Comparative Medication Adherence for Antihypertensive Therapy in Rural Ambulatory Clinics

Terrence J. Adam, University of Minnesota, Twin Cities, Minneapolis, MN

ABSTRACT

The assessment of medication adherence is a key measure of patient exposure to pharmaceuticals. However, measures of patient utilization of medications are frequently limited to available data sources such as medication claims data. Though gold standard measures such as directly observed therapy or measures of medication biomarkers are often available, these methods are generally either too expensive to implement or logistically implausible to manage. These limitations make indirect measures of medication utilization useful in providing data on medication exposure to assess drug usage and assess clinical outcomes. Several methods to measure adherence are included in this paper focused on antihypertensive therapy.

INTRODUCTION

The use of antihypertensive medications is an important clinical problem since it is a major risk factor for heart disease and stroke, end-stage renal disease, and peripheral vascular disease. The Center for Disease Control previously identified that approximately one in four adults in the United States has hypertension. Secondly, even though effective therapy has been available for several decades, hypertension has not been well controlled in patients who have the diagnosis. Patient non-adherence to pharmaceutical treatment is an important area of concern for long-term management of hypertension. For many chronic conditions, poor patient compliance with prescribed medications can adversely affect the treatment outcome. It is estimated that the compliance rate for patients receiving long-term treatment for chronic asymptomatic conditions, such as hypertension, can be as low as 50%. Failure to obtain medication is especially problematic in patients with asymptomatic conditions as the patient may not experience apparent clinical effects until major problems ensue such as strokes and heart attacks. Electronic tracking of medication prescription data can alert the ordering provider of the prescription fill status to facilitate patient follow-up contact and education. In addition, the use of electronic prescription tracking can enhance the provider's ability adhere to treatment guidelines and monitor patient's response to treatment. Given the chronic nature of hypertension, a key measure for therapy is the patient's adherence to their prescribed regimen.

METHODS

The effect of electronic prescribing was evaluated by assessing the levels of patient adherence after system implementation. Patient adherence was the main outcome measure and was modeled using there different measures of medication adherence to antihypertensive medications. All measures were developed and implemented in SAS 9.2 using a Microsoft Windows operating system.

Measures of Adherence

Method 1: MPR. The Medication Possession Ratio (MPR) was intended to track adherence to a medication regimens over time and generally reflects a basic aggregate ratio of the days supplied divided by the number of days of the adherence evaluation period.

Method 2: CSA. The continuous single interval measure of medication acquisition (CSA) is based on individual prescription fills and provides a measure of adherence which is more sensitive to frequent gaps in medication acquisition.

Method 3: PDC. The proportion of days covered (PDC), provides a method to assess medication adherence when it is important to appreciate adherence when patients are using multiple medications for a single therapeutic class of medications such as antihypertensives. Typically, the PDC method provides a more conservative measure of medication adherence when compared to the MPR and CSA methods.

SAS code to derive the Adherence measures:

```
/* Data set: MedClaims.Adheredata  */

PROC SORT DATA = MedClaims.Adheredata ;
BY key descending prscrptn_fill_dt;
run;

DATA MedClaims.Adheredata;
SET MedClaims.Adheredata;
BY key;
filllag = lag(prscrptn_fill_dt);
IF first.key THEN filllag = .;
RUN;

DATA MedClaims.Adheredata;
SET MedClaims.Adheredata;
intervaldays = (filllag - prscrptn_fill_dt);
RUN;
DATA MedClaims.Adheredata;
SET MedClaims.Adheredata;
IF intervaldays = . THEN intervaldays = days_supply;
RUN;

PROC sql;   /* PROC sql is utilized */
CREATE table MedClaims.mpr8de AS
SELECT distinct msis_id, sum(days_supply) AS dayssum, max(lstsply) AS endeval,
indexdt, lastfilldt,
days_supply/intervaldays AS csa
FROM MedClaims.Adheredata
GROUP BY msis_id; /*add generic_name if analysis by drug vs class*/

CREATE table MedClaims.mpr8df AS
SELECT msis_id, (endeval - indexdt) AS evaldays      , (lastfilldt - indexdt) AS
obsdays   /* provides the observed prescription days */
FROM MedClaims.mpr8de;
DATA MedClaims.mpr8de;
MERGE MedClaims.mpr8de MedClaims.mpr8df;
BY msis_id generic_name;
run;

PROC SQL;    /* final adherence calculations are completed for each method */
 CREATE table MedClaims.mpr8dfinal AS
 SELECT distinct msis_id, dayssum,  evaldays, dayssum/180 AS mpr, min(1,dayssum/180)
AS pdc1, dayssum/obsdays AS RCR , dayssum/evaldays AS mprm,
FROM MedClaims.mpr8de ;
```

In assessing adherence data, the prescriptions data was linked to providers and to the clinical sites to generate a list of prescriptions which were identifiable at the patient level. Data was obtained from the software vendor with all prescription data represented as completed medication claims data. It was assumed that each prescription that was registered electronically with a matching pharmacy claim was filled by the patient. Conversely, a prescription written electronically without a matching pharmacy claim was intended to suggest the prescription was not filled by the patient.

DISCUSSION

The three methods of adherence calculations utilized slightly different assumptions to deal with potential limitations on the prescription data as well as the patterns of prescription use by patients. Given the nature of prescription

claims data, there are a number of a limitations a number scenarios the project encountered with this model whereby false negatives can be generated and compliance and adherence was potentially skewed downward. For example, if a patient elects to pay cash for a prescription (i.e. low cost generic incentive programs) then no pharmacy claim will be generated and it will appear as though the patient did not fill the prescription. A second scenario could occur if a provider verbally directs a patient to take a medication differently from the instructions on the original prescription; it could possibly cause compliance to be reported incorrectly. For example, if the original electronic prescription direct the use of one tablet daily, but the provider verbally changes the instructions and directs the patient to split tablets and take one-half tablet daily, the compliance and adherence data will appear as though the patient is only 50% compliant. A third scenario is if a provider discontinues a medication but does not appropriately stop the medication in the e-prescribing application, compliance and adherence will erode overtime as the application will continue to look for pharmacy claims. A fourth scenario which can be problematic is when the compliance and Adherence data may be erroneous due to changes in a patients' pharmacy benefits coverage changes. For example, if a patient's pharmacy benefits change from a PBM that shares data to a PBM that does not share data, claims will no longer be available causing compliance and adherence to inaccurately erode over time.

Given the potential limitations of the data it was deemed important that multiple measures of adherence would be available for the assessment to help provide a broader set of measures of patient adherence to help detect changes in medication therapy use and measurement. Three methods were identified in this project to demonstrate how to get estimates of patient adherence. The optimal method may be in part directed by patient characteristics, the medication of interest, and medication payment characteristics for the medication data set under analysis.

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