

## Safety and Effectiveness Evaluations for Kidney Disease in Complex Patients

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### Description

Chronic kidney disease is a common debilitating condition in older people with diabetes, and it is associated with premature mortality and high costs of care. A number of medications are recommended for preventing or slowing the progression of chronic kidney disease, but there is little evidence to support these recommendations in complex diabetes patients and more information is needed on which drugs are most safe and effective. This study examines the comparative effectiveness and safety of drugs to treat chronic kidney disease in complex diabetes patients who receive care at the Veterans Health Administration. The findings can help guide future prescribing practices and reduce the burden of disease in our aging population.

### Specific Aims

To compare different groups of medications for treating chronic kidney disease in patients with diabetes and other comorbidities and to determine which are most beneficial and safe, specifically:

1. Class-to-class and drug-to-drug comparisons of renin-angiotensin system inhibitors used to treat hypertension, including angiotensin converting enzyme inhibitors (ACE: benzapril, captopril, enalapril, fosinopril, lisinopril, quinapril, ramipril) and angiotensin II receptor blockers (ARB: candesartan, irbesartan, losartan, valsartan) in terms of:
  - a. Comparisons for *effectiveness* in long-term renoprotection (decline trends in renal function; time to dialysis or death) and persistence on treatment.
  - b. Comparisons for *safety* in terms of initial increase in creatinine levels, frequency of angioedema, falls, and other side effects.
2. Comparisons of statins by agent (atorvastatin, fluvastatin, lovastatin, pravastatin, rosuvastatin, simvastatin) and dose in terms of side effects, treatment persistence, and renoprotection.

### Main Objective

Examine the comparative effectiveness and safety of drugs to treat chronic kidney disease in diabetes patients with multiple chronic comorbid conditions.

### Chronic Conditions Considered

Diabetes  
Chronic Kidney Disease

### Study Design & Methods

Analytic epidemiologic study: retrospective, longitudinal cohort design.

Methods include formation of new user cohorts with stratified analyses, multiple variable proportional hazards regression, propensity score matching, and instrumental variables analysis.

### Data Sources & Sample Size

Electronic medical records for approximately 500,000 patients with diabetes and nephropathy served by the Veterans Health Administration from 1999 to 2009

### Strategies Addressed from the HHS Strategic Framework on Multiple Chronic Conditions

- 3.A. Identify best practices and tools
- 4.C. Increase clinical research

# Safety and Effectiveness Evaluations for Kidney Disease in Complex Patients (continued)

## Findings

- In terms of safety, only small differences were found among the agents. Following initiation of renin-angiotensin system inhibitors, clinically important increases in creatinine and potassium were found in about 10% and 5% of patients, respectively. This was similar between the classes (ACE and ARB) and among all agents, except for slightly higher rates with captopril and lower rates with fosinopril. Except for a higher risk of angioedema with ACE, the incidence of other side effects was also similar among the agents.
- In initial analyses of comparative renoprotection, it appears that effectiveness was quite similar among all renin-angiotensin system inhibitors and, to a lesser extent overall, among all statins.

## Publications (as of September 2013)

Grembowski DE, Schaefer J, Johnson K, Fischer H, Moore SL, Tai-Seale M, Ricciardi R, Fraser JR, Miller D, LeRoy L. The AHRQ Multiple Chronic Conditions Research Network conceptual model for research on complex patient care. *Medical Care*. In Press, 2014.

(Additional publications currently in preparation).