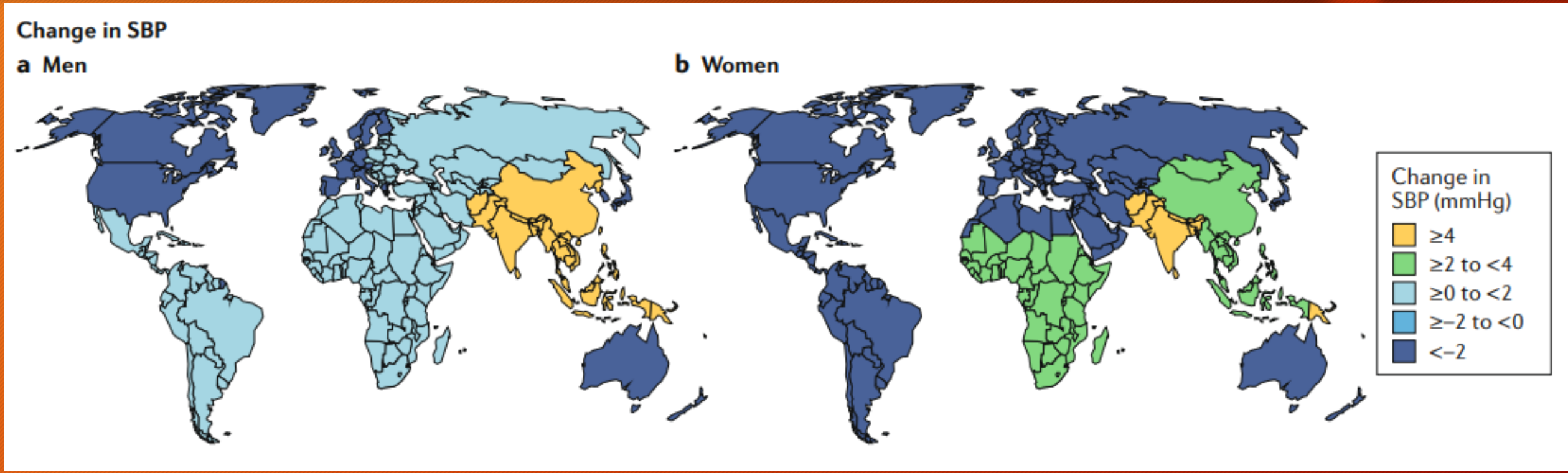
Recent updates in Hypertension management

Introduction

- Hypertension is the leading preventable risk factor for Cardiovascular disease.[1]
- The global burden of hypertension has been growing over time, largely driven by population growth, changes in lifestyle, and aging.[1]
- Alarmingly, hypertension is controlled in less than a fifth of patients worldwide.[1]
- Blood pressure of 120/80 mm Hg or higher is linearly related to risk for fatal and nonfatal stroke, ischemic heart disease, and noncardiac vascular disease. [2]
- Each increase of 20/10 mm Hg doubles the risk for a fatal CVD event. [2]

1) Mills K.T. et al. *Nat Rev Nephrol*.2020; 1-16
2) Carey RM et al. Ann Intern Med. 2018;168:351-358.

Global epidemiology of hypertension



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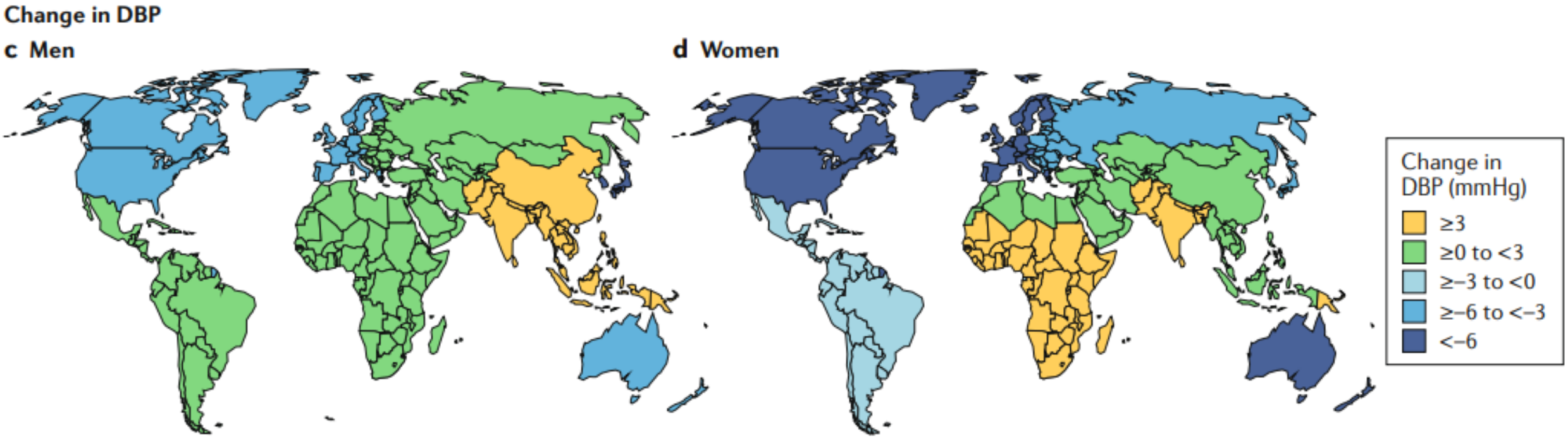
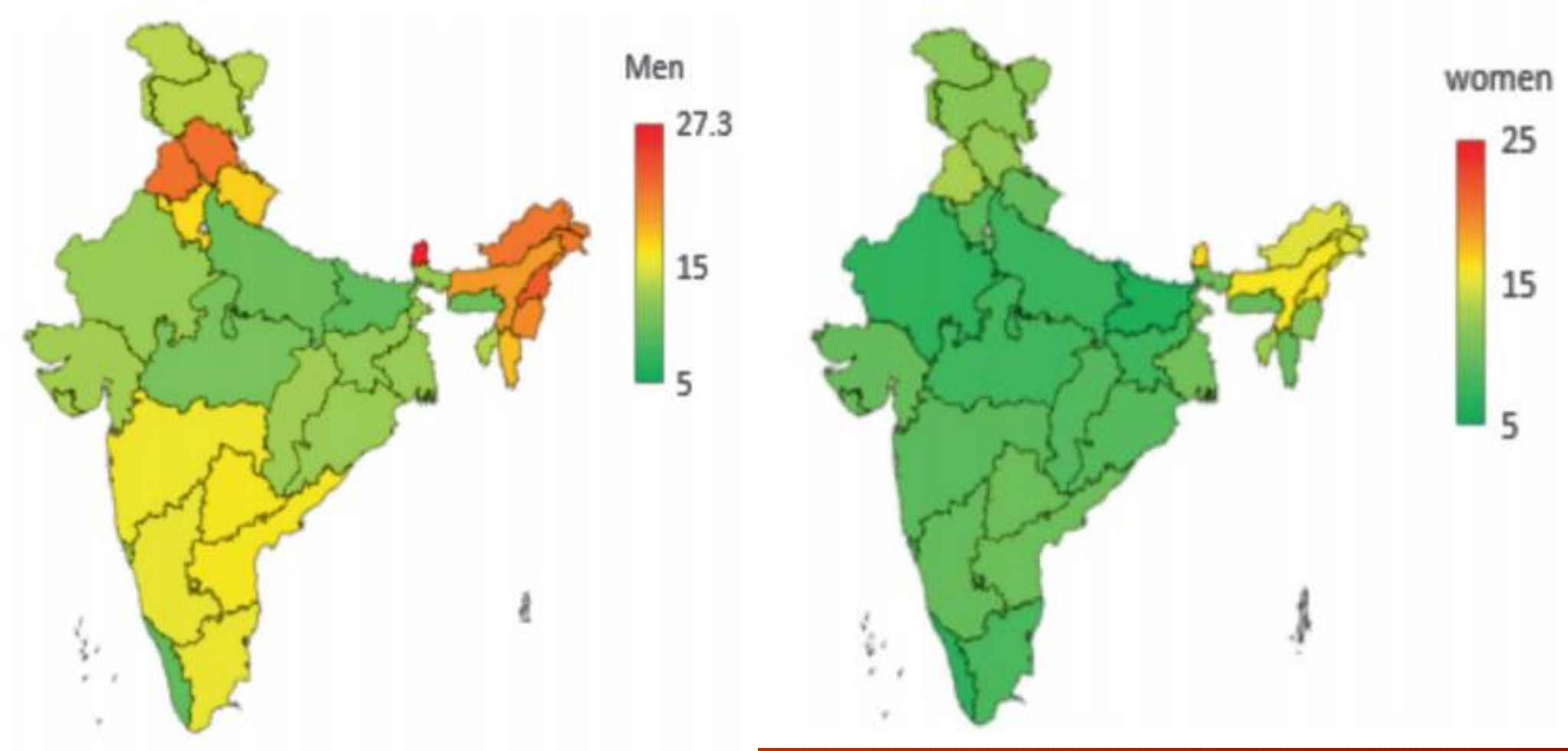


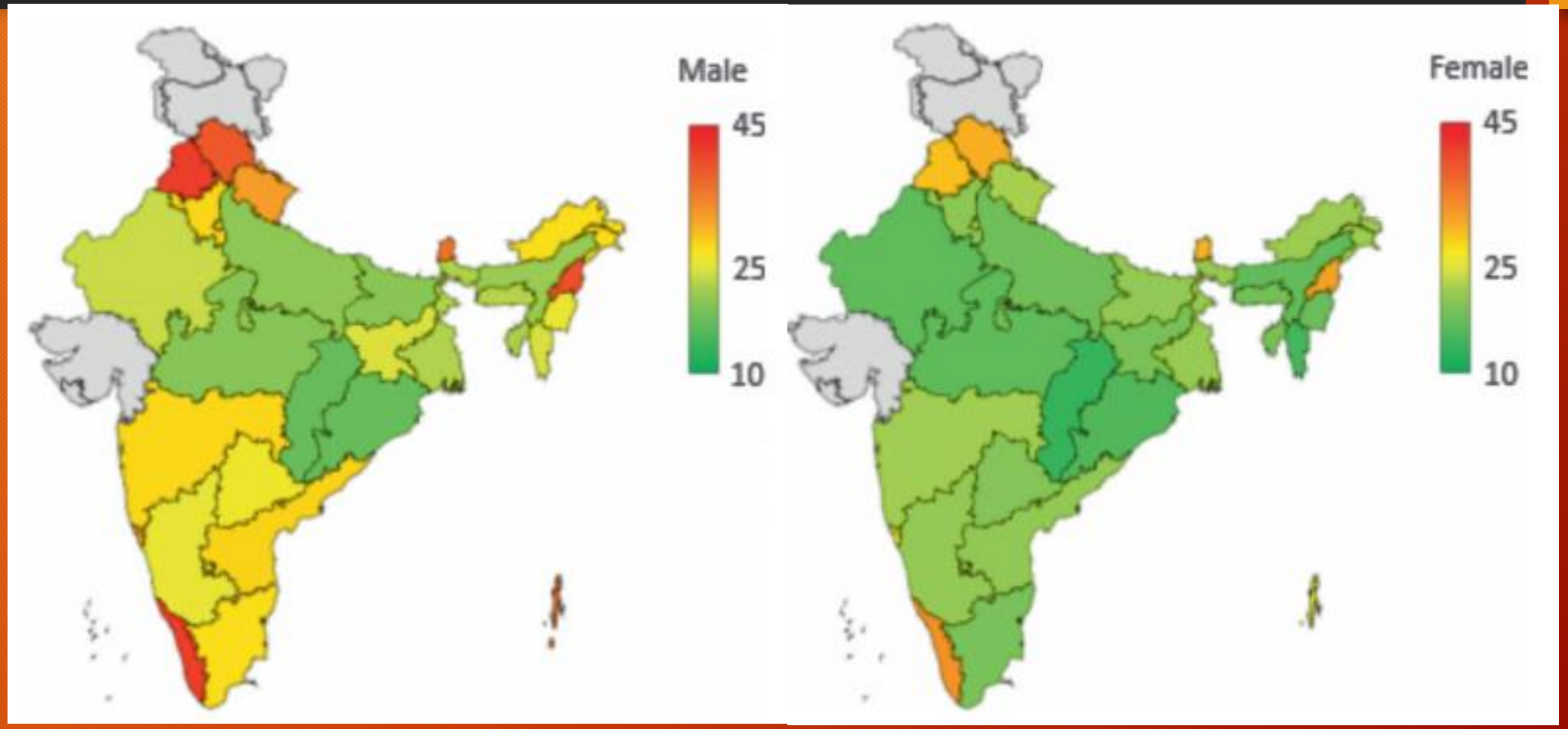
Mills K.T. et al. *Nat Rev Nephrol*.2020; 1-16

The hypertension prevalence in India according to National Family Health Survey-4



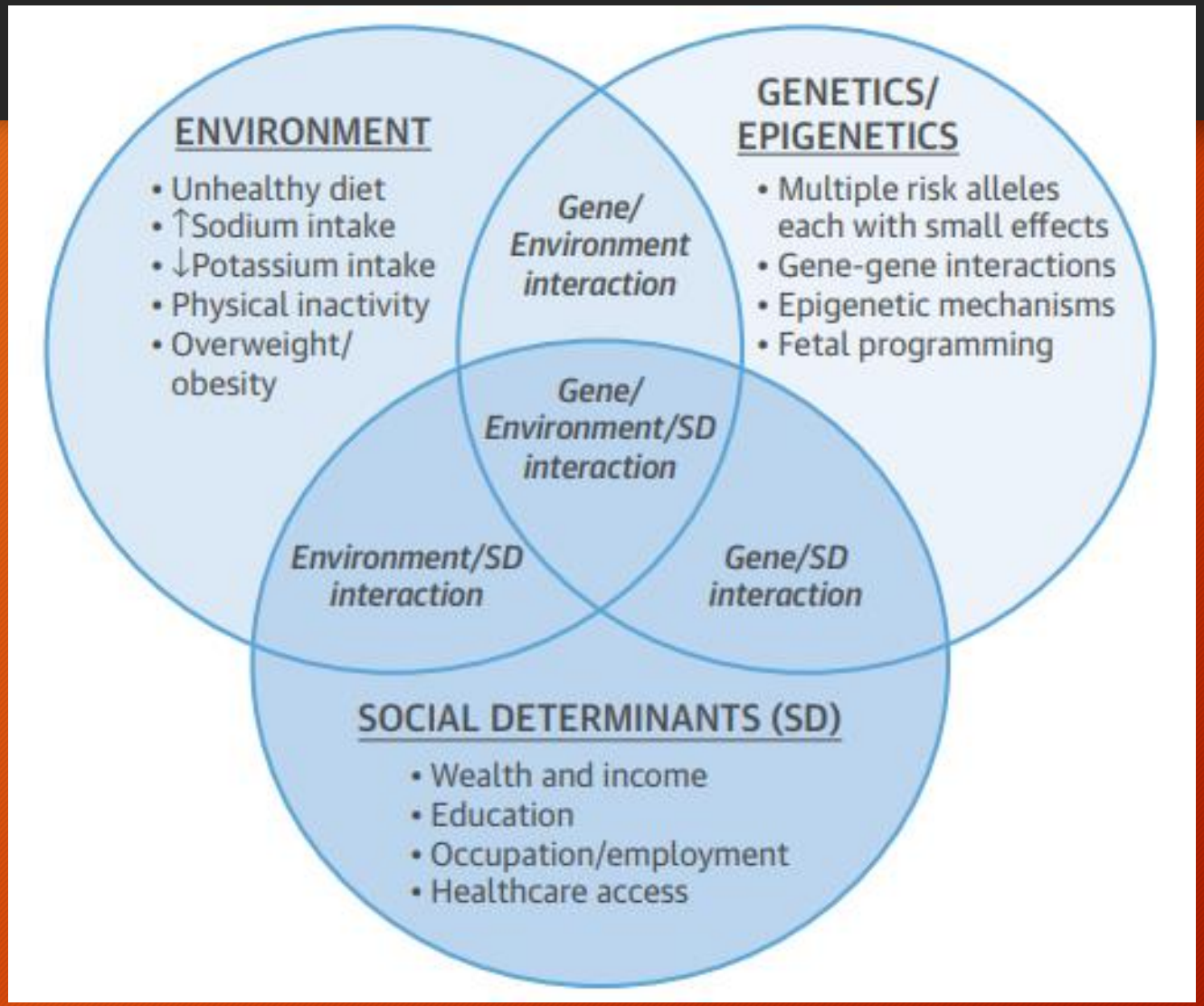
Gupta R et al. Journal of Human Hypertension. 2019; 33:575–587

The hypertension prevalence in India according to district level household survey



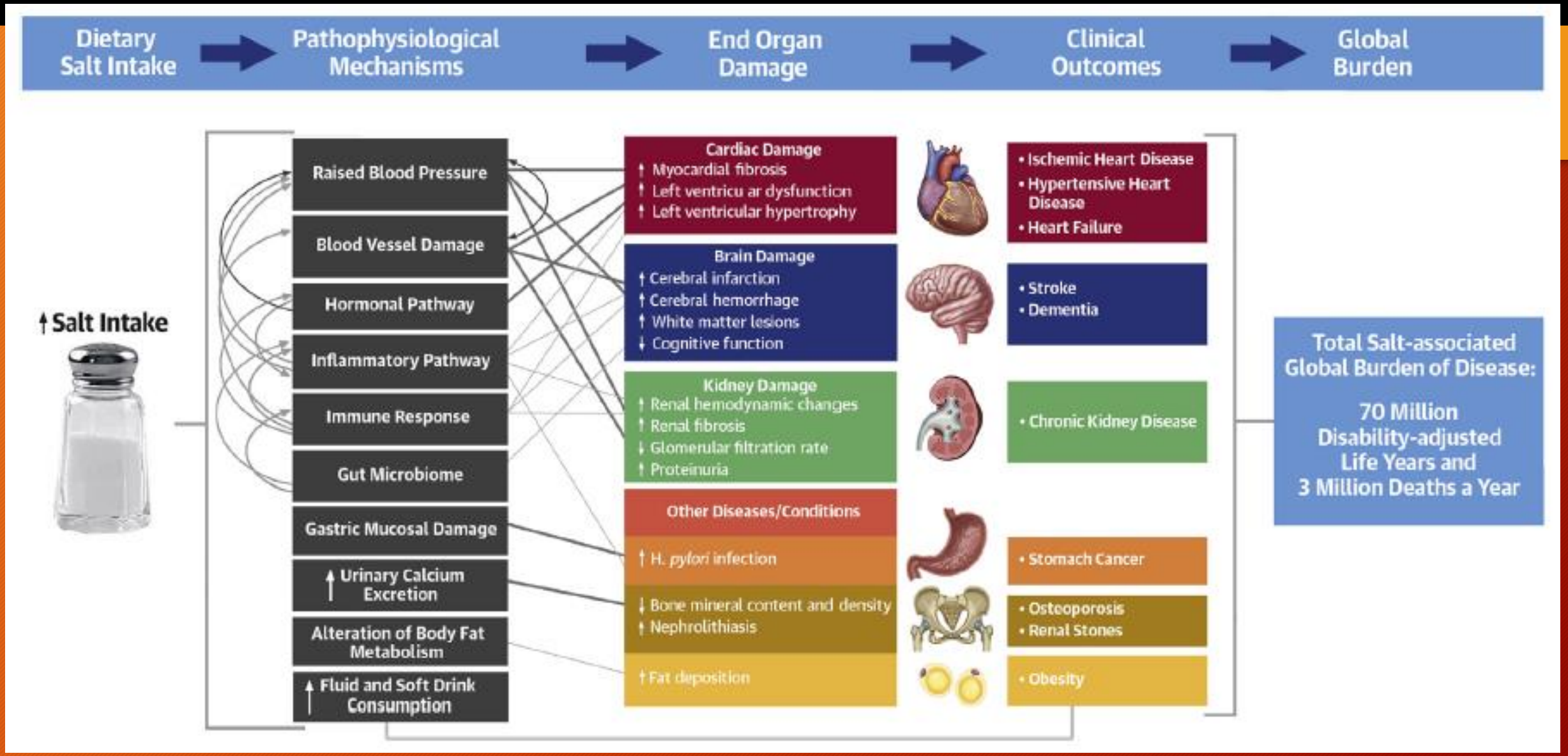
Gupta R et al. Journal of Human Hypertension. 2019; 33:575–587

Major determinants of BP in hypertension



Carey, R.M. et al. J Am Coll Cardiol. 2018;72(11):1278–93.

Pathophysiology



He, F.J. et al. J Am Coll Cardiol. 2020;75(6):632-47

Comparison of the Latest ACC/AHA and ESC/ESH Hypertension Guidelines for BP diagnosis

Parameter	ACC/AHA	ESC/ESH
Definition of hypertension, mm Hg	>130/80	>140/90
Grading of normal pressure, mm Hg	Normal <120/80	Optimal <120/80
	Elevated 120–129/<80	Normal 120–129/80–84
		High normal 130–139/85–89
Grading of hypertension, mm Hg	Grade 1, 130–139/80–89	Grade 1 140–159/90–99
	Grade 2, ≥140/90	Grade 2, 160–179/100–109
		Grade 3, ≥180/110
Target blood pressure in various subsets	≤65 y, <130/80	<65 y, <130/80
	≥65 y, <130/80	≥65 y, <140/80

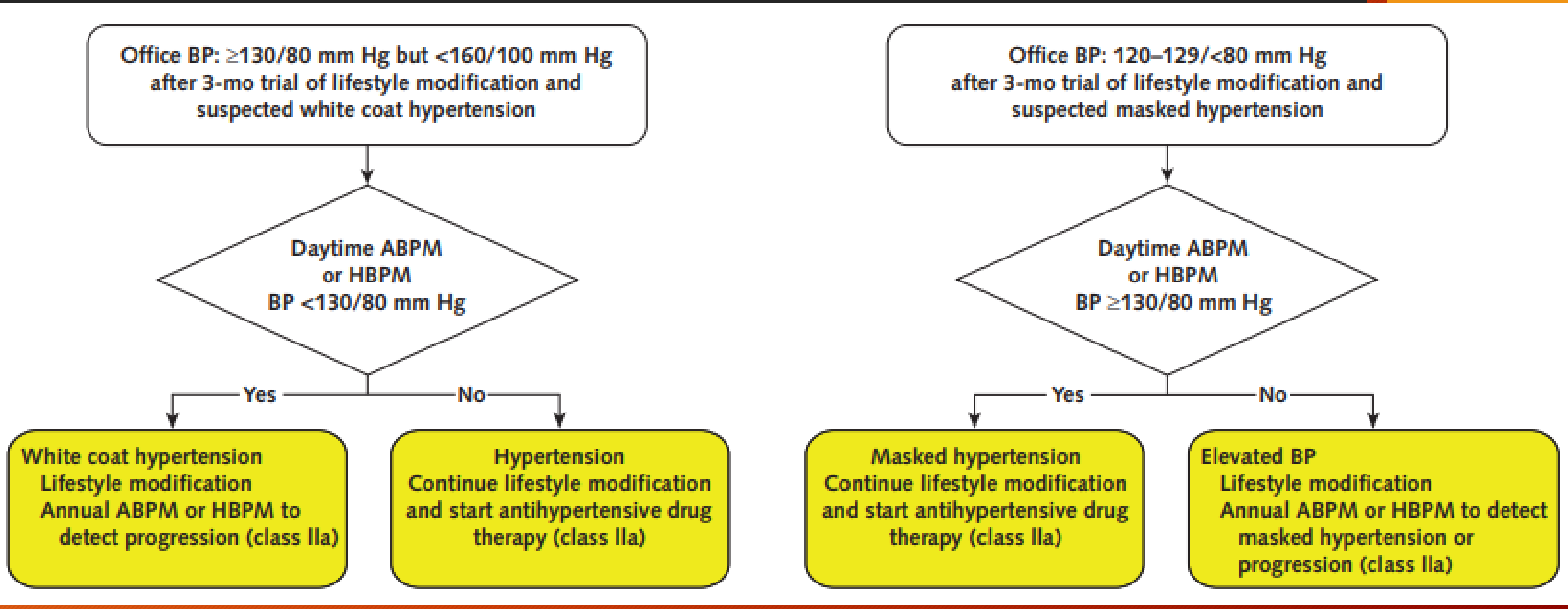
Williams B et al.. Eur Heart J. 2018;39:3021-3
Whelton PK et al. J Am Coll Cardiol. 2018;71:2199-2269.

Office BP Treatment Goals

Age Group	Office Systolic Blood Pressure Treatment Target Ranges (mm Hg)					Diastolic Treatment Target Range (mm Hg)
	Hypertension	+ Diabetes Mellitus	+ CKD	+ CAD	+ Stroke/TIA	
18–65 y	Target to 130 or lower if tolerated	Target to 130 or lower if tolerated	Target to <140 to 130 if tolerated	Target to 130 or lower if tolerated	Target to 130 or lower if tolerated	<80 to 70
	Not <120	Not <120		Not <120	Not <120	
65–79 y	Target to <140 to 130 if tolerated	Target to <140 to 130 if tolerated	Target to <140 to 130 if tolerated	Target to <140 to 130 if tolerated	Target to <140 to 130 if tolerated	<80 to 70
≥ 80 y	Target to <140 to 130 if tolerated	Target to <140 to 130 if tolerated	Target to <140 to 130 if tolerated	Target to <140 to 130 if tolerated	Target to <140 to 130 if tolerated	<80 to 70
Diastolic treatment target range (mmHg)	<80 to 70	<80 to 70	< 80 to 70	<80 to 70	<80 to 70	

Williams B et al. Eur Heart J. 2018;39:3021–3104

Algorithm for detection of masked hypertension in patients not on drug therapy.



ABPM = ambulatory blood pressure monitoring; BP = blood pressure; HBPM = home blood pressure monitoring

Carey RM et al. Ann Intern Med. 2018;168(5):351-358.

American college of Cardiology recommendations for Hypertension

Applying Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care

CLASS (STRENGTH) OF RECOMMENDATION

CLASS I (STRONG) — **Benefit >>> Risk**

Suggested phrases for writing recommendations:
- Is recommended
- Is indicated/useful/effective/beneficial
- Should be performed/administered/other
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is recommended/indicated in preference to treatment B
  - Treatment A should be chosen over treatment B

CLASS IIa (MODERATE) — **Benefit >> Risk**

Suggested phrases for writing recommendations:
- Is reasonable
- Can be useful/effective/beneficial
- Comparative-Effectiveness Phrases†:
  - Treatment/strategy A is probably recommended/indicated in preference to treatment B
  - It is reasonable to choose treatment A over treatment B

CLASS IIb (WEAK) — **Benefit ≥ Risk**

Suggested phrases for writing recommendations:
- May/might be reasonable
- May/might be considered
- Usefulness/effectiveness is unknown/unclear/uncertain or not well established

CLASS III: No Benefit (MODERATE) — **Benefit = Risk**
(Generally, LOE A or B use only)

Suggested phrases for writing recommendations:
- Is not recommended
- Is not indicated/useful/effective/beneficial
- Should not be performed/administered/other

CLASS III: Harm (STRONG) — **Risk > Benefit**

Suggested phrases for writing recommendations:
- Potentially harmful
- Causes harm
- Associated with excess morbidity/mortality
- Should not be performed/administered/other

LEVEL (QUALITY) OF EVIDENCE‡

LEVEL A
- High-quality evidence‡ from more than 1 RCT
- Meta-analyses of high-quality RCTs
- One or more RCTs corroborated by high-quality registry studies

LEVEL B-R (Randomized)
- Moderate-quality evidence‡ from 1 or more RCTs
- Meta-analyses of moderate-quality RCTs

LEVEL B-NR (Nonrandomized)
- Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies
- Meta-analyses of such studies

LEVEL C-LD (Limited Data)
- Randomized or nonrandomized observational or registry studies with limitations of design or execution
- Meta-analyses of such studies
- Physiological or mechanistic studies in human subjects

LEVEL C-EO (Expert Opinion)

Consensus of expert opinion based on clinical experience

COR and LOE are determined independently (any COR may be paired with any LOE).

A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

* The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).

† For comparative-effectiveness recommendations (COR I and IIa; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

‡ The method of assessing quality is evolving, including the application of standardized, widely used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee.

COR indicates Class of Recommendation; EO, expert opinion; LD, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; and RCT, randomized controlled trial.

Definition of High BP

COR	LOE	Recommendation for Definition of High BP
I	B-NR	BP should be categorized as normal, elevated, or stage 1 or 2 hypertension to prevent and treat high BP.

Categories of BP in Adults

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
Hypertension			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

*Individuals with SBP and DBP in 2 categories should be designated to the higher BP category.
BP indicates blood pressure (based on an average of ≥2 careful readings obtained on ≥2 occasions, as detailed in DBP, diastolic blood pressure; and SBP systolic blood pressure.

Goals of Therapy in Hypertension and cardio vascular disease according to American college of Cardiology

Clinical condition	BP Threshold mm Hg	BP goal mm Hg
Clinical CVD or 10-year ASCVD risk >10%	>130/80	<130/80
No clinical CVD and 10-year ASCVD risk <10%	>140/90	<130/80
Heart failure	> 130/80	<130/80
Stable ischemic heart disease	> 130/80	<130/80

ASCVD indicates atherosclerotic cardiovascular disease; BP, blood pressure; CVD, cardiovascular disease; and SBP, systolic blood pressure.

Whelton PK et al. J Am Coll Cardiol 2018;71: 127–248

Comparison of American and European Society guidelines recommened goals for Hypertension

Guideline Differences	American College of Cardiology/American Heart Association (ACC/AHA)			European Society of Cardiology/European Society of Hypertension (ESC/ESH)		
Level of blood pressure (BP) defining hypertension	Systolic (mm Hg)	and/or	Diastolic (mm Hg)	Systolic (mm Hg)	and/or	Diastolic (mm Hg)
Office/Clinic BP	≥ 130		≥ 80	≥ 140		≥ 90
Daytime mean	≥ 130		≥ 80	≥ 135		≥ 85
Nighttime mean	≥ 110		≥ 65	≥ 120		≥ 70
24-hour mean	≥ 125		≥ 75	≥ 130		≥ 80
Home BP mean	≥ 130		≥ 80	≥ 135		≥ 85
BP targets for treatment	< 130/80 mm Hg			Systolic targets < 140 mm Hg and close to 130 mm Hg		
Initial Combination Therapy	Initial single-pill combination therapy in patients > 20/10 mm Hg above BP goal			Initial single-pill combination therapy in patients ≥ 140/90 mm Hg		
Hypertensive requiring intervention	> 130/80 mm Hg			≥ 140/90 mm Hg		

Bakris G et al. *J Am Coll Cardiol*. 2019;73(23):3018-3026.

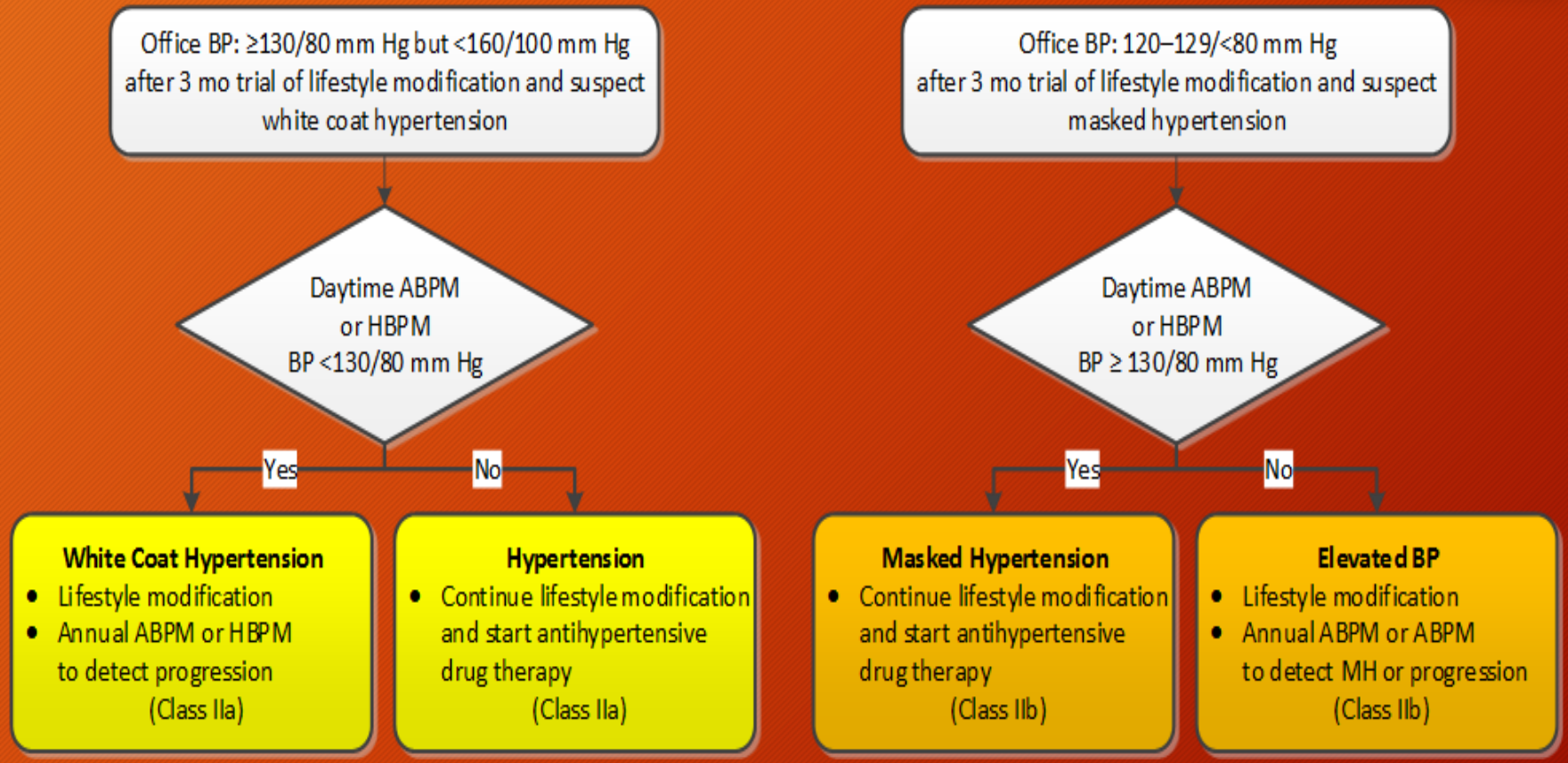
Masked and White Coat Hypertension

COR	LOE	Recommendations for Masked and White Coat Hypertension
IIa	B-NR	In adults with an untreated SBP greater than 130 mm Hg but less than 160 mm Hg or DBP greater than 80 mm Hg but less than 100 mm Hg, it is reasonable to screen for the presence of white coat hypertension by using either daytime ABPM or HBPM before diagnosis of hypertension.
IIa	C-LD	In adults with white coat hypertension, periodic monitoring with either ABPM or HBPM is reasonable to detect transition to sustained hypertension.
IIa	C-LD	In adults being treated for hypertension with office BP readings not at goal and HBPM readings suggestive of a significant white coat effect, confirmation by ABPM can be useful.

Masked and White Coat Hypertension (cont.)

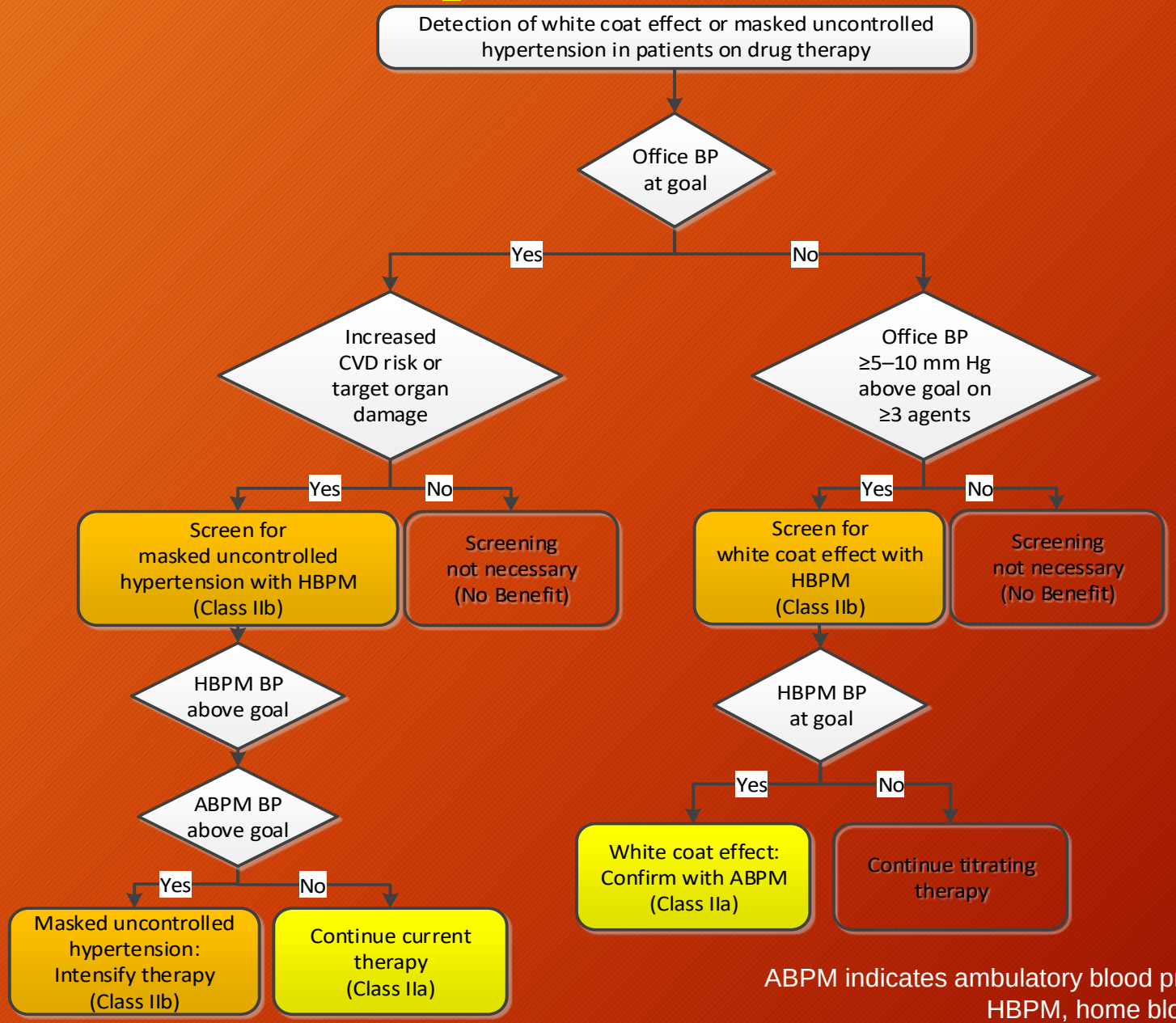
COR	LOE	Recommendations for Masked and White Coat Hypertension
IIa	B-NR	In adults with untreated office BPs that are consistently between 120 mm Hg and 129 mm Hg for SBP or between 75 mm Hg and 79 mm Hg for DBP, screening for masked hypertension with HBPM (or ABPM) is reasonable.
IIb	C-LD	In adults on multiple-drug therapies for hypertension and office BPs within 10 mm Hg above goal, it may be reasonable to screen for white coat effect with HBPM (or ABPM).
IIb	C-EO	It may be reasonable to screen for masked uncontrolled hypertension with HBPM in adults being treated for hypertension and office readings at goal, in the presence of target organ damage or increased overall CVD risk.
IIb	C-EO	In adults being treated for hypertension with elevated HBPM readings suggestive of masked uncontrolled hypertension, confirmation of the diagnosis by ABPM might be reasonable before intensification of antihypertensive drug treatment.

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



ABPM indicates ambulatory blood pressure monitoring; BP, blood pressure; and HBPM, home blood pressure monitoring.

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



ABPM indicates ambulatory blood pressure monitoring; BP, blood pressure; and HBPM, home blood pressure monitoring.

Basic and Optional Laboratory Tests for Primary Hypertension

Basic testing	Fasting blood glucose*
	Complete blood count
	Lipid profile
	Serum creatinine with eGFR*
	Serum sodium, potassium, calcium*
	Thyroid-stimulating hormone
	Urinalysis
	Electrocardiogram
Optional testing	Echocardiogram
	Uric acid
	Urinary albumin to creatinine ratio

*May be included in a comprehensive metabolic panel.
eGFR indicates estimated glomerular filtration rate.

Follow-Up After Initial BP Evaluation

COR	LOE	Recommendations for Follow-Up After Initial BP Elevation
I	B-R	Adults with an elevated BP or stage 1 hypertension who have an estimated 10-year ASCVD risk less than 10% should be managed with nonpharmacological therapy and have a repeat BP evaluation within 3 to 6 months.
I	B-R	Adults with stage 1 hypertension who have an estimated 10-year ASCVD risk of 10% or higher should be managed initially with a combination of nonpharmacological and antihypertensive drug therapy and have a repeat BP evaluation in 1 month.
I	B-R	Adults with stage 2 hypertension should be evaluated by or referred to a primary care provider within 1 month of the initial diagnosis, have a combination of nonpharmacological and antihypertensive drug therapy (with 2 agents of different classes) initiated, and have a repeat BP evaluation in 1 month.

Follow-Up After Initial BP Evaluation

COR	LOE	Recommendations for Follow-Up After Initial BP Elevation
I	B-R	For adults with a very high average BP (e.g., SBP ≥180 mm Hg or DBP ≥110 mm Hg), evaluation followed by prompt antihypertensive drug treatment is recommended.
IIa	C-EO	For adults with a normal BP, repeat evaluation every year is reasonable.

BP Treatment Threshold and the CVD Risk Estimation to Guide Drug Treatment of Hypertension

COR	LOE	Recommendations for BP Treatment Threshold and Use of Risk Estimation* to Guide Drug Treatment of Hypertension
I	SBP: A DBP: C-EO	Use of BP-lowering medications is recommended for secondary prevention of recurrent CVD events in patients with clinical CVD and an average SBP of 130 mm Hg or higher or an average DBP of 80 mm Hg or higher, and for primary prevention in adults with an estimated 10-year atherosclerotic cardiovascular disease (ASCVD) risk of 10% or higher and an average SBP 130 mm Hg or higher or an average DBP 80 mm Hg or higher.
I	C-LD	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 an SBP of 140 mm Hg or higher or a DBP of 90 mm Hg or higher.

*ACC/AHA Pooled Cohort Equations (http://tools.acc.org/ASCVD-Risk-Estimator/) to estimate 10-year risk of atherosclerotic CVD.

Nonpharmacological Interventions

COR	LOE	Recommendations for Nonpharmacological Interventions
I	A	Increased physical activity with a structured exercise program is recommended for adults with elevated BP or hypertension.
I	A	Adult men and women with elevated BP or hypertension who currently consume alcohol should be advised to drink no more than 2 and 1 standard drinks* per day, respectively.

Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension

	Nonpharmacological Intervention	Dose	Approximate Impact on SBP	
			Hypertension	Normotension
Physical activity	Aerobic	• 90–150 min/wk • 65%–75% heart rate reserve	-5/8 mm Hg	-2/4 mm Hg
	Dynamic resistance	• 90–150 min/wk • 50%–80% 1 rep maximum • 6 exercises, 3 sets/exercise, 10 repetitions/set	-4 mm Hg	-2 mm Hg
	Isometric resistance	• 4 × 2 min (hand grip), 1 min rest between exercises, 30%–40% maximum voluntary contraction, 3 sessions/wk • 8–10 wk	-5 mm Hg	-4 mm Hg
Moderation in alcohol intake	Alcohol consumption	In individuals who drink alcohol, reduce alcohol† to: • Men: ≤2 drinks daily • Women: ≤1 drink daily	-4 mm Hg	-3 mm

*Type, dose, and expected impact on BP in adults with a normal BP and with hypertension.
†In the United States, one "standard" drink contains roughly 14 g of pure alcohol, which is typically found in 12 oz of regular beer (usually about 5% alcohol), 5 oz of wine (usually about 12% alcohol), and 1.5 oz of distilled spirits (usually about 40% alcohol).

General Principles of Drug Therapy

COR	LOE	Recommendation for General Principle of Drug Therapy
III: Harm	A	Simultaneous use of an ACE inhibitor, ARB, and/or renin inhibitor is potentially harmful and is not recommended to treat adults with hypertension.

BP Goal for Patients With Hypertension

COR	LOE	Recommendations for BP Goal for Patients With Hypertension
I	SBP: B-R[SR]	For adults with confirmed hypertension and known CVD or 10-year ASCVD event risk of 10% or higher a BP target of less than 130/80 mm Hg is recommended.
	DBP: C-EO	
IIb	SBP: B-NR	For adults with confirmed hypertension, without additional markers of increased CVD risk, a BP target of less than 130/80 mm Hg may be reasonable.
	DBP: C-EO	

SR indicates systematic review.

Choice of Initial Medication

COR	LOE	Recommendation for Choice of Initial Medication
I	A^{SR}	For initiation of antihypertensive drug therapy, first-line agents include thiazide diuretics, CCBs, and ACE inhibitors or ARBs.

SR indicates systematic review.

Choice of Initial Monotherapy Versus Initial Combination Drug Therapy

COR	LOE	Recommendations for Choice of Initial Monotherapy Versus Initial Combination Drug Therapy*
I	C-EO	Initiation of antihypertensive drug therapy with 2 first-line agents of different classes, either as separate agents or in a fixed-dose combination, is recommended in adults with stage 2 hypertension and an average BP more than 20/10 mm Hg above their BP target.
IIa	C-EO	Initiation of antihypertensive drug therapy with a single antihypertensive drug is reasonable in adults with stage 1 hypertension and BP goal <130/80 mm Hg with dosage titration and sequential addition of other agents to achieve the BP target.

Follow-Up After Initiating Antihypertensive Drug Therapy

COR	LOE	Recommendation for Follow-Up After Initiating Antihypertensive Drug Therapy
I	B-R	Adults initiating a new or adjusted drug regimen for hypertension should have a follow-up evaluation of adherence and response to treatment at monthly intervals until control is achieved.

Monitoring Strategies to Improve Control of BP in Patients on Drug Therapy for High BP

COR	LOE	Recommendation for Monitoring Strategies to Improve Control of BP in Patients on Drug Therapy for High BP
I	A	Follow-up and monitoring after initiation of drug therapy for hypertension control should include systematic strategies to help improve BP, including use of HBPM, team-based care, and telehealth strategies.

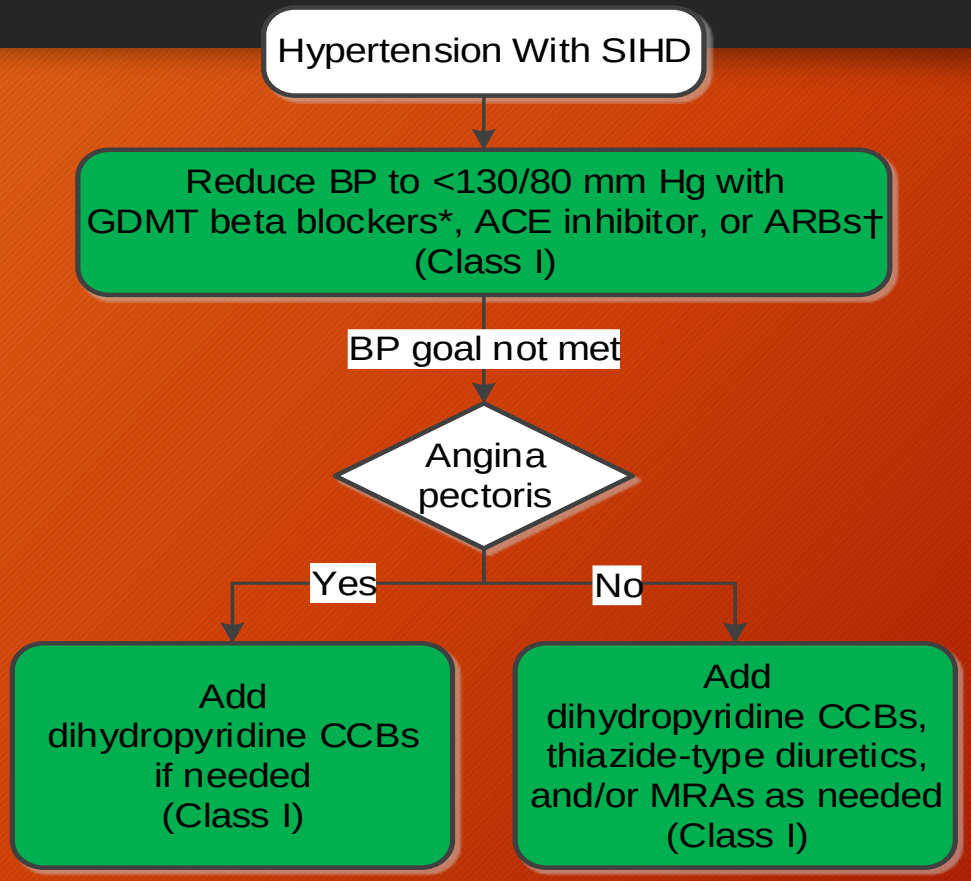
Stable Ischemic Heart Disease (SIHD)

COR	LOE	Recommendations for Treatment of Hypertension in Patients With Stable Ischemic Heart Disease (SIHD)
I	SBP: B-R	In adults with SIHD and hypertension, a BP target of less than 130/80 mm Hg is recommended.
	DBP: C-EO	
I	SBP: B-R	Adults with SIHD and hypertension (BP ≥130/80 mm Hg) should be treated with medications (e.g., GDMT beta blockers, ACE inhibitors, or ARBs) for compelling indications (e.g., previous MI, stable angina) as first-line therapy, with the addition of other drugs (e.g., dihydropyridine CCBs, thiazide diuretics, and/or mineralocorticoid receptor antagonists) as needed to further control hypertension.
	DBP: C-EO	

Stable Ischemic Heart Disease (cont.)

COR	LOE	Recommendations for Treatment of Hypertension in Patients With Stable Ischemic Heart Disease (SIHD)
I	B-NR	In adults with SIHD with angina and persistent uncontrolled hypertension, the addition of dihydropyridine CCBs to GDMT beta blockers is recommended.
IIa	B-NR	In adults who have had a MI or acute coronary syndrome, it is reasonable to continue GDMT beta blockers beyond 3 years as long-term therapy for hypertension.
IIb	C-EO	Beta blockers and/or CCBs might be considered to control hypertension in patients with CAD (without HF*r*EF) who had an MI more than 3 years ago and have angina.

Management of Hypertension in Patients With SIHD



Colors correspond to Class of Recommendation in Table 1.

*GDMT beta blockers for BP control or relief of angina include carvedilol, metoprolol tartrate, metoprolol succinate, nadolol, bisoprolol, propranolol, and timolol. Avoid beta blockers with intrinsic sympathomimetic activity. The beta blocker atenolol should not be used because it is less effective than placebo in reducing cardiovascular events.

†If needed for BP control.

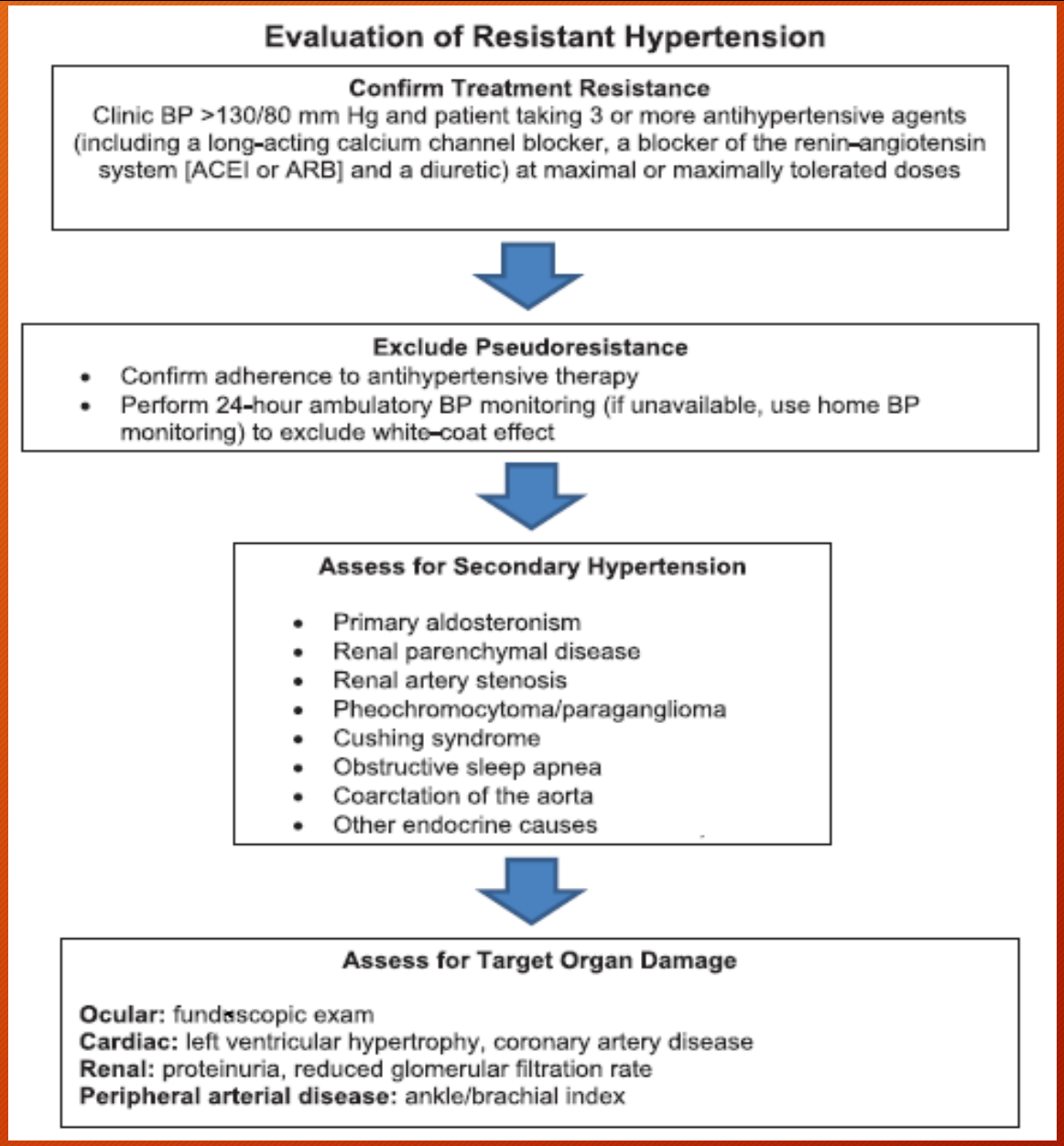
- ACE indicates angiotensin-converting enzyme;
- ARB, angiotensin receptor blocker;
- BP, blood pressure;
- CCB, calcium channel blocker;
- GDMT, guideline-directed management and therapy; and
- SIHD, stable ischemic heart disease.

Resistant Hypertension

- Resistant hypertension (RH) is defined elevated BP in a patient despite the concurrent use of 3 antihypertensive drug classes, including a long-acting calcium channel blocker, renin-angiotensin system blocker and a diuretic.
- RH refers to hypertension with both uncontrolled and controlled BP, depending on the number of antihypertensive agents used.
- Among treated adults with hypertension, prevalent RH occurs in ≈12% to 15% of population-based and 15% to 18% of clinic-based reports.
- The antihypertensive drugs should be administered at maximum or maximally tolerated daily doses and at the appropriate dosing frequency.

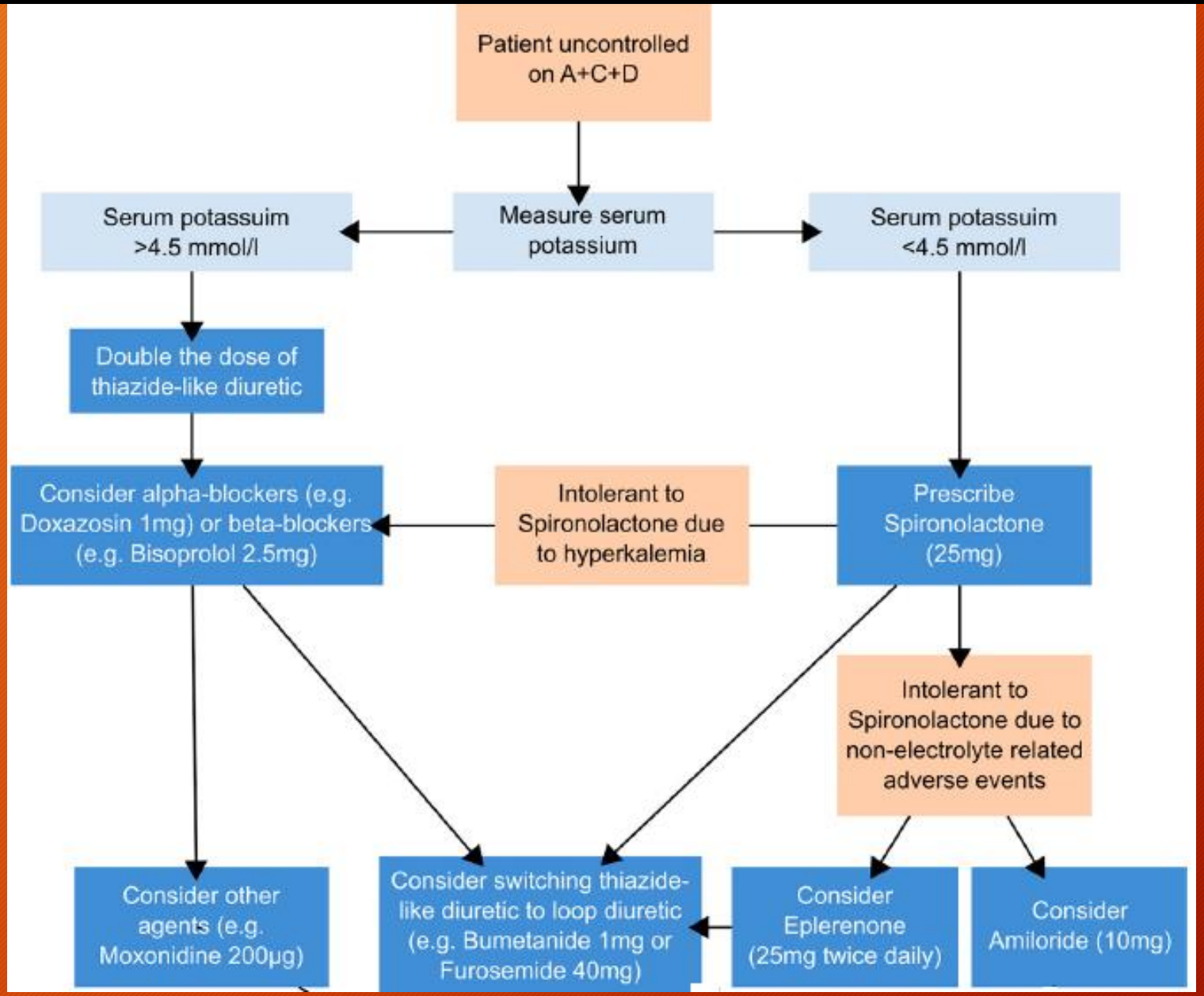
Carey RM et al. Hypertension. 2018;72:53-90.

Resistant Hypertension: Diagnosis, Evaluation



Carey RM et al. Hypertension. 2018;72:53-90.

Treatment of Resistant Hypertension



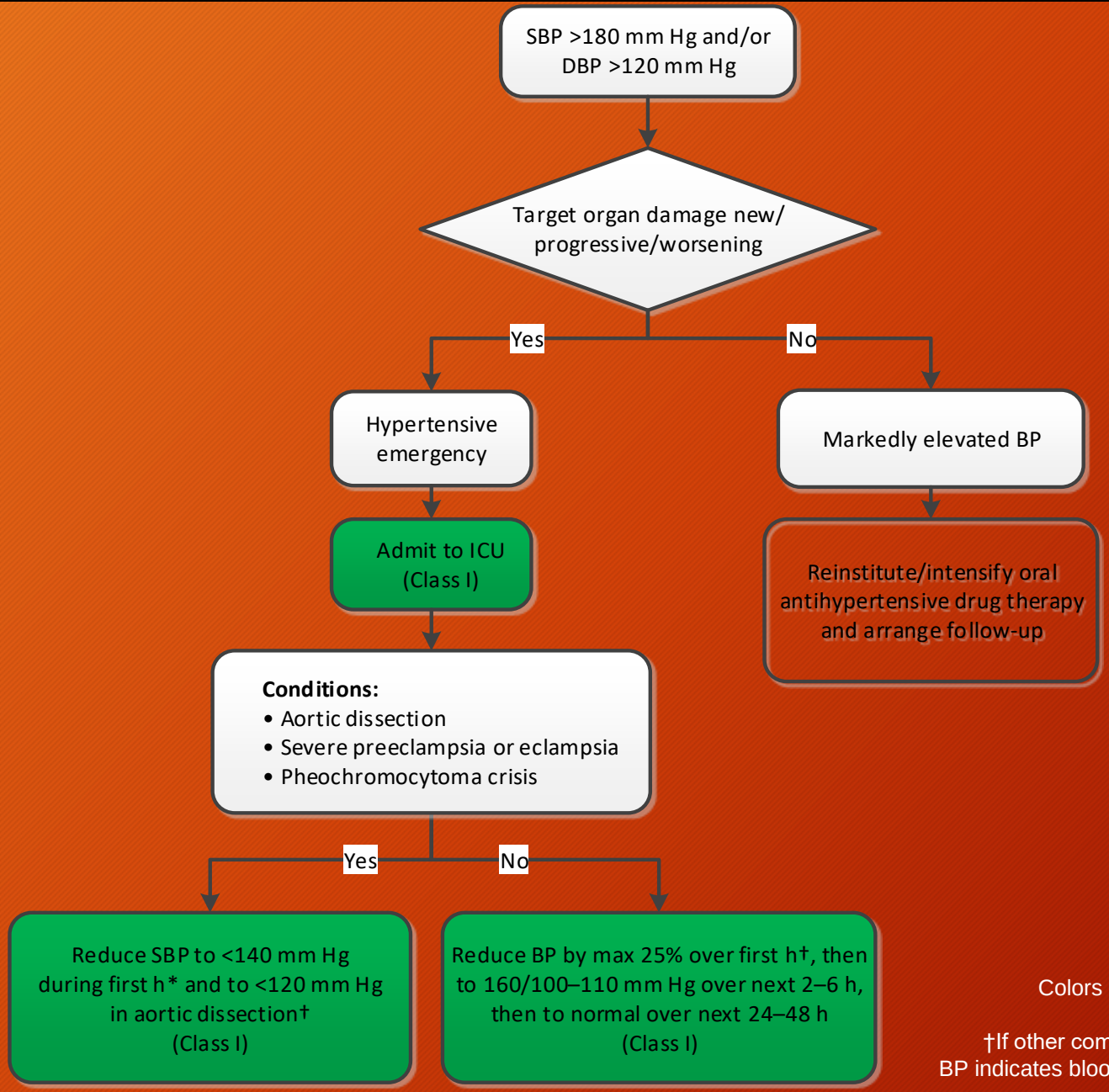
(A) - ACE inhibitor or an angiotensin II receptor blocker
(C)- calcium channel antagonist
(D) thiazide or thiazide-like diuretic

Sheppard JP et al. Heart 2017 ; 103 : 1295–1302

Hypertensive Crises: Emergencies and Urgencies

COR	LOE	Recommendations for Hypertensive Crises and Emergencies
I	B-NR	In adults with a hypertensive emergency, admission to an intensive care unit is recommended for continuous monitoring of BP and target organ damage and for parenteral administration of an appropriate agent.
I	C-EO	For adults with a compelling condition (i.e., aortic dissection, severe preeclampsia or eclampsia, or pheochromocytoma crisis), SBP should be reduced to less than 140 mm Hg during the first hour and to less than 120 mm Hg in aortic dissection.
I	C-EO	For adults without a compelling condition, SBP should be reduced by no more than 25% within the first hour; then, if stable, to 160/100 mm Hg within the next 2 to 6 hours; and then cautiously to normal during the following 24 to 48 hours.

Diagnosis and Management of a Hypertensive Crisis



Colors correspond to Class of Recommendation in Table 1.
*Use drug(s) specified in Table 19.
†If other comorbidities are present, select a drug specified in Table 20.
BP indicates blood pressure; DBP, diastolic blood pressure; ICU, intensive care unit; and SBP, systolic blood pressure.

Intravenous Antihypertensive Drugs in cardiovascular morbidity

Comorbidity	Preferred Drug(s)	Comments
Acute aortic dissection	Esmolol, labetalol	Requires rapid lowering of SBP to ≤120 mm Hg. Beta blockade should precede vasodilator (e.g., nicardipine or nitroprusside) administration, if needed for BP control or to prevent reflex tachycardia or inotropic effect; SBP ≤120 mm Hg should be achieved within 20 min.
Acute pulmonary edema	Clevidipine, nitroglycerin, nitroprusside	Beta blockers contraindicated.
Acute coronary syndromes	Esmolol, labetalol, nicardipine, nitroglycerin	Nitrates given in the presence of PDE-5 inhibitors may induce profound hypotension. Contraindications to beta blockers include moderate-to-severe LV failure with pulmonary edema, bradycardia (<60 bpm), hypotension (SBP <100 mm Hg), poor peripheral perfusion, second- or third-degree heart block, and reactive airways disease.
Eclampsia or preeclampsia	Hydralazine, labetalol, nicardipine	Requires rapid BP lowering. ACE inhibitors, ARBs, renin inhibitors, and nitroprusside contraindicated.
Perioperative hypertension (BP ≥160/90 mm Hg or SBP elevation ≥20% of the preoperative value that persists for >15 min)	Clevidipine, esmolol, nicardipine, nitroglycerin	Intraoperative hypertension is most frequently seen during anesthesia induction and airway manipulation.
Acute sympathetic discharge or catecholamine excess states (e.g., pheochromocytoma, post-carotid endarterectomy status)	Clevidipine, nicardipine, phentolamine	Requires rapid lowering of BP.

Medications and Substances that may elevate BP

Agent	Possible Management Strategy
NSAIDs	■ Avoid systemic NSAIDs when possible ■ Consider alternative analgesics (e.g., acetaminophen, tramadol, topical NSAIDs), depending on indication and risk
Recreational drugs (e.g., "bath salts" [MDPV], cocaine, methamphetamine, etc.)	■ Discontinue or avoid use
Systemic corticosteroids (e.g., dexamethasone, fludrocortisone, methylprednisolone, prednisone, prednisolone)	■ Avoid or limit use when possible ■ Consider alternative modes of administration (e.g., inhaled, topical) when feasible
Angiogenesis inhibitor (e.g., bevacizumab) and tyrosine kinase inhibitors (e.g., sunitinib, sorafenib)	■ Initiate or intensify antihypertensive therapy

ADHD indicates attention-deficit/hyperactivity disorder; BP, blood pressure; CVD, cardiovascular disease; IUD, intra-uterine device; MAOI, monoamine-oxidase inhibitors; MDPV, methylenedioxypyrovalerone; NSAIDs, nonsteroidal anti-inflammatory drugs; SNRI, serotonin norepinephrine reuptake inhibitor; SSRI, selective serotonin reuptake inhibitor; and TCA, tricyclic antidepressant

Summary

- Hypertension is a leading risk factor for death and disability-adjusted life-years worldwide.
- It is probably the most important health burden to individuals and society in terms of costs and loss of quality adjusted life-years.
- It is important for treating hypertension effectively to reduce the incidence of stroke, cardiac and renal morbidity.
- Massive screening check-ups to detect hypertension with a guaranteed follow-up and evaluation is beneficial.