Angiotensin-Converting Enzyme (ACE) Inhibitors

Angiotensin-Converting Enzyme (ACE) inhibitors are a large group of medications that are used in heart failure patients and patients that have hypertension. ACE inhibitors interfere with the renin angiotensin-aldosterone system (RAAS), which leads to a decrease in blood pressure. They are used in the treatment of hypertension, heart failure, have shown to prevent heart remodeling post myocardial infarction, as well as delaying the onset of nephropathy in diabetic patients at risk.

PLAY PICMONIC

"-pril" Suffix

Pearls

ACE inhibitors can be identified by having the “-pril” suffix at the end of the generic name of a medication. ACE inhibitors are also prescribed to reduce mortality following an MI and improve hemodynamics in heart failure. Ex. Lisinopril (Prinivil) is generally used in the first line of defense in decreasing blood pressure. Captopril (Capoten) also used for slowing progression of diabetic nephropathy.

Mechanism of Action

Block Renin Angiotensin-Aldosterone System (RAAS)

Blocking RAAS-berries with Wrench, Angel-tennis, and Aldo-stereo

ACE inhibitors prevent the conversion of angiotensin I to angiotensin II. Angiotensin II is a powerful vasoconstrictor and its inhibition prevents direct vasoconstriction, which decreases peripheral vascular resistance and blood pressure and prevents the release of aldosterone, which decreases sodium retention.

Indications

Hypertension

Hiker-BP

ACE Inhibitors are one of the safest and easiest medications to manage. Typically a first-choice medication, ACE inhibitors help relax and dilate the blood vessels. However, ACE Inhibitors may be avoided in African Americans due to that population being at risk for developing angioedema.

Heart Failure

Dead Heart

By blocking angiotensin II the body does not retain as much water as when angiotensin II is activated. Decreases in fluid volume in combination with decreased vascular resistance work synergistically to decrease the workload on the heart.

Side Effects

Dry Non-productive Cough

Dry and Non-productive Coughing Coffee-pot

ACE inhibitors sometimes cause a side effect which produces a dry non productive cough related to bradykinin release. These patients should notify their physician immediately if this side effect occurs.

Hypotension

Hippo-BP

The first dose can have the most impact on an individual’s blood pressure. It is important to always check the blood pressure before administration and monitor BP for 2 hours with the first dose administration. Follow provider recommendations, commonly hold medication if systolic blood pressure is 90-100.

Dizziness

Dizzy-eyes

Because of the dilated blood vessels, orthostatic hypotensive can occur. This can make the patient feel dizzy or lightheaded, especially when changing positions quickly.

Possible Hyperkalemia

Hiker-banana

Aldosterone assists in the reabsorption of sodium and water in the kidneys, exchanging out potassium. Due to suppressed production of aldosterone from the renin pathway, there is a decrease in sodium and water reabsorption, and an increase in potassium retention. This can lead to hyperkalemia in patients. It is important to remember not to give ACE Inhibitors with a potassium-sparing diuretic and to monitor electrolyte levels in patients.

Angioedema

Angel-edamame with a Swollen Face

Angioedema is rare reaction and is characterized by rapid swelling of the face, tongue, glottis, and pharynx with giant wheals. Angioedema from ACE inhibitors typically occur in the African American population. Angioedema occurs through the same process as the dry cough. The increase in bradykinin causes the increase in vascular permeability resulting in edema. It is also important to note that NSAIDS may reduce the effectiveness of ACE inhibitors, as well as, increase the potential of angioedema to occur.

Nursing Considerations

Slowly Change Position

Slow-tortoise getting up from Delta-chair

Orthostatic hypotension can occur in patients that take blood pressure medications. It is important to educate patients to change positions slowly to prevent a drop in blood pressure and feeling dizzy.

Do Not Stop Abruptly

Can't Stop Cold-turkey

Educate the patient to not miss a dose. A sudden drop in the blood level of the medication can result in a surge of angiotensin II and aldosterone, which can increase the blood pressure causing a hypertensive emergency.