Adherence to angiotensin-converting enzyme inhibitors in incident chronic kidney disease patients

Changchun Wang, MS[1], Wendy St. Peter, PharmD, FCCP[1,2], Jiannong Liu, PhD[1], Frank Daniels, BS[1], David Gilbertson, PhD[1], Allan Collins, MD, FACP[1,2]
[1]United States Renal Data System, Minneapolis Medical Research Foundation, [1,2]University of Minnesota Twin Cities

Introduction

- Angiotensin-converting enzyme inhibitors (ACE-I) have been shown to slow the progression of kidney disease in hypertensive patients with diabetes or with proteinuria.
- Patient adherence to ACE-I is thought to be essential in slowing the progression of kidney disease, but the ACE-I adherence rate among chronic kidney disease (CKD) patients is unclear.
- The medication possession ratio (MPR), first introduced by Sclar et al. (1991), is one measure of medication adherence.
- The MPR is a continuous measure of adherence that allows assessment over multiple medication fill periods.
- Typically, a MPR threshold of 80% describes fairly consistent medication use.
- The goals of this study were to explore various methodologies for MPR calculation and to evaluate MPR as a measure of adherence to ACE-I in incident CKD patients.

Methods

- The MedStat MarketScan® Database (1999-2004) was used in this retrospective administrative data analysis.
- CKD patients were defined by at least 1 inpatient or 2 outpatient claims with CKD-related ICD-9-CM codes in each calendar year.
- Incident CKD patients (2000-2004) were selected if (1) they had CKD in current year, but did not have CKD in previous year; (2) their first CKD diagnosis date fell into a fee-for-service continuous enrollment period.
- ACE-I users were identified by at least (1) one ACE-I prescription claim after the first CKD diagnosis date; (2) a three-month enrollment period before the first ACE-I prescription claim.
- The MPR is defined as the sum of the days' supply of medication divided by the number of follow-up days (Figure 1).
- The MPR was examined using various lengths of follow-up , a range of maximum allowable days of prescription gap; and the number of drug follow-up days as weight.

Results

- There were 63,356 incident CKD patients (2000-2004). Of those, 19,609 patients were on ACE-Is.
  - 3,852 patients were <55 years old.
  - 4,766 patients were 56-64 years old.
  - 10,991 patients were ≥ 65 years of age.
- Using fixed follow-up periods from 6 to 24 months, the MPR decreased as follow-up time increased. For all patients, for example, it fell from 78.1 to 65.8% (Table 1 & Figure 2).
- For patients followed at least 12 months, without considering prescription gaps, the MPR decreased to 63.2% (Table 1 & Figure 2).
- Consideration of prescription gaps significantly impacted MPR calculation. By allowing a 90 day gap, for example, the MPR increased from 63.2% to 92.9% for all patients followed at least 12 months (Table 2 & Figure 3).
- Using the number of follow-up days as a weight versus no weight did not significantly affect the MPR (Table 2 & Figure 3).
- Regardless of methodology, adherence was better in patients age 56 and older than in younger patients (Figure 2 & 3).

Figure 1. Calculation of MPR as a function of a fixed length of time

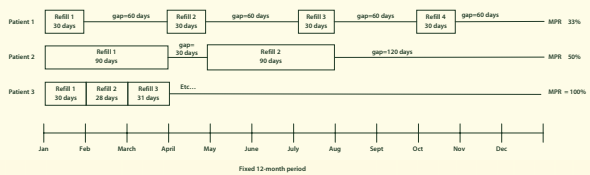


Table 1. Mean ACE-I MPR in incident CKD patients, by different fixed follow-up periods or by at least 12 months of follow-up

	mean MPR (%) by fixed follow-up months				
Age group	6	12	18	24	at least 12
All	78.1	72	68.7	65.8	63.2
0 to 55 yrs	75.5	69.4	67	64.1	61
56 to 64 yrs	79.9	74.8	72.6	70.8	67.4
65+ yrs	78.3	71.8	67.7	64.5	62.3

Table 2. Definitions for different methods to determine ACE-I adherence by MPR in incident CKD patients

Method	Definition
Method I	no consideration of drug gap, no weights applied
Method II	no consideration of drug gap, follow-up days used as weight
Method III	applied 90 days drug gap, no weights applied
Method IV	applied 90 days drug gap, follow-up days used as weight

Figure 2. Mean ACE-I MPR, by different fixed follow-up periods compared with at least 12 months follow-up

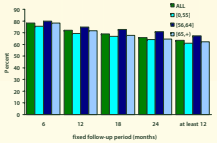
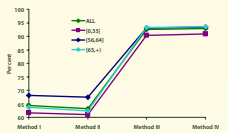


Figure 3. Mean ACE-I MPR in incident CKD patients, followed at least 12 months, by different methods (Table 2)



Conclusions

- Assessment of ACE-I adherence based on MPR varied with methodology.
- The use of fixed follow-up periods provided a more realistic view of adherence; patients with short follow-up periods can bias MPR upwards when non-fixed periods are used.
- Older patients were more adherent. Patients younger than 56 should be targeted to improve adherence.

Limitations

- The MarketScan® Database is composed of a large convenience sample of patients and not a random sample. Data may thus not be reflective of the broader U.S. CKD population.
- The MPR provides information on medication availability over defined periods of time, but does not shed light on the timeliness or consistency of prescription refilling.

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