Enalapril is one of the most frequently prescribed ACE inhibitors for HTN. Unlike captopril (Capoten), the first ACE inhibitor to be marketed, enalapril has a prolonged half-life, which permits administration once or twice daily. It is available as oral tablets and as an IV injection. Enalapril acts by reducing angiotensin II and aldosterone levels to produce a significant reduction in blood pressure with few side effects. Enalapril may be used by itself or in combination with other antihypertensives to minimize side effects.

**ADMINISTRATION ALERTS**
- May produce a first-dose phenomenon resulting in profound hypotension, which may result in syncope.
- Pregnancy category D.

**PHARMACOKINETICS**
- Onset: 1 h PO; 15 min IV
- Peak: 4–8 h PO; 4 h IV
- Half-life: 2 h
- Duration: 12–24 h PO; 4 h IV

**ADVERSE EFFECTS**
Unlike diuretics, ACE inhibitors such as enalapril have little effect on electrolyte balance; and unlike beta-adrenergic blockers, they cause few cardiac side effects. Enalapril may cause orthostatic hypotension when the client moves quickly from a supine to an upright position. A rapid fall in blood pressure may occur following the first dose. Other side effects include headache and dizziness. ACE inhibitors can cause life-threatening angioedema, neutropenia, or agranulocytosis.

**Contraindications**: Enalapril is contraindicated in clients with prior hypersensitivity and should not be administered during pregnancy or lactation.

**INTERACTIONS**
- **Drug–Drug**: When given concurrently, other antihypertensives have additive effects with enalapril on blood pressure. Thiazide diuretics increase potassium loss. Potassium supplements or potassium-sparing diuretics increase the risk of hyperkalemia. Enalapril may induce lithium toxicity by reducing renal clearance of lithium. NSAIDs may reduce the hypotensive action of ACE inhibitors.
- **Lab Tests**: May increase values of the following: BUN, alkaline phosphatase, serum potassium, serum creatinine, ALT, and AST; may cause positive ANA titer
- **Herbal/Food**: Unknown.

**Treatment of Overdose**: The most likely sign of overdosage is hypotension, which is treated with an IV infusion of normal saline solution.

See the Companion Website for a Nursing Process Focus specific to this drug.

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**NURSING PROCESS FOCUS  Clients Receiving ACE-inhibitor Therapy**

**Assessment**
- Prior to administration:
  - Obtain a complete health history including recent cardiac events and any incidence of angioedema, allergies, drug history, and possible drug interactions.
  - Obtain baseline ECG and vital signs.
  - Assess neurological status and level of consciousness.
  - Obtain blood and urine specimens for laboratory analysis.

**Potential Nursing Diagnoses**
- Injury, Risk for, related to orthostatic hypotension
- Knowledge, Deficient, related to drug therapy
- Nutrition imbalanced: more than body requirements, related to hyperkalemia

**Planning: Client Goals and Expected Outcomes**
- The client will:
  - Exhibit a reduction in systolic and diastolic blood pressure.
  - Maintain normal serum electrolyte levels during drug therapy.
  - Demonstrate an understanding of the drug’s action by accurately describing drug side effects and precautions.

**Implementation**

**Interventions and (Rationales)**
- Monitor for profound hypotension. (ACE inhibitors can cause first-dose phenomenon with initial doses.)

**Client Education/Discharge Planning**
- Instruct client:
  - About the first-dose phenomenon and reassure that this effect diminishes with continued therapy.
  - To immediately report feelings of faintness because rapid reduction in blood pressure can cause changes in consciousness.
  - To rest in the supine position beginning 1 hour after administration and for 3 to 4 hours after the first dose.
Chapter 23  Drugs for Hypertension

NURSING PROCESS FOCUS  Clients Receiving ACE-inhibitor Therapy (Continued)

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<tr>
<th>Interventions and (Rationales)</th>
<th>Client Education/Discharge Planning</th>
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| ■ Observe for hypersensitivity reaction, particularly angioedema. (Angioedema may occur at any time during ACE inhibitor therapy, but is generally expected shortly after initiation of therapy.) | Instruct client:  
■ To immediately seek medical attention for difficulty breathing, throat tightness, muscle cramps, hives or rash, or tremors. These symptoms can occur on the first dose or much later as a delayed reaction.  
■ That angioedema can be life threatening and to call emergency medical services if severe dyspnea or hoarseness is accompanied by swelling of the face or mouth. |
| ■ Monitor for neutropenia and signs of infection. (ACE inhibitors can lower white blood cell count and decrease the ability to fight infection.) | ■ Instruct client to immediately report any flulike symptoms such as fever, sore throat, malaise, and joint pain. |
| ■ Monitor for changes in level of consciousness, dizziness, drowsiness, or light-headedness. (ACE inhibitors can cause decreased circulation to the brain owing to vasodilation.) | ■ Instruct client to:  
■ Report dizziness or fainting that persists beyond the first dose, as well as unusual sensations such as numbness and tingling, or other changes in the face or limbs. Sudden collapse is possible.  
■ Contact the healthcare provider before the next scheduled dose of the drug, if fainting occurs. |
| ■ Monitor for persistent dry cough or changes in cough pattern. (ACE inhibitors affect the proinflammatory action of bradykinin. A change in cough may indicate another disease process.) | ■ Monitor for safe ambulation until response to drug is known. (The drugs may cause postural hypotension.) |
| ■ Monitor for hyperkalemia. (Reduced aldosterone levels, especially in clients with CHF, impaired kidney function, and diabetes, may cause hyperkalemia.) | ■ Instruct client to:  
■ Immediately report signs of hyperkalemia: nausea, irregular heartbeat, profound fatigue/muscle weakness, and slow or faint pulse.  
■ Avoid consuming electrolyte-fortified snacks, or sports drinks that may contain potassium.  
■ Avoid using salt substitute (KCl) to flavor foods.  
■ Consult the healthcare provider before taking any nutritional supplements containing potassium. |
| ■ Monitor for liver and kidney function. (ACE inhibitors are metabolized by the liver and excreted by the kidneys.) | ■ Instruct client to:  
■ Report signs of liver toxicity: nausea, vomiting, anorexia, diarrhea, rash, jaundice, abdominal pain, tenderness or distention, or change in the color or character of stools.  
■ Immediately stop drug and contact healthcare provider if jaundice occurs.  
■ Keep all scheduled laboratory visits for testing. |
| ■ Monitor for safe ambulation until response to drug is known. (The drugs may cause postural hypotension.) | Evaluation of Outcome Criteria |

Evaluate the effectiveness of drug therapy by confirming that client goals and expected outcomes have been met (see “Planning”).

■ The client’s blood pressure is within normal limits.
■ The client’s serum electrolyte levels remain normal during drug therapy.
■ The client demonstrates an understanding of the drug’s action by accurately describing drug side effects and precautions.

See Table 23.6 under “ACE Inhibitors” for a list of drugs to which these nursing actions apply.