

**Indiana Medicaid Therapeutics Committee**  
**Therapeutic Class Review Summary**

**Therapeutic class:**

Angiotensin converting enzyme (ACE) inhibitors

**Overview:**

Angiotensin converting enzyme (ACE) inhibitors prevent the conversion of angiotensin I to angiotensin II, a potent vasoconstrictor, via inhibition of the angiotensin converting enzyme. By decreasing the production of angiotensin II, ACE inhibitors lower both systolic and diastolic blood pressure.

All ACE inhibitors are indicated for essential hypertension. However, various ACE inhibitors are indicated to treat congestive heart failure (CHF), myocardial infarction (MI) and diabetic nephropathy. Generic products are available for benazepril, captopril, enalapril, fosinopril, moexipril, quinapril, lisinopril, and trandolapril. Common side effects include cough, headache, dizziness and nausea. Severe side effects that may require medical attention include angioedema, hypotension and hyperkalemia.

The CONSENSUS study was the first outcome trial to show the advantage of enalapril over placebo in improvement of mortality in chronic CHF patients. Additional studies have demonstrated that ACE inhibitors also improve left ventricular function in post-MI patients. Subsequent trials have demonstrated that improving CHF outcome and reducing post-MI mortality is a class-effect shared by most of the ACE inhibitors. The Heart Outcome Prevention (HOPE) study showed that ramipril reduced the rate of death, MI and stroke in patients with cardiovascular risk (including diabetic patients), but without a history of CHF.

The Antihypertensive and Lipid Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) concluded that thiazide diuretics (chlorthalidone), which are less expensive, are superior to ACE inhibitors (lisinopril) and dihydropyridine calcium channel blockers (amlodipine) in preventing one or more major forms of cardiovascular disease. The risk of stroke, heart failure and incidences of being treated or hospitalized for angina were higher in the lisinopril group as compared to the chlorthalidone group. However, in special populations, such as diabetic patients, combination therapy is normally needed to achieve a target BP of <130/80. Therefore, ACE inhibitors should be considered as additional therapy due to demonstrated favorable affect on the progression of diabetic nephropathy and reduction in albuminuria.

| <b>Generic Name</b> | <b>Trade Name</b>                            | <b>Manufacturer</b>     | <b>Generic Availability</b> |
|---------------------|--|-------------------------|-----------------------------|
| Benazepril          | Lotensin <sup>®</sup>                        | Novartis                | Y                           |
| Captopril           | Capoten <sup>®</sup>                         | Bristol Myers Squibb    | Y                           |
| Enalapril           | Vasotec <sup>®</sup>                         | Biovail                 | Y                           |
| Fosinopril          | Monopril <sup>®</sup>                        | Bristol-Myers Squibb    | Y                           |
| Lisinopril          | Prinivil <sup>®</sup> ; Zestril <sup>®</sup> | Merck; AstraZeneca      | Y                           |
| Moexipril           | Univasc <sup>®</sup>                         | Schwarz Pharma          | Y                           |
| Perindopril         | Aceon <sup>®</sup>                           | Solvay                  | N                           |
| Quinapril           | Accupril <sup>®</sup>                        | Pfizer                  | Y                           |
| Ramipril            | Altace <sup>®</sup>                          | Monarch Pharmaceuticals | N                           |
| Trandolapril        | Mavik <sup>®</sup>                           | Abbott                  | Y                           |

**Summary:**

Clinical trials have shown that ACE inhibitors are efficacious in the treatment of hypertension. In addition to the indication for hypertension, various ACE inhibitors are approved for heart failure, diabetic nephropathy, heart failure post MI, myocardial infarction prophylaxis and left ventricular dysfunction. All ACE inhibitors appear to be similar in their incidence of adverse events. Currently, benazepril, captopril, enalapril, fosinopril, moexipril, lisinopril, quinapril, and trandolapril are available as generics. The preferred drug list should be based upon FDA-approved indications, generic availability, dosing regimen, and cost.