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ABSTRACT

Impact of including physician's prescribing directions on calculations of medication possession ratios

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Introduction

Medication adherence studies typically use pharmacy-dispensing data to infer drug exposures. These studies often require calculations reflecting the intensity and duration of drug exposure. The typical approach to estimating duration of drug exposure is to use dispensing dates and day supply.[1–3] Often, pharmacy databases have random and/or systematic errors causing improbable calculations.[1] These errors become particularly problematic when estimating medication duration in drugs with complicated dosing schedules. Experts recommending cleaning data or removing erroneous data before analysis,[1] but do not provide instructional guidelines. We developed an algorithmic approach to improve estimation of drug-course duration, dosing and medication possession ratios (MPRs). This study compares estimated MPRs produced by the standard method with MPRs by the algorithmic approach. Methotrexate was chosen as the first drug to implement the algorithm because of its widespread use for rheumatoid arthritis (RA) and for its complexity in dosing schedules.

Methods

The data used in this study were provided by the Pharmacy Benefits Management (PBM) Database for patients enrolled in the Veterans Affairs RA (VARA) Registry. The algorithm was based on clinically feasible weekly doses to calculate our research variables. A course was defined as any number of prescriptions for the same drug for a given individual without a prescribing gap of greater than or equal to 90 days. The prescribed course duration of drug exposure was defined as the sum of the expected durations for each prescription within a course. The average dose prescribed was calculated as the total dose dispensed divided by the prescribed duration. The average dose consumed was the total dose dispensed divided by the observed course duration. The MPR was calculated as the prescribed duration divided by the observed course duration. When calculated doses fell out of the clinically expected range, the algorithm was triggered to flag the course and use the sig interpretation and give a set of alternate calculations. Alternate sig calculations were performed on the whole data set for comparison purposes.

Results

We identified 2127 unique courses of methotrexate in 1034 individuals. Approximately 2% of the prescription courses triggered the algorithm. A paired *t*-test was run on MPRs calculated by both methods on the whole data set. MPR values were significantly lower when calculated without using the sig interpretation (mean difference $= -0.03$, $P = 0.0005$). On the subset of records that triggered the algorithm, the effect was more dramatic with a mean difference was -0.27 with a *P*-value of < 0.0001.

Conclusions

This algorithm provides a systematic approach to error detection and correction in secondary databases. Researchers in need of careful precision and accuracy of drug exposure and compliance may benefit from this algorithmic approach.

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