Angiotensin Converting Enzyme Inhibitors (ACEIs) / Angiotensin Receptor Blockers (ARBs)*

**Heart Failure Medication Initiation and Titration**

### Initiation

**Symptomatic HF or LVEF < 40%**

- Bilateral renal artery stenosis
- Moderate/Severe aortic stenosis
- Hyperkalemia: K+ > 5.5 mmol/L
- Renal Dysfunction: Serum Creatinine > 220 µmol/L
- Hypotension: SBP < 90 mmHg or symptoms
- Allergy: angioedema, hives, rash
- Intolerance: cough (ACEI)

**Initiation**

- YES: Refer to Physician
- NO: Continue

**Titration**

- Titrating every 1-3 weeks, depending on tolerance

**Goal: Target dose (see dosing) or maximum tolerated dose**

**Assess**

- BP
- K+
- Scr

**Blood Pressure**

- Volume deplete: Reduce/hold diuretic x 2-3 days
- Volume overload: Reduce/hold diuretic dose/vasodilator

**Serum Creatinine**

- Fluid Assessment: Reassess diuretic dose/vasodilator
- Eurovolemic: Reduce/hold dose of other vasodilators +/- ACEI/ARB x 1-2 weeks

**Serum Potassium**

- K+ 5.2-5.5: Stop K+ supplements, reduce/hold spironolactone
- K+ 5.6-6.0: Stop K+ supplements, spironolactone, hold ACEI/ARB
- K+ > 6.0: Refer to Physician

**Fluid Assessment**

- Volume deplete: Reduce/hold diuretic x 2-3 days
- Volume overload: Increase diuretic; reduce/hold ACEI/ARB

**Other considerations**

- Angioedema:
  - Assess cough at baseline or if due to worsening HF
  - If intractable cough secondary to ACEI consider:
  - Trial of another ACEI
  - Switch to ARB
  - Reassess in 2 weeks and document

**Monitoring**

- Initiation of ACEI/ARB
- Blood Pressure
- Serum Creatinine
- Serum Potassium

**Considerations**

- Baseline cough
- K+ supplements
- K+ sparing diuretics
- Spironolactone
- NSAIDs/Cox2 inhibitors
- Combination ACEI/ARB

**Initiation**

- YES: Refer to Physician
- NO: Continue

**Titration**

- Titrating every 1-3 weeks, depending on tolerance

**Assess**

- BP
- K+
- Scr

**Blood Pressure**

- Volume deplete: Reduce/hold diuretic x 2-3 days
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**Other considerations**

- Angioedema:
  - Assess cough at baseline or if due to worsening HF
  - If intractable cough secondary to ACEI consider:
  - Trial of another ACEI
  - Switch to ARB
  - Reassess in 2 weeks and document

*This algorithm is intended for single agent (ACEI or ARB)

**This is a guide to monitoring; increased monitoring may be required given patient’s status and co-morbidities (i.e. renal insufficiency)*

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<table>
<thead>
<tr>
<th>Drug</th>
<th>Initial Dose</th>
<th>Target Dose</th>
<th>Dosage forms (mg)</th>
<th>Key points:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACEIs</strong>²</td>
<td></td>
<td></td>
<td></td>
<td>- ACEIs are first line treatment for NYHA Class I-IV</td>
</tr>
<tr>
<td>Captopril (generic)</td>
<td>12.5mg tid</td>
<td>50mg tid</td>
<td>12.5, 25, 50, 100</td>
<td>- ARBs are considered second line agents when an ACEI is not tolerated secondary to a <strong>cough</strong> and rarely <strong>angioedema</strong></td>
</tr>
<tr>
<td>Cilazapril (Inhibace®, generic)</td>
<td>2.5mg qd</td>
<td>10mg qd</td>
<td>1, 2.5, 5</td>
<td>- Cough should be assessed and clearly documented <strong>prior to</strong> initiation of ACEI</td>
</tr>
<tr>
<td>Enalapril (Vasotec®, generic)</td>
<td>2.5mg bid</td>
<td>10mg bid</td>
<td>2.5, 5, 10, 20</td>
<td>- If cough is determined to be secondary to ACEI use (e.g. resolves upon discontinuation or recurs on re-challenge), and is bothersome enough to warrant reassessment of therapy, it should be documented</td>
</tr>
<tr>
<td>Fosinopril (Monopril®, generic)</td>
<td>10mg qd</td>
<td>40mg qd</td>
<td>10, 20</td>
<td>- If titration of dose is limited by <strong>hypotension</strong>:</td>
</tr>
<tr>
<td>Lisinopril (Prinivil®, Zestril®, generic)</td>
<td>2.5mg qd</td>
<td>30-40mg qd</td>
<td>5, 10, 20</td>
<td>- reassess diuretic use</td>
</tr>
<tr>
<td>Perindopril (Coversyl®)</td>
<td>2mg qd</td>
<td>4-8mg qd</td>
<td>2, 4, 8</td>
<td>- consider staggering dosing with other vasoactive agents or dosing at bedtime</td>
</tr>
<tr>
<td>Quinapril (Accupril®)</td>
<td>5-10mg qd</td>
<td>40mg qd</td>
<td>5, 10, 20, 40</td>
<td>- Compliance is increased with once daily dosing strategy</td>
</tr>
<tr>
<td>Ramipril (Altace®, generic)</td>
<td>1.25-2.5mg bid</td>
<td>5mg bid</td>
<td>1.25, 2.5, 5, 10</td>
<td>- Given that the main side effects of ACEIs and ARBs are <strong>renal dysfunction</strong> and <strong>hyperkalemia</strong>, assessment of other medications and factors that precipitate these effects are warranted:</td>
</tr>
<tr>
<td>Trandolapril (Mavik®)</td>
<td>0.5-1mg qd</td>
<td>4mg qd</td>
<td>0.5, 1, 2, 4</td>
<td>1) Renal dysfunction: NSAIDs and COX2 inhibitors</td>
</tr>
<tr>
<td></td>
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<td>2) Hyperkalemia: combination therapy, spironolactone, potassium supplements, potassium-sparing diuretics (triazide, Dyazide, triamterene, amiloride), salt substitutes (No Salt, Half Salt), dietary K+</td>
</tr>
<tr>
<td><strong>ARBs</strong>⁴</td>
<td></td>
<td></td>
<td></td>
<td><strong>Goal is to keep patient at target or maximally tolerated dose of evidence based medications</strong></td>
</tr>
<tr>
<td>Candesartan (Atacand®)</td>
<td>4mg qd</td>
<td>32mg</td>
<td>8, 16</td>
<td><strong>Clinical course of HF is variable—frequent reassessment of medication regime required</strong></td>
</tr>
<tr>
<td>Valsartan (Diovan®)</td>
<td>40mg bid</td>
<td>160mg bid</td>
<td>80, 160</td>
<td><strong>Complete and thorough history and physical assessment essential with each dose adjustment</strong></td>
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<tr>
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<td><strong>Titrate one medication at a time—small dose changes may result in significant clinical ones (ie. symptoms, BW)</strong></td>
</tr>
</tbody>
</table>

¹Target doses based on clinical trials, but are limited to patient tolerance
²ACEIs are first line agents
³Limited use due to TID dosing
⁴ARBs are second line. Agents listed have been used and studied in clinical trials

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