

**COSEHC  
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**TOP 10 POINTS TO IMPLEMENT THE  
2017 ACC/AHA HYPERTENSION GUIDELINES**

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# Conflicts of Interest

Robert M. Carey, MD, MACP, FAHA

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- Financial

None

- Institutional

University of Virginia

- Organizational

American Heart Association

American College of Physicians

# Top 10 Take-Home Messages and Companion Cases

**2017 Hypertension Guidelines**

# Top 10 Take Home Messages

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- 1. In all individuals, use proper methods for accurate measurement and documentation of BP.**

Accurate measurement and recording of BP are essential to categorize level of BP, ascertain BP-related CVD risk and guide management of high BP.

Most systematic errors in BP measurement can be avoided by following the suggestions in the next slide.

# Checklist for Accurate Measurement of BP |

## Key Steps for Proper BP Measurement

Step 1: Properly prepare the patient.

Step 2: Use proper technique for BP measurements.

Step 3: Take the proper measurements needed for diagnosis and treatment of elevated BP/hypertension.

Step 4: Properly document accurate BP readings.

Step 5: Average the readings ( $\geq 2$  readings on each of  $\geq 2$  occasions).

Step 6: Provide BP readings to patient.

# Use Proper Technique

1. Use an upper-arm cuff BP measurement device that has been validated, and ensure that the device is calibrated periodically.
2. Support the patient's arm (eg, resting on a desk). The patient should not be holding his/her arm because isometric exercise will affect the BP levels.
3. Position the middle of the cuff on patient's upper arm at the level of the right atrium (midpoint of the sternum).
4. Use the correct cuff size such that the bladder encircles 75%–100% of the arm.
5. Use either the stethoscope diaphragm or bell for auscultatory readings.

# Properly Prepare the Patient

1. Have patient relax, sitting in a chair with feet flat on floor and back supported. Patient should be seated for 3–5 min without talking or moving before recording the first BP reading. A shorter wait period is used for some AOBP devices.
2. Patient should avoid caffeine, exercise, and smoking for at least 30 min before measurement.
3. Ensure that patient has emptied his/her bladder.
4. Neither patient nor observer should talk during the rest period or measurement.
5. Remove clothing covering the location of cuff placement.
6. Measurements made while patient is sitting on an examining table do not fulfill these criteria.

# Take Proper Measurements

1. At the first visit, record BP in both arms. Use the arm that gives the higher reading for subsequent readings.
2. Separate repeated measurements by 1–2 min.
3. For auscultatory determinations, use a palpated estimate of radial pulse obliteration pressure to estimate SBP. Inflate the cuff 20–30 mm Hg above this level for an auscultatory determination of the BP level.
4. For auscultatory readings, deflate the cuff pressure 2 mm Hg/s, and listen for Korotkoff sounds.



# Top 10 Take Home Messages

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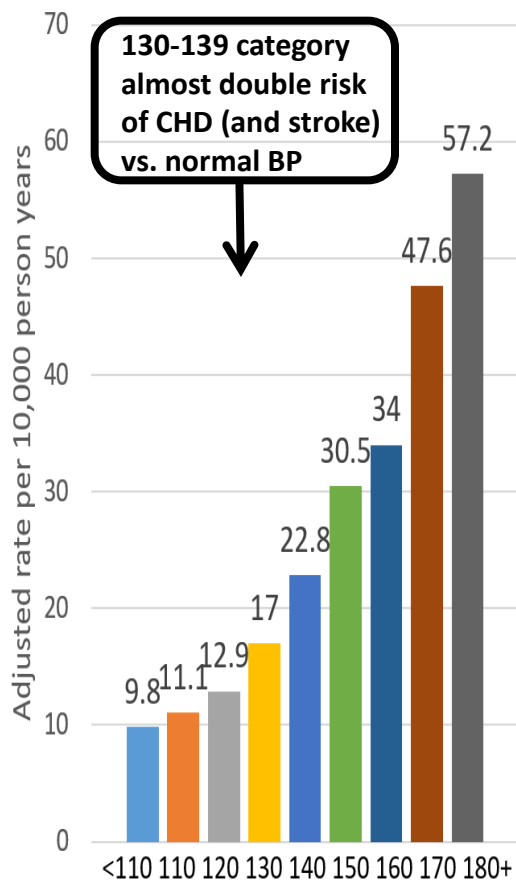
**2. Classify BP as normal, elevated, or Stage 1 or 2 hypertension to prevent and treat high BP.**

The choice and naming of BP categories is based on a pragmatic interpretation of BP-related CVD risk and the benefit of BP reduction in clinical trials.

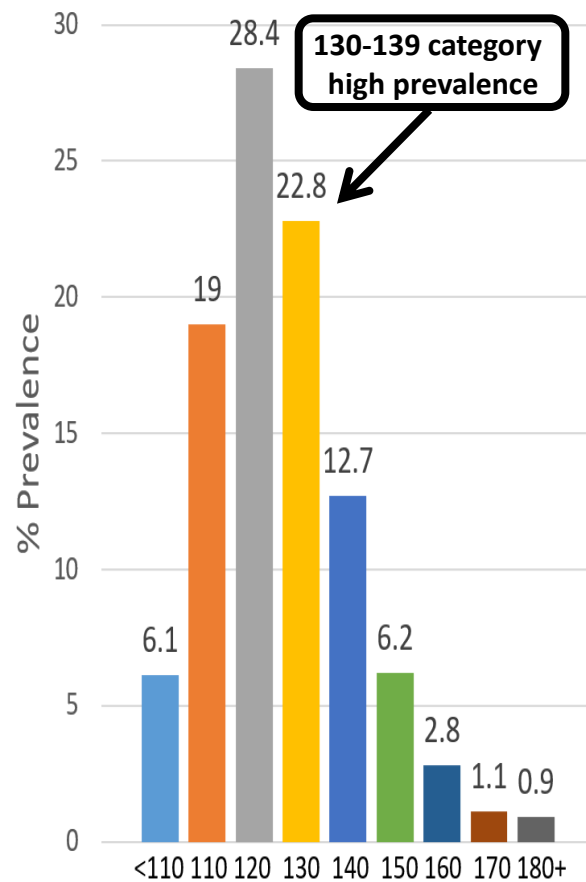
# Estimated Risk of BP-related Coronary Heart Disease by Level of Systolic Blood Pressure

Experience during an average of 11.6 years of follow-up in 347,978 adults screened for entry into the Multiple Risk Factor Intervention Trial

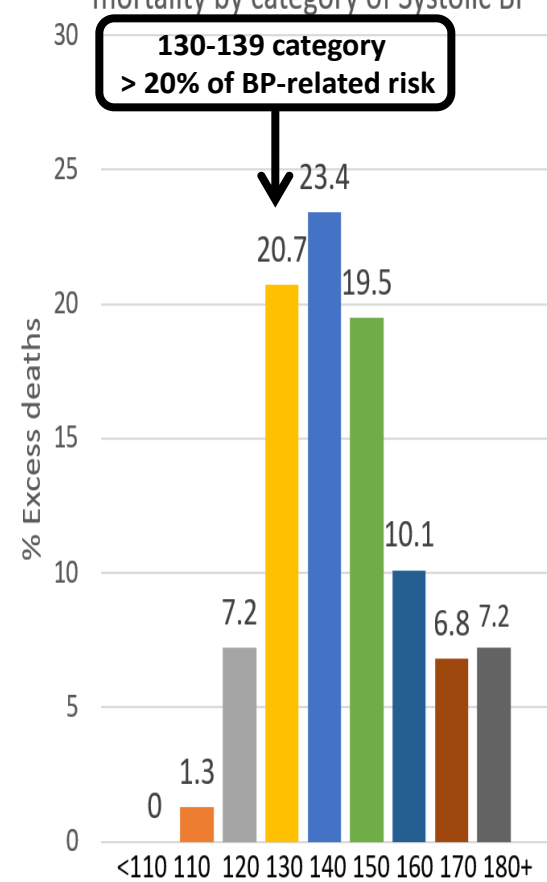
Risk by category of Systolic BP



Prevalence by category of Systolic BP



BP-related excess risk of CHD mortality by category of Systolic BP



# BP CLASSIFICATION (JNC 7 and ACC/AHA Guidelines)

| <i>SBP</i>     |            | <i>DBP</i>    | <i>2003 JNC7</i>            | <i>2017 ACC/AHA</i>         |
|----------------|------------|---------------|-----------------------------|-----------------------------|
| <i>&lt;120</i> | <i>and</i> | <i>&lt;80</i> | <i>Normal BP</i>            | <i>Normal BP</i>            |
| <i>120–129</i> | <i>and</i> | <i>&lt;80</i> | <i>Prehypertension</i>      | <i>Elevated BP</i>          |
| <i>130–139</i> | <i>or</i>  | <i>80–89</i>  |                             | <i>Stage 1 hypertension</i> |
| <i>140–159</i> | <i>or</i>  | <i>90–99</i>  | <i>Stage 1 hypertension</i> | <i>Stage 2 hypertension</i> |
| <i>≥160</i>    | <i>or</i>  | <i>≥100</i>   | <i>Stage 2 hypertension</i> | <i>Stage 2 hypertension</i> |

} Area of difference

- Blood Pressure should be based on an average of  $\geq 2$  careful readings on  $\geq 2$  occasions
- Adults with SBP or DBP in two categories should be designated to the higher BP category

# Top 10 Take Home Messages

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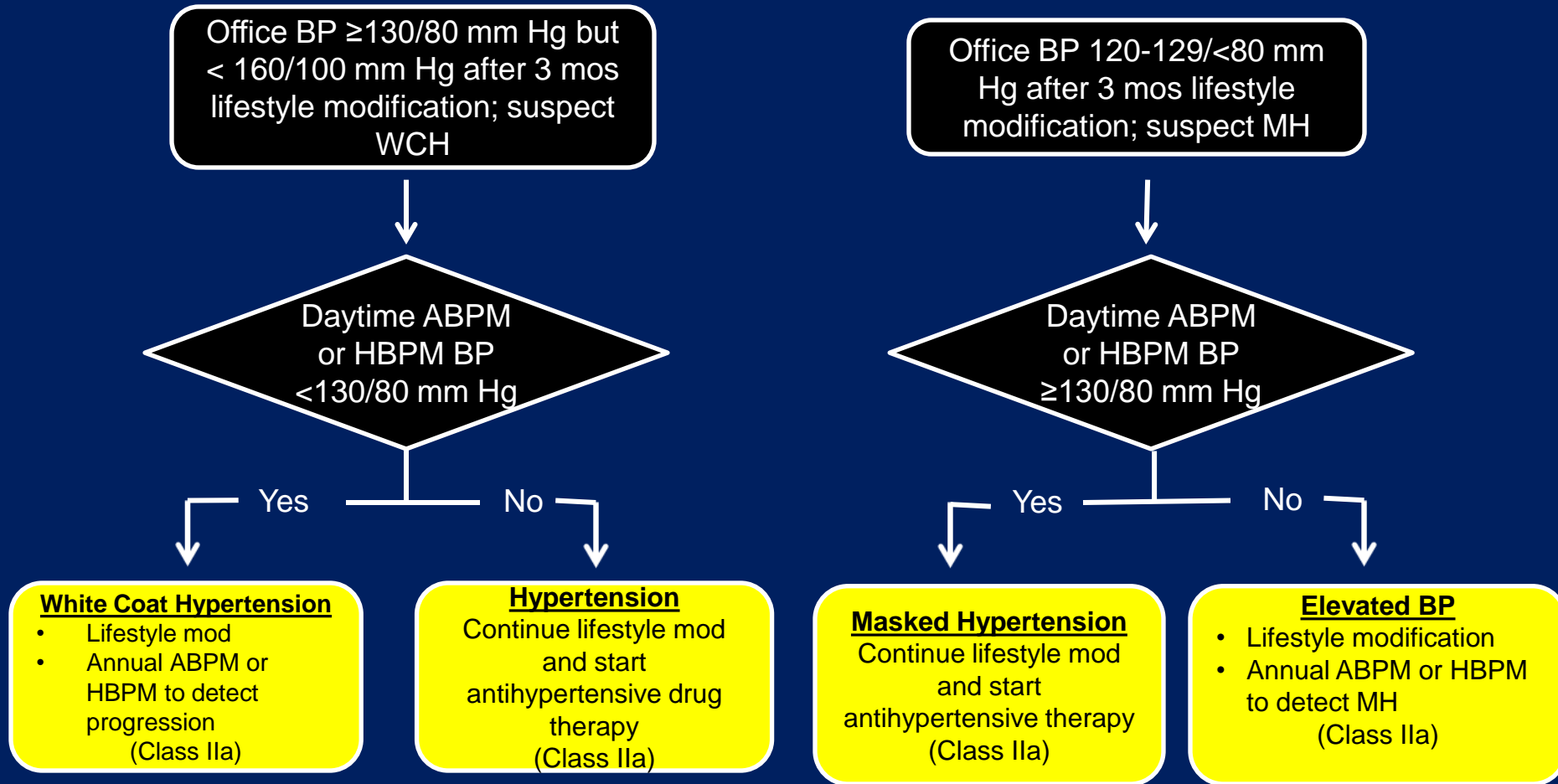
**3. Use out-of-office BP measurements (ABPM and HBPM) to confirm the diagnosis of hypertension and to titrate antihypertensive medication in conjunction with telehealth counseling or clinical interventions.**

Using a combination of office and out-of-office BP measurements, several useful BP patterns can be discerned. There are no data on the risks and benefits of treating white coat or masked hypertension. However, the data indicate that **masked hypertension and masked uncontrolled hypertension** are associated with high risk of CVD and mortality. On the other hand, **white coat hypertension and white coat effect** are associated with minimum to only slightly increased risk of CVD and mortality compared with normal BP.

## BP Patterns Based on Office and Out-of-Office Measurements

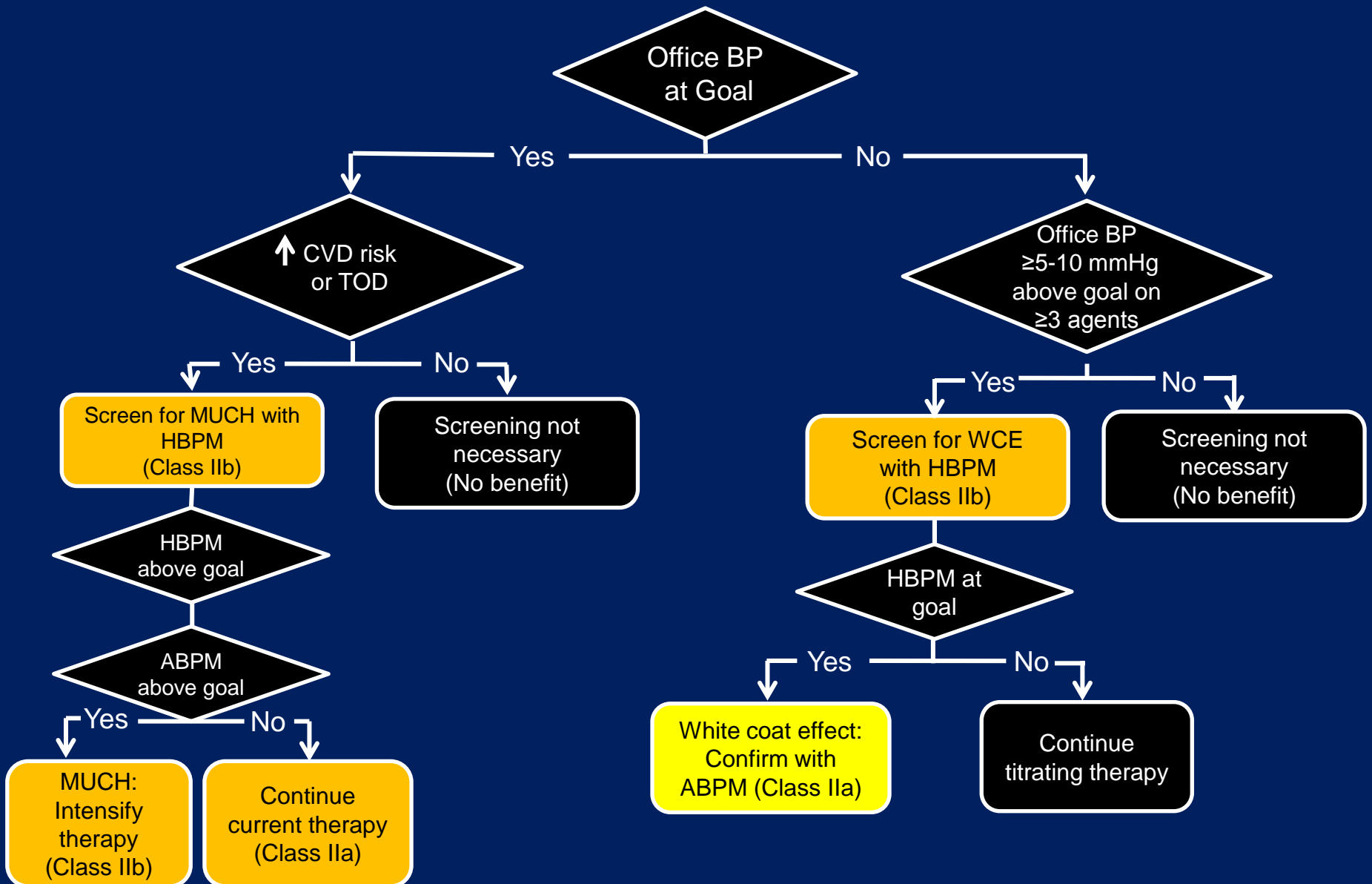
|                         | <b>Office/Clinic/Healthcare Setting</b> | <b>Home/Nonhealthcare/ABPM Setting</b> |
|-------------------------|---|--|
| Normotensive            | No hypertension                         | No hypertension                        |
| Sustained hypertension  | Hypertension                            | Hypertension                           |
| Masked hypertension     | No hypertension                         | Hypertension                           |
| White coat hypertension | Hypertension                            | No hypertension                        |

# Detection of White Coat Hypertension or Masked Hypertension in Patients not on Drug Therapy



ABPM: ambulatory BP monitoring; HBPM: home BP monitoring

# Detection of White Coat Effect or Masked Uncontrolled Hypertension in Patients on Drug Therapy



# Top 10 Take Home Messages

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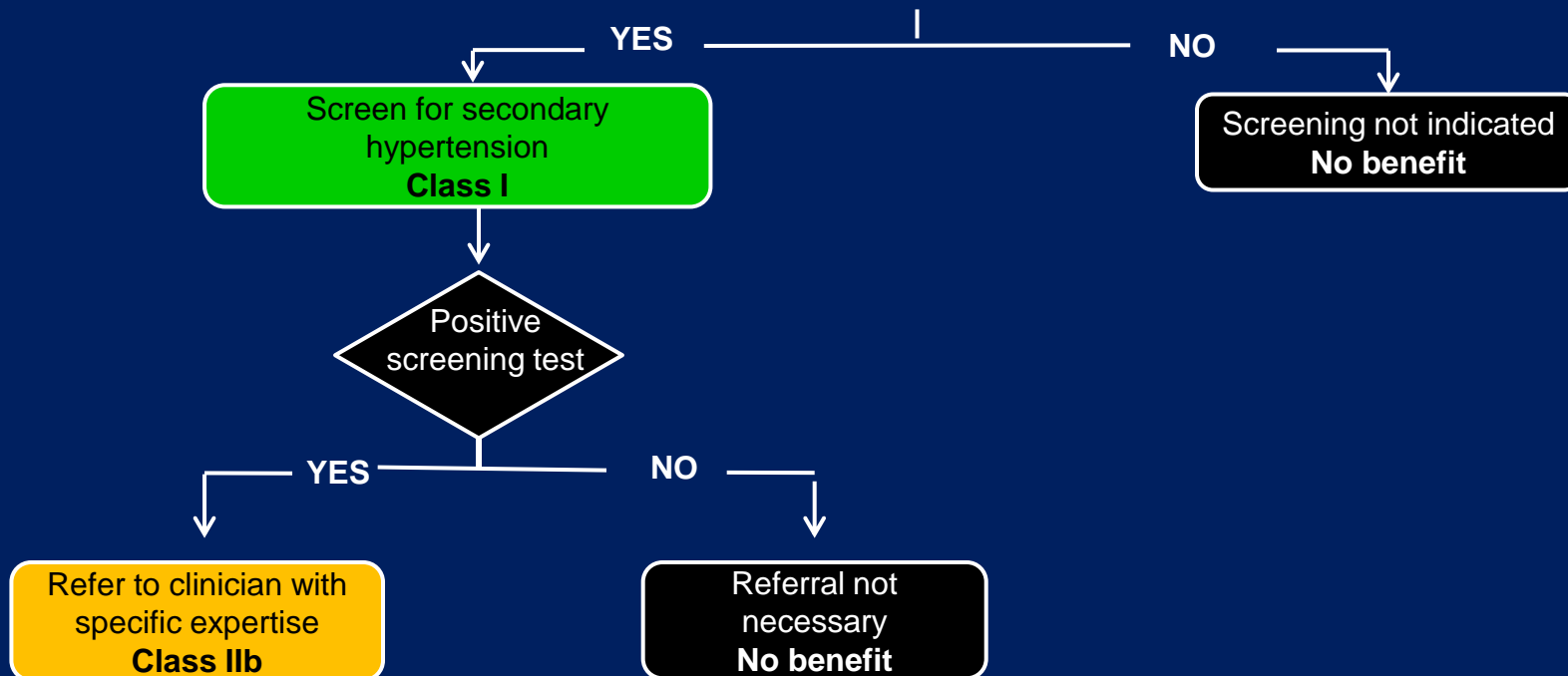
**4. Screen for specific forms of secondary hypertension if clinical indications are present or in adults with resistant hypertension.**



# New onset or uncontrolled hypertension in adults

## Conditions:

- Drug-resistant/induced hypertension
- Abrupt onset of hypertension
- Onset of hypertension at <30 y
- Exacerbation of previously controlled hypertension
- Disproportionate TOD for degree of hypertension
- Accelerated/malignant hypertension
- Onset of diastolic hypertension in older adults ( $\geq 65$  y)
- Unprovoked or excessive hypokalemia



# Case 1

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- 50 year-old male with no CVD
- No diabetes mellitus or chronic kidney disease
- Average office BP 135/86 mmHg

Recommended treatment?

First, calculate the 10-year ASCVD risk score.

# Top 10 Take Home Messages

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**5. In patients with Stage 1 hypertension (BP 130-139/80-89 mmHg), assess for clinical ASCVD or, if absent, estimate 10-y ASCVD risk.**

Whereas treatment of high BP with BP-lowering agents on the basis of BP level alone is cost-effective, use of a combination of absolute ASCVD risk and BP level to guide treatment decisions is more efficient and cost-effective at reducing risk of CVD events than is use of BP level alone.

# BP TREATMENT THRESHOLD AND THE USE OF ASCVD RISK ESTIMATION TO GUIDE DRUG TREATMENT OF HYPERTENSION

| Recommendations for BP Treatment Threshold and Use of ASCVD Risk Estimation* to Guide Drug Treatment of Hypertension |              |   |
|--|--------------|---|
| COR  | LOE          | Recommendations   |
| I  | SBP:<br>A    | 1. Use of BP-lowering medications is recommended for secondary prevention of recurrent CVD events in patients with clinical CVD and average BP $\geq 130/80$ mm Hg , and for primary prevention in adults with an estimated 10-year atherosclerotic cardiovascular disease (ASCVD) risk $\geq 10\%$ and average BP $\geq 130/80$ mm Hg. |
|  | DBP:<br>C-EO |   |
| I  | C-LD         | 2. Use of BP-lowering medication is recommended for primary prevention of CVD in adults with no history of CVD and with an estimated 10-year ASCVD risk $< 10\%$ and average BP $\geq 140/90$ mm Hg.  |

\* ACC/AHA Pooled Cohort Equations to estimate 10-y risk of ASCVD. ASCVD was defined as a first nonfatal MI or CHD death, or fatal or nonfatal stroke among adults free of CVD.

# ACC/AHA POOLED COHORT EQUATIONS

*To estimate the 10-year risk of ASCVD*

Based on age, race, sex, total cholesterol, LDL cholesterol, HDL cholesterol, treatment with a statin, systolic BP, treatment for hypertension, history of diabetes, current smoker, aspirin therapy

Validated for adults 40-79 years of age.

<http://tools.acc.org/ASCVD-Risk-Estimator/>

APP Store: ASCVD Risk Estimator Plus

# Case 1 (continued)

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- 50 year-old male with no CVD
- No diabetes mellitus or chronic kidney disease
- Average office BP 135/86 mmHg

10-year ASCVD risk score = 5%

Recommended treatment?

Lifestyle modification

# Top 10 Take Home Messages

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**6. If Stage 1 hypertension and 10y ASCVD risk score <10%, initiate program of lifestyle intervention.**

Nonpharmacological interventions are effective in lowering BP and often are sufficient to prevent hypertension or meet goal BP in managing patients with Stage 1 hypertension.

# LIFESTYLE MODIFICATION: THE CORNERSTONE FOR PREVENTION AND TREATMENT OF HYPERTENSION

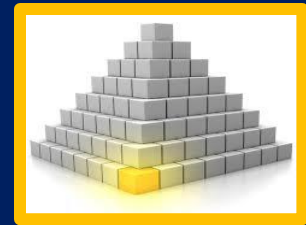


| <b>Lifestyle<br/>Intervention</b>           | <b>Dose</b>  | <b>Impact on SBP</b> |                     |
|---|--|----------------------|---------------------|
|   |  | <b>Hypertension</b>  | <b>Normotension</b> |
| <b>Weight loss</b>                          | Best goal is ideal body weight, but aim for at least a 1-kg reduction in body weight for most adults who are overweight. Expect about 1 mm Hg for every 1-kg reduction in body weight. | -5 mm Hg             | -2/3 mm Hg          |
| <b>Healthy diet</b>                         | Consume a diet rich in fruits, vegetables, whole grains, and low-fat dairy products, with reduced content of saturated and total fat.  | -11 mm Hg            | -3 mm Hg            |
| <b>Reduced intake of dietary sodium</b>     | Optimal goal is <1500 mg/d, but aim for at least a 1000-mg/d reduction in most adults.   | -5/6 mm Hg           | -2/3 mm Hg          |
| <b>Enhanced intake of dietary potassium</b> | Aim for 3500–5000 mg/d, preferably by consumption of a diet rich in potassium.   | -4/5 mm Hg           | -2 mm Hg            |

All 4 Recommendations COR:1; LOE:A



# LIFESTYLE MODIFICATION: THE CORNERSTONE FOR PREVENTION AND TREATMENT OF HYPERTENSION



| Nonpharmacological           |                      | Effect on SBP  |                     |                     |
|------------------------------|----------------------|--|---------------------|---------------------|
| <u>Intervention</u>          |                      | <u>Dose</u>  | <u>Hypertension</u> | <u>Normotension</u> |
| Physical activity            | Aerobic              | <ul style="list-style-type: none"> <li>● 90–150 min/wk</li> <li>● 65%–75% heart rate reserve</li> </ul>  | -5/8 mm Hg          | -2/4 mm Hg          |
|                              | Dynamic resistance   | <ul style="list-style-type: none"> <li>● 90–150 min/wk</li> <li>● 50%–80% 1 rep maximum</li> <li>● 6 exercises, 3 sets/exercise, 10 repetitions/set</li> </ul>                   | -4 mm Hg            | -2 mm Hg            |
|                              | Isometric resistance | <ul style="list-style-type: none"> <li>● 4 × 2 min (hand grip), 1 min rest between exercises, 30%–40% maximum voluntary contraction, 3 sessions/wk</li> <li>● 8–10 wk</li> </ul> | -5 mm Hg            | -4 mm Hg            |
| Moderation in alcohol intake | Alcohol consumption  | In individuals who drink alcohol, reduce alcohol to: <ul style="list-style-type: none"> <li>● Men: ≤2 drinks daily</li> <li>● Women: ≤1 drink daily</li> </ul>                   | -4 mm Hg            | -3 mm               |

Both Recommendations COR:1; LOE:A

# Case 2

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54 year-old male with a history of obesity but no past cardiovascular disease, hypertension, diabetes or chronic kidney disease.

- 10-year ASCVD risk score = 12%
- Average office BP 134/84 mmHg

Recommended treatment?

Initiate lifestyle modification and antihypertensive drug therapy preferably with a single agent.

# Top 10 Take Home Messages

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**7. If Stage 1 hypertension with clinical ASCVD or ASCVD risk score  $\geq 10\%$ , initiate antihypertensive drug therapy in addition to lifestyle modification.**

Lowering BP results in benefit in higher-risk individuals, regardless of their baseline treated or untreated BP  $\geq 130/80$  mmHg and irrespective of the specific cause of their elevated risk. Benefit of treatment outweighs potential harm at threshold BP  $\geq 130/80$  mmHg.

# Case 3

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40 year-old male with no history of cardiovascular disease, diabetes mellitus or chronic kidney disease.

- Average office BP 155/95 mmHg
- Ambulatory BP monitoring demonstrates average BP in the 148/94 to 150/98 mmHg range with absent nocturnal dipping.

Recommended treatment?

Initiate lifestyle modification and antihypertensive therapy with a combination of two agents of different pharmacologic classes.

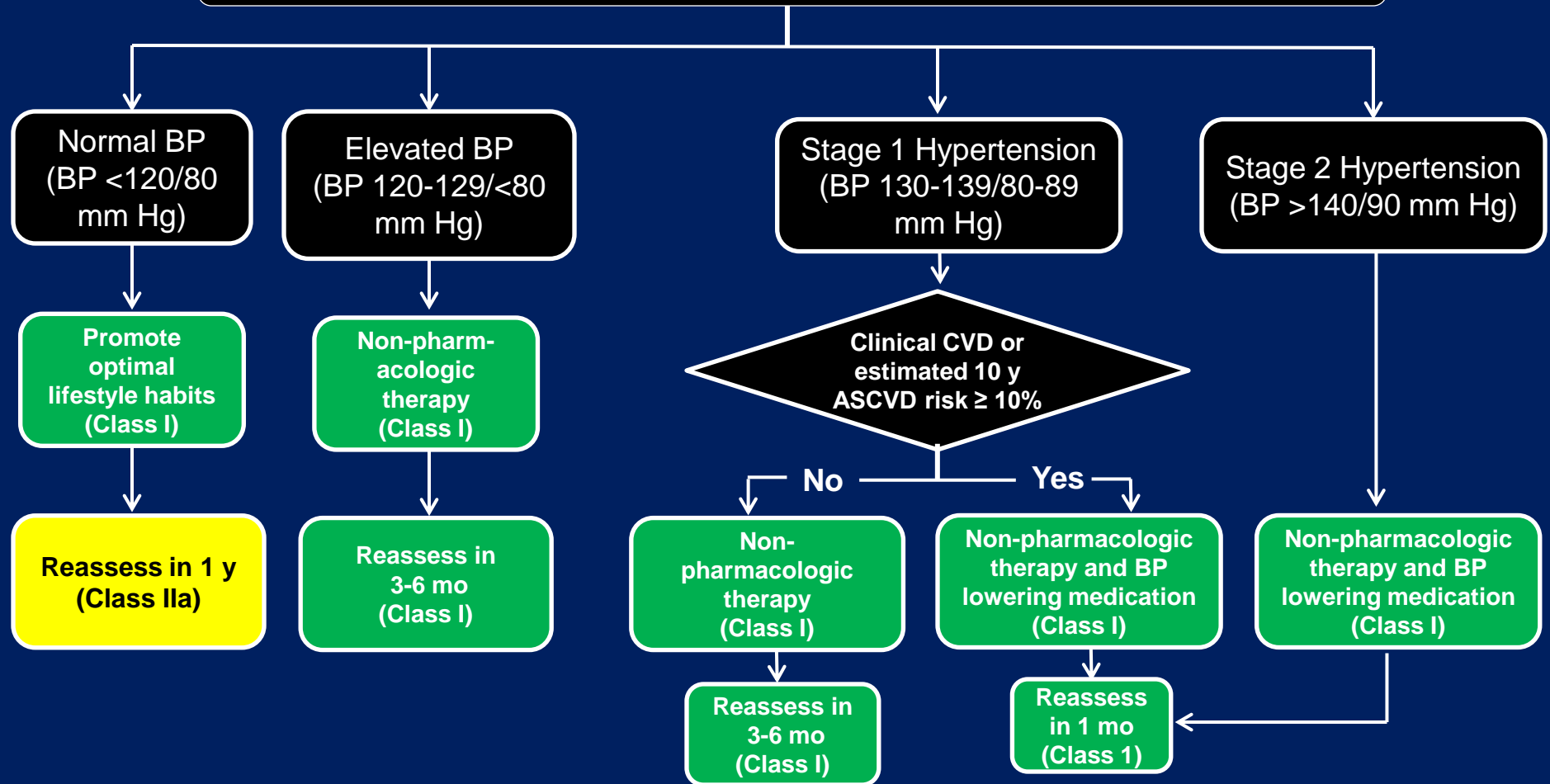
# Top 10 Take Home Messages

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**8. If Stage 2 hypertension (BP  $\geq$  140/90 mmHg), and BP  $\geq$  20/10 mmHg above target, initiate 2 antihypertensive agents of different classes in addition to lifestyle modification.**

# BP THRESHOLDS AND RECOMMENDATIONS FOR TREATMENT AND FOLLOW UP

BP thresholds and recommendations for treatment and follow-up



# 2017 ACC/AHA BP Guideline: Thresholds for Treatment

| SBP  | DBP | CVD Risk/other circumstances            | Recommended Treatment  |
|--|-----|---|--|
| <120 and <80<br>(Normal)                   |     | N/A                                     | Healthy Lifestyle  |
| 120–129 and <80<br>(Elevated)              |     | N/A                                     | Nonpharmacological therapy   |
| 130-139 or 80-89<br>(Stage 1 Hypertension) |     | - No CVD<br>- 10-yr ASCVD risk <10%*    | Nonpharmacological therapy   |
|  |     | - CVD, or<br>- 10-year ASCVD risk ≥ 10% | Nonpharmacological therapy<br>and<br>Antihypertensive drug therapy |
| 130-139<br>(Stage 1 Hypertension)          |     | Diabetes or CKD                         |  |
|  |     | Age ≥65 years                           |  |
| ≥140 or ≥90<br>(Stage 2 Hypertension)      |     | N/A                                     |  |

\* AHA/ACC 2013 Pooled Cohort CVD Risk Equations

# Top 10 Take Home Messages

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**9. For initiation of antihypertensive drug therapy, first-line classes include thiazide diuretics, CCBs, and ACE inhibitors or ARBs.**



# Top 10 Take Home Messages

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**10. Once antihypertensive drug therapy has been initiated, the therapeutic BP target is < 130/80 mmHg.**

Meta-analyses of trials comparing more intense versus standard BP lowering show that more intense lowering significantly reduces risk of stroke, coronary events, major cardiovascular events and cardiovascular mortality.

# BP GOAL FOR PATIENTS WITH HYPERTENSION

| <u>COR</u> | <u>LOE</u>                | <u>Recommendations</u>   |
|------------|---------------------------|--|
| I          | SBP:<br>B-R <sup>SR</sup> | 1. For adults with confirmed hypertension and known CVD or 10-year ASCVD event risk $\geq 10\%$ , a BP target of $<130/80$ mm Hg is recommended. |
|            | DBP:<br>C-EO              |  |
| Ib         | SBP:<br>B-NR              | 2. For adults with confirmed hypertension, without additional markers of increased CVD risk, a BP target of $<130/80$ mm Hg may be reasonable .  |
|            | DBP:<br>C-EO              |  |

# 2017 ACC/AHA BP Guideline: Treatment Targets

| SBP     |     | DBP   | CVD Risk                                 | Recommended BP Target    |
|---------|-----|-------|--|--------------------------|
| <120    | and | <80   | N/A                                      | N/A                      |
| 120–129 | and | <80   | N/A                                      | N/A                      |
| 130–139 | or  | 80–89 | No CVD and 10-year ASCVD risk <10%       | SBP <130 (DBP <80 mm Hg) |
| 130–139 | or  | 80–89 | Clinical CVD or 10-year ASCVD risk ≥ 10% |                          |
| ≥130    | or  | ≥80   | Diabetes or CKD                          |                          |
| ≥140    | or  | ≥90   | N/A                                      |                          |
| ≥130    |     |       | Age ≥65 years                            | SBP <130 mm Hg           |

# OLDER PERSONS

| COR | LOE  | Recommendations for Treatment of Hypertension in Older Persons   |
|-----|------|--|
| I   | A    | Treatment of hypertension with a SBP treatment goal of <130 mm Hg is recommended for noninstitutionalized ambulatory community-dwelling adults (≥65 years of age) with an average SBP ≥130 mm Hg.  |
| IIa | C-EO | For older adults (≥65 years of age) with hypertension and a high burden of comorbidity and limited life expectancy, clinical judgment, patient preference, and a team-based approach to assess risk/benefit is reasonable for decisions regarding intensity of BP lowering and choice of antihypertensive drugs. |

# ASSOCIATION OF HYPERTENSION GUIDELINES WITH CVD EVENTS AND DEATH IN THE US

- (1) Incidence of major CVD events & all-cause mortality by modeling 4 community-based cohort studies
- (2) Network meta-analysis (42 RCTs) to estimate HRs for outcomes and determine population-attributable risks and events reduced.

| Characteristic  | 2014 Evidence-Based Guideline          | 2017 ACC/AHA Guideline                               |
|---|--|--|
| BP threshold for definition of hypertension           | ≥140/90                                | ≥130/80  |
| BP threshold for initiation of antihypertensive drugs | ≥140/90 (<age 60)<br>≥150/90 (≥age 60) | ≥140/90 (gen. population)<br>≥130/80 (high CVD risk) |
| BP goal of treatment                                  | <140/90 (<age 60)<br><150/90 (≥age 60) | <130/80  |
| Annual CVD event reduction (adults ≥age 40)           | 270,000                                | 610,000 (NNT=70)                                     |
| Annual reduction in death (adults ≥age 40)            | 177,000                                | 334,000 (NNT=129)                                    |

## SUMMARY

- Hypertension is the world's leading risk factor for cardiovascular disease and death.
- In preventing cardiovascular disease, the 2017 ACC/AHA hypertension clinical practice guidelines are of major critical importance.
- The guidelines are not a substitute for clinical judgement, but do provide an evidence-based guide to the detection, evaluation and management of high BP.
- Lowering BP according to guideline recommendations has been shown to prevent an increased number of cardiovascular events and death.

***THANK YOU FOR YOUR  
KIND ATTENTION!***