

# Type 2 Diabetes Master Decision Path: Hypertension

At presentation

**Blood pressure targets**  
In-office BP <130/80 mmHg and Self-monitored BP <125/75 mmHg

|   |  |  |
|---|--|--|
| <p><b>Self-management</b></p> <ul style="list-style-type: none"> <li>• Ensure tobacco free</li> <li>• Consider self-monitored blood pressure</li> </ul> | <p><b>Nutrition and activity</b></p> <ul style="list-style-type: none"> <li>• Refer for Medical Nutrition Therapy</li> <li>• Lowers Systolic BP 2-20 mmHg</li> </ul> | <p><b>Emotional health</b></p> <ul style="list-style-type: none"> <li>• Stress-management training</li> <li>• Assess psychosocial needs including anxiety and/or depression</li> </ul> |
|---|--|--|

For all patients with BP above normal (SBP ≥120 mmHg)

*Add medication if not at target*

Systolic BP 130-149 mmHg

|  |                          |                                   |
|--|--------------------------|-----------------------------------|
|  | <b>Hypertension only</b> | <b>Hypertension + nephropathy</b> |
|--|--------------------------|-----------------------------------|

# BP Meds  
1

|                               |                    |
|-------------------------------|--------------------|
| <b>ACEI / ARB or Thiazide</b> | <b>ACEI or ARB</b> |
|-------------------------------|--------------------|

*Titrate dose, add medication if not at target in 1-2 months*

Systolic BP ≥150 mmHg (Start 2 meds if SBP ≥150 mmHg)

2

|                                   |                     |
|-----------------------------------|---------------------|
| <b>Add Thiazide or ACEI / ARB</b> | <b>Add Thiazide</b> |
|-----------------------------------|---------------------|

*Titrate dose, add medication if not at target in 1-2 months*

3

**Add CCB or β-blocker**

*Titrate dose, add medication if not at target in 1-2 months*

4

**Add β-blocker or CCB**

*Titrate dose, add medication if not at target in 1-2 months*

Annual screen for microalbuminuria and eGFR ([www.nephron.com](http://www.nephron.com))

5+

**Add additional BP medication as needed**  
**Consider: Aldosterone antagonists, reserpine, combining ACEI and ARB, α/β blocker (Carvediol), α-blocker and hydralazine**

See next page for clinical considerations; key to abbreviations

### Key to abbreviations

**ACEI:** Angiotensin Converting Enzyme Inhibitor; **ARB:** Angiotensin II Receptor Blocker; **CCB:** Calcium Channel Blocker; **SBP:** Systolic Blood Pressure; **eGFR:** Estimated Glomerular Filtration Rate.

### Clinical considerations

1. Consider electronic blood pressure monitoring device for accurate blood pressure measurement.
2. For suspected white coat HTN, masked HTN (office BP normal and BP outside office elevated) or to adjust timing (i.e. moving one or more medications to PM for AM HTN) and dose of medication.
3. Nephropathy defined as micro- or macroalbuminuria and/or eGFR <60 ml/min/1.73 m<sup>2</sup>.
4. Multiple medications usually required to achieve BP target; combo tablets available (see below).
5. Switch ACEI to ARB if persistent dry cough; small to modest rise in Sr Cr expected with ACEI therapy; ACEI recommended in patients with history of CVD.
6. Thiazide diuretics effective in elderly patients, systolic HTN and for fluid retention; chlorthalidone may be more effective in lowering BP and is used in most major HTN outcome trials.
7. Preliminary evidence from ACCOMPLISH trial showed benefit of ACEI + CCB over ACEI + diuretic.
8. CCB effective for systolic HTN and in elderly patients; use non dihydropyridine CCB (diltiazem, verapamil) with caution in combination with b-Blockers due to bradycardia.
9. Recommend b-blocker with history of M.I., avoid in patients with asthma.
10. Consider causes for resistant HTN (i.e. poor adherence to regimen, secondary causes of hypertension and/or interfering medications), consider referral to HTN specialist.
11. Adding ACEI to ARB or ARB to ACEI has additional effect on reducing albuminuria, minimal additional BP lowering, and no additional reduction in CV events.

### Examples of 2 Drug Combination Medications

| ACEI + Diuretic and ARB + Diuretic | Trade name           |
|------------------------------------|----------------------|
| Benazepril/hydrochlorothiazide     | Lotensin HCT         |
| Enalapril/hydrochlorothiazide      | Vaseretic            |
| Lisinopril/hydrochlorothiazide     | Prinzide, Zestoretic |
| Valsartan/hydrochlorothiazide      | Diovan HCT           |
| Telmisartan/hydrochlorothiazide    | Micardis HCT         |
| Irbesartan/hydrochlorothiazide     | Avalide              |

### Examples of 4 Drug Therapies Using 2 Combination Medications

| ACEI + CCB and β-blocker + Diuretic                      | Trade names               |
|--|---------------------------|
| Benazepril/amlodipine +<br>Atenolol/chlorthalidone       | Lotrel + Tenoretic        |
| Enalapril/felodipine +<br>Metoprolol/hydrochlorothiazide | Lexxel + Lopressor<br>HCT |

### Hypertension algorithm references

- ALLHAT Collaborative Research Group. Major Outcomes in High-Risk Hypertensive Patients Randomized to Angiotensin-Converting Enzyme Inhibitor or Calcium Channel Blocker vs Diuretic. The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *JAMA* 2002; 288:2981-2997.
- Andersen, N.H., et al. Long-term dual blockade with candesartan and lisinopril in hypertensive patients with diabetes: the CALM II study. *Diab Care*. 2005;28:273-277.
- Appel LJ, Moore TJ, Obarzanek E et al. A clinical trial of the effects of dietary patterns on blood pressure. *N Engl J Med*. 1997; 336:1117-1124.
- Lewis EJ, Hunsicker LG, Bain RP, Rohde RD. The effect of angiotensin-converting-enzyme inhibition on diabetic nephropathy: the Collaborative Study Group. *N Engl J Med* 1993; 329:1456-1462.
- Lewis EJ, Hunsicker LG, Clarke WR, et al. Renoprotective effect of the angiotensin-receptor antagonist irbesartan in patients with type 2 diabetes. *N Engl J Med*. 2001 345:851-860.
- Masding MG, Jones JR, Bartley E and Sandeman DD. Assessment of blood pressure in patients with Type 2 diabetes: comparison between home blood pressure monitoring, clinic blood pressure measurement and 24-h ambulatory blood pressure monitoring. *Diabet Med* 2001;8:431-437.
- The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure, NIH Publication No 04-5230;2004.
- UK Prospective Diabetes Study Group. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38. *Br Med J* 1998;317:703-726.