patient outcomes using real-world data

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Introduction

Health system and administrative data sources, although collected for process/procedural healthcare use, have recently been leveraged for research purposes. Complex methodologies such as data linkages, defined algorithms, and proxy measures are needed to validate the use of these data. Alberta has exceptionally rich health system data to be explored.

Objectives and Approach

Our objectives were to explore data sources in Alberta regarding pharmacotherapy treatments, patient outcomes, and develop methods to calibrate associations. We scoped data sources for pharmacotherapy treatment and patient outcomes in Alberta, Canada. Using a cohort of patients with multiple sclerosis (MS) as an example, we developed algorithms to measure medication possession ratio (MPR), proportion of days covered (PDC), and treatment discontinuation (TD). Patient outcomes included: ambulatory care visits, physician claims and hospitalizations. We explored different algorithms for statistical modeling of patient treatments and outcomes. Optimal cut-points and statistical model performance of MPR/PDC and TD with patient outcomes were evaluated.

Results

We utilized six Albertan data sources to examine treatment patterns and patient outcomes. From the year 2000, the pharmaceutical information network (PIN) and Alberta Blue Cross drug datasets collected: service dates, dosages, drug identification numbers, anatomical therapeutic chemical classification codes, and days of supplies; which were used to calculate MPR, PDC and TD. MPR and PDC were calculated using three different methods: (1) fixed follow-up period; (2) with and without last fill; and (3) adjustment for hospitalization periods. No significant differences between methods were found. In addition, TD using 60- and 90-day gaps, while considering the medication day supplies, were calculated. Adherence with optimal cut-point 0.8 of MPR/PDC and TD were significantly associated with ambulatory care visits, physician claims, and hospitalizations (p=0.000; C-statistic range: 0.78-0.89).

Conclusion/Implications

The PIN data can be utilized for measuring pharmacotherapy treatment in patient outcomes research. To understand the impact of therapies on outcomes in a real-world setting, however, comprehensive methods for measuring treatment indicators as well as patient outcomes should be developed to control for inherent biases in observational data.

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