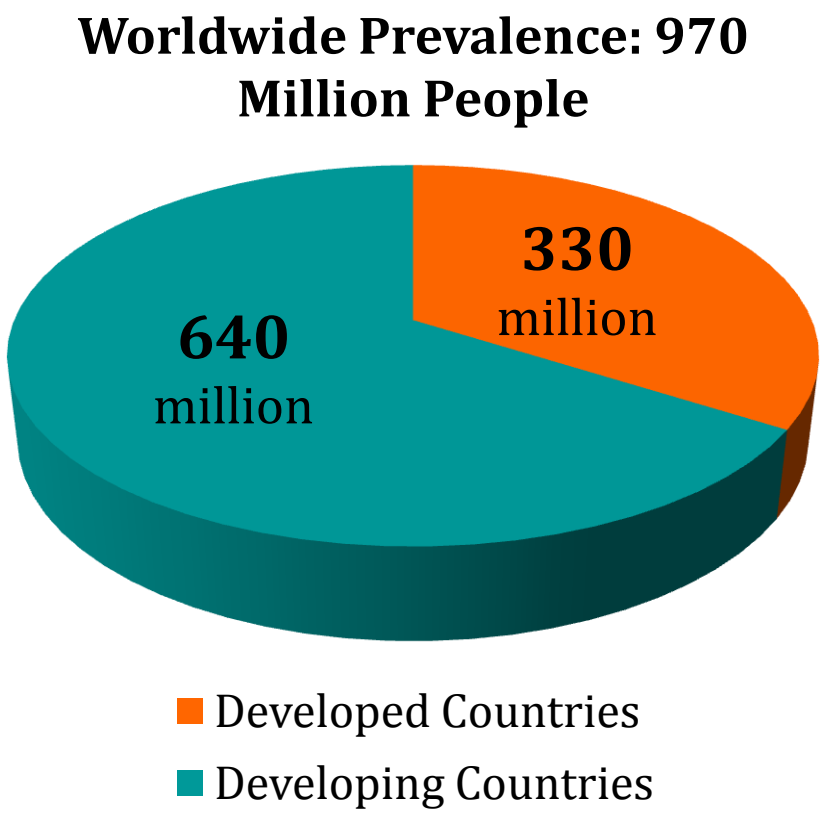
Hypertension

Hypertension Burden

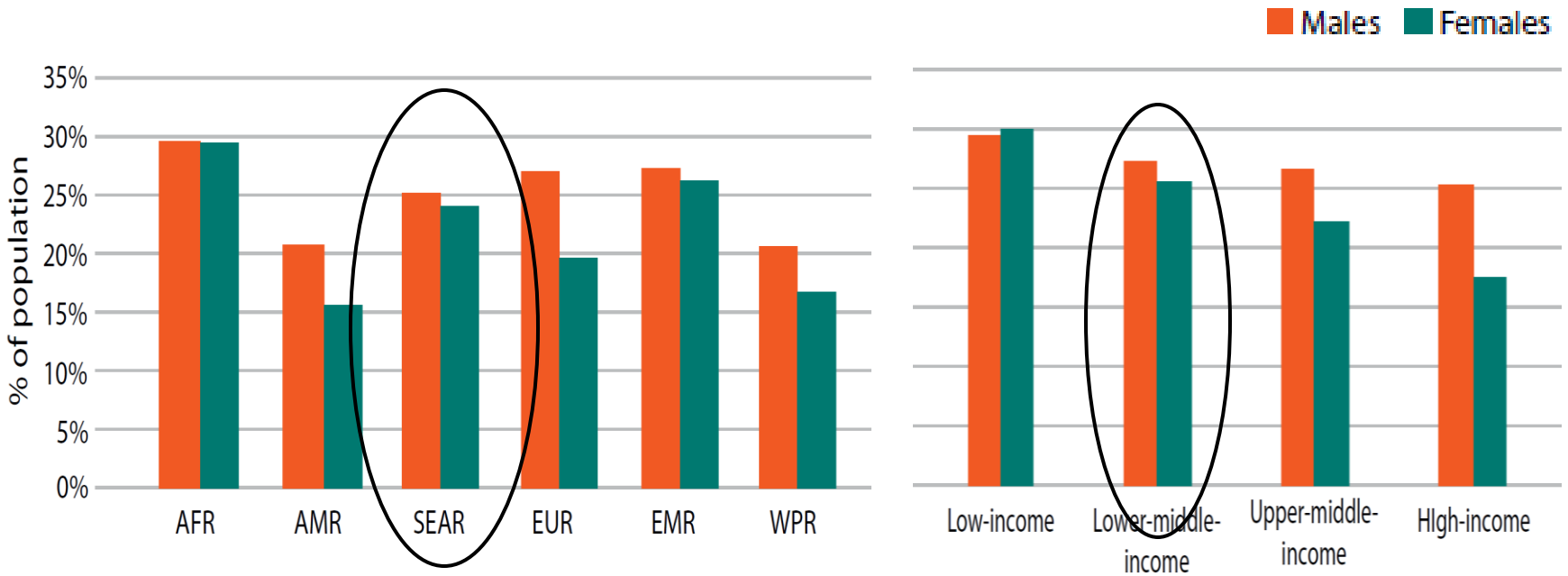
- One of the major contributors of CV morbidity and mortality
- Undiagnosed, uncontrolled, and undertreated hypertension - responsible for increased chronic disease burden
- Worldwide Prevalence: 970 million
- Expected to affect 1.56 billion adults with hypertension by 2025



World-heart-federation.org.

Hypertension: WHO Estimates

- The global prevalence is ≈22%.



AFR=African Region, AMR=Region of the Americas, SEAR =South-East Asia Region, EUR=European Region, EMR=Eastern Mediterranean Region, WPR=Western Pacific Region

Global Status Report, 2014. Apps.WHO.int.

Get The Pressure Down!!

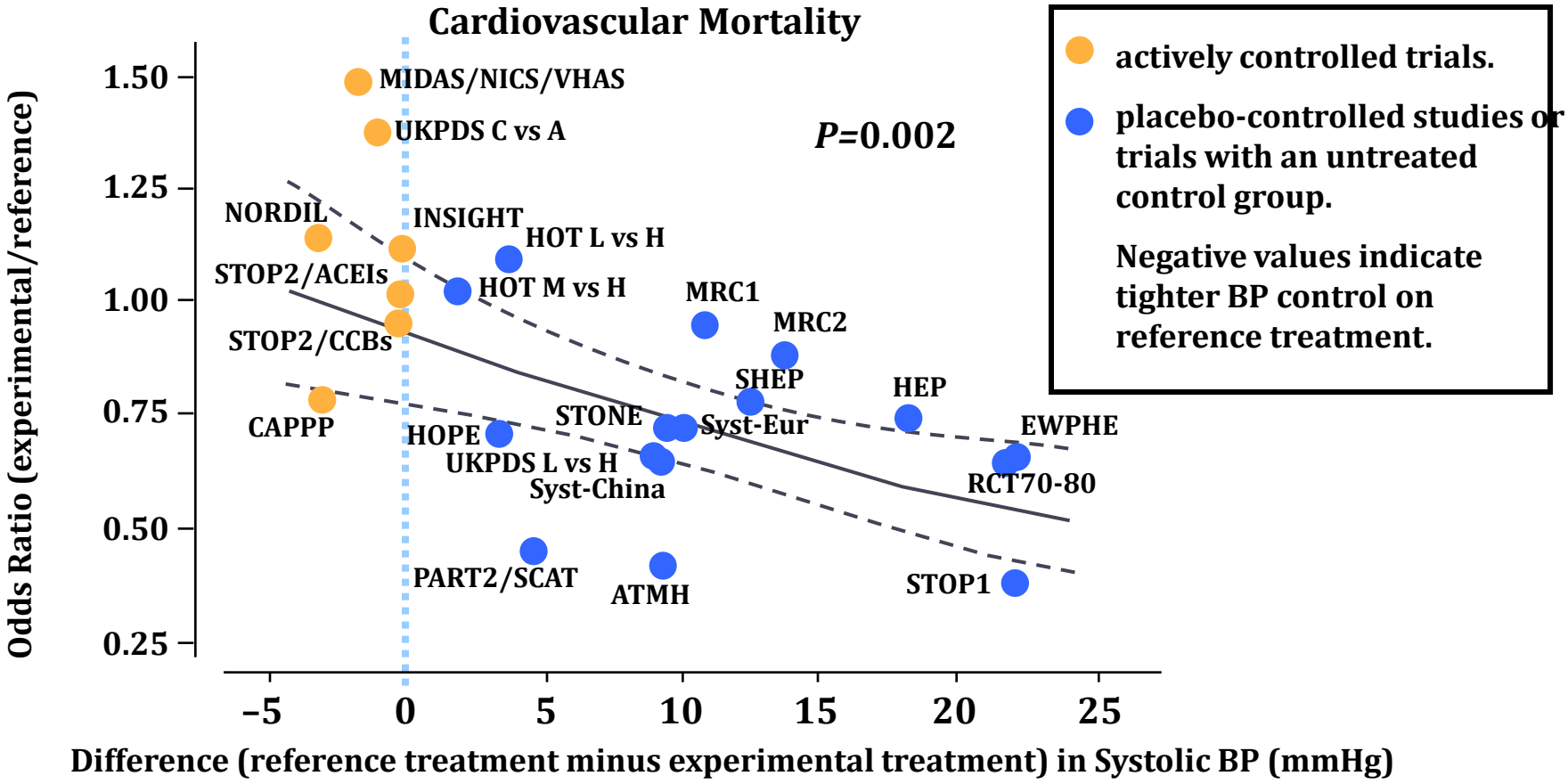
51%	Of Deaths from Stroke
45%	Of Deaths from Coronary Heart Disease
7.5 million	Deaths due to HT
13%	Total global deaths

Awareness, Diagnosis & Best antihypertensive which prevent complications will save lives !

http://www.who.int/gho/ncd/risk_factors/blood_pressure_prevalence_text/en/

Importance of Lowering BP

(Data from Multiple Clinical Trials Measuring the Impact of Hypertensive Therapy on Cardiovascular Mortality)



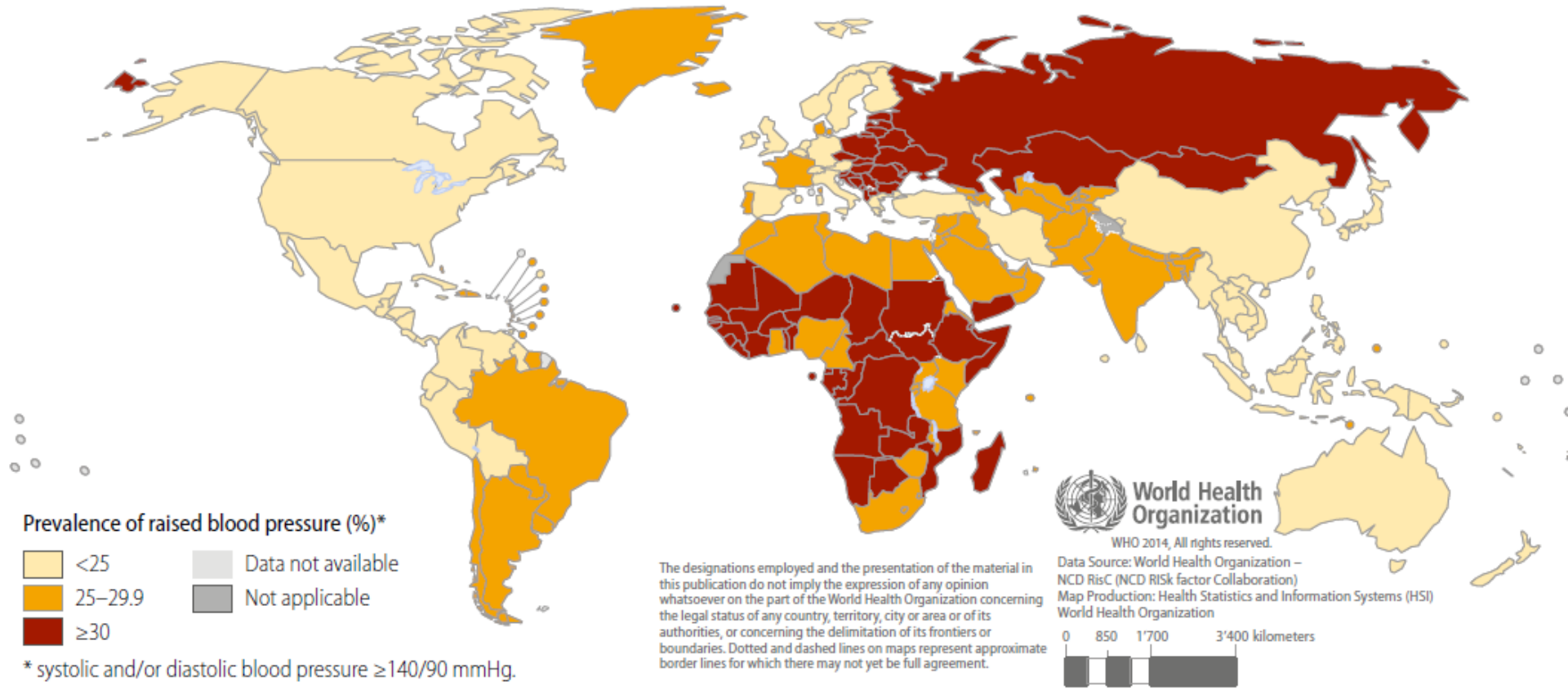
Greater differences in BP reduction mean greater reductions in the risk of cardiovascular mortality.

BP, blood pressure

Staessen JA et al. *Hypertension Research.* 2005;28:385-407.

Prevalence of Hypertension in India

Fig. 6.1 Age-standardized prevalence of raised blood pressure in males aged 18 years and over (defined as systolic and/or diastolic blood pressure equal to or above 140/90 mm Hg), comparable estimates, 2014

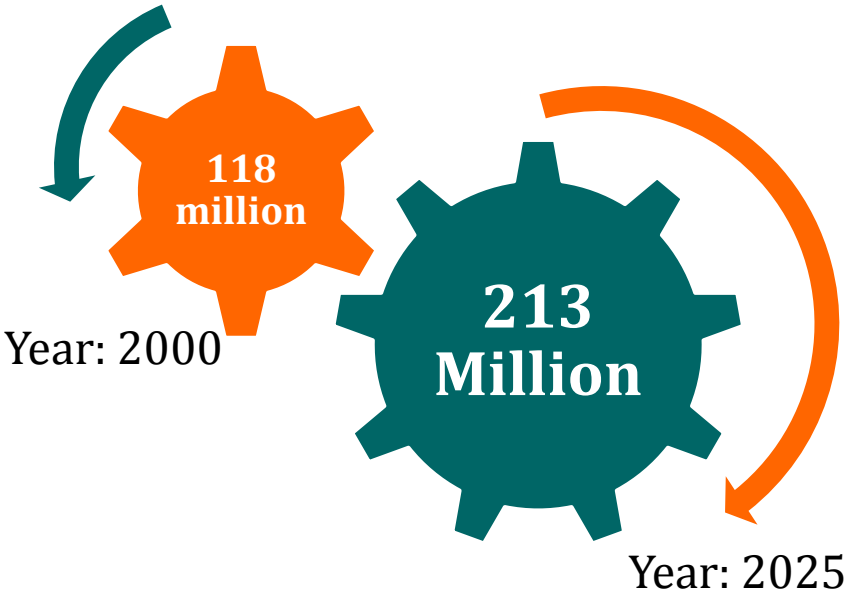


Hypertension In India

- Responsible for

57% • of all stroke deaths

24% • all deaths due to CHD

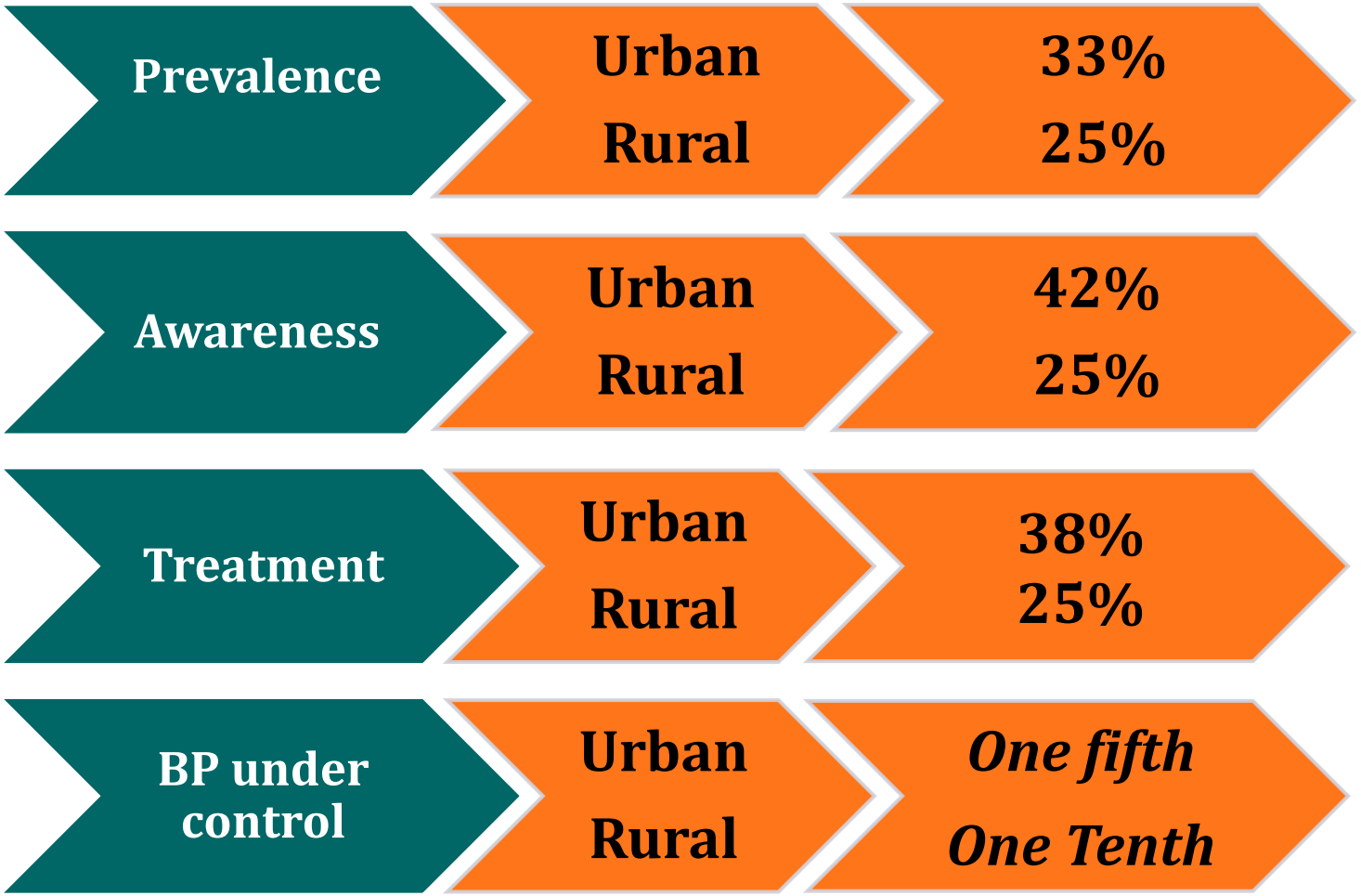


Incidence of hypertension is expected to almost double to 213 million by 2025 in India

Mohan et al:. *IJMR*. 2013;137:627-31

Hypertension In India

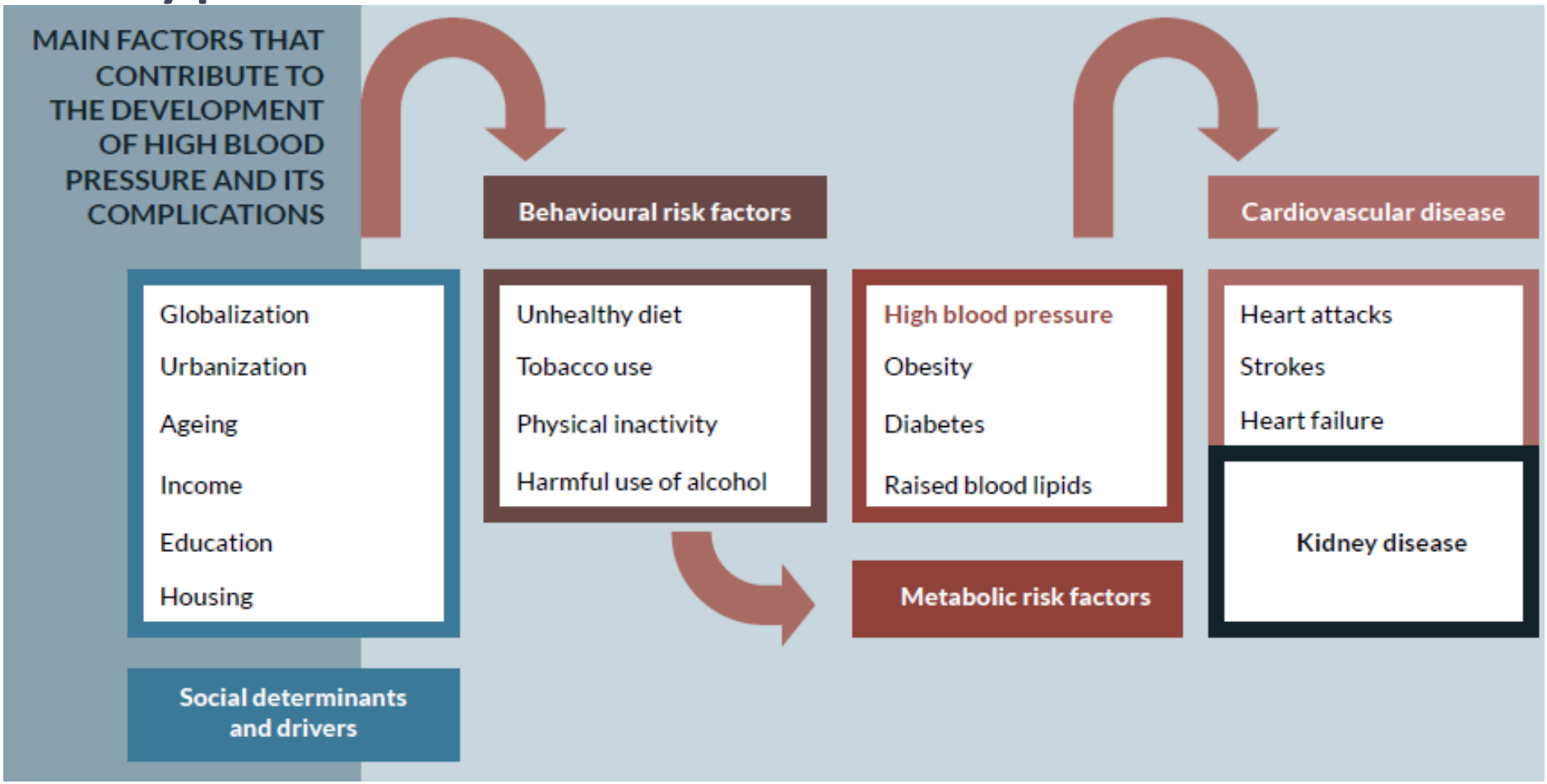
A meta-analysis by Anchala, *et al.* which included 142 articles from the year 1950 to 2013.



Anchala R *et al. J Hypertens.* 2014; 32(6):1170-77.

Uncontrolled Hypertension

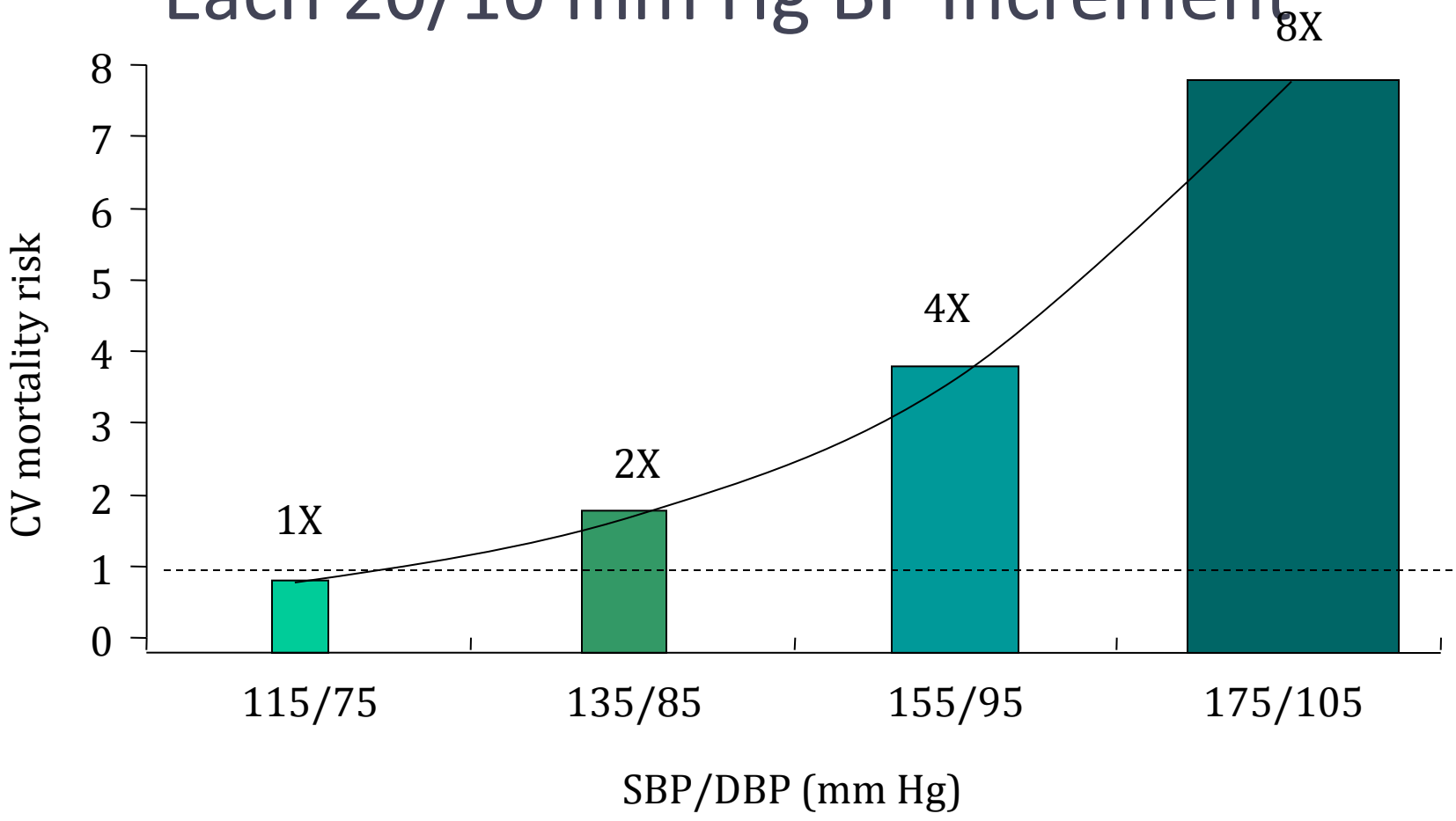
Hypertension Risk Factors



Hypertension is a polygenic disease involving a major contribution of various factors

Who.int. WHO/ A global brief on hypertension

CV Mortality Risk Doubles With Each 20/10 mm Hg BP Increment



Assadi F *et al*. *Int J Prev Med.* 2014 Mar;5(Suppl 1):S4-9.

Current Challenges in Hypertension Control

- Majority of the physicians attribute poor patient compliance to poor control.
- Most patients claim to be compliant and blame the lack of efficacy and side effects.
- Most often, physicians fail to act when patients do not achieve their targets.

Uncontrolled hypertension is due to an interplay of many factors including patient, physician, lifestyle, and diet-related factors.

Redon J *et al.* J Hypertens. 2011; 29(8):1633-40.
Wang T. *et al.* Circulation. 2005;112(11):1651-62

Hypertension

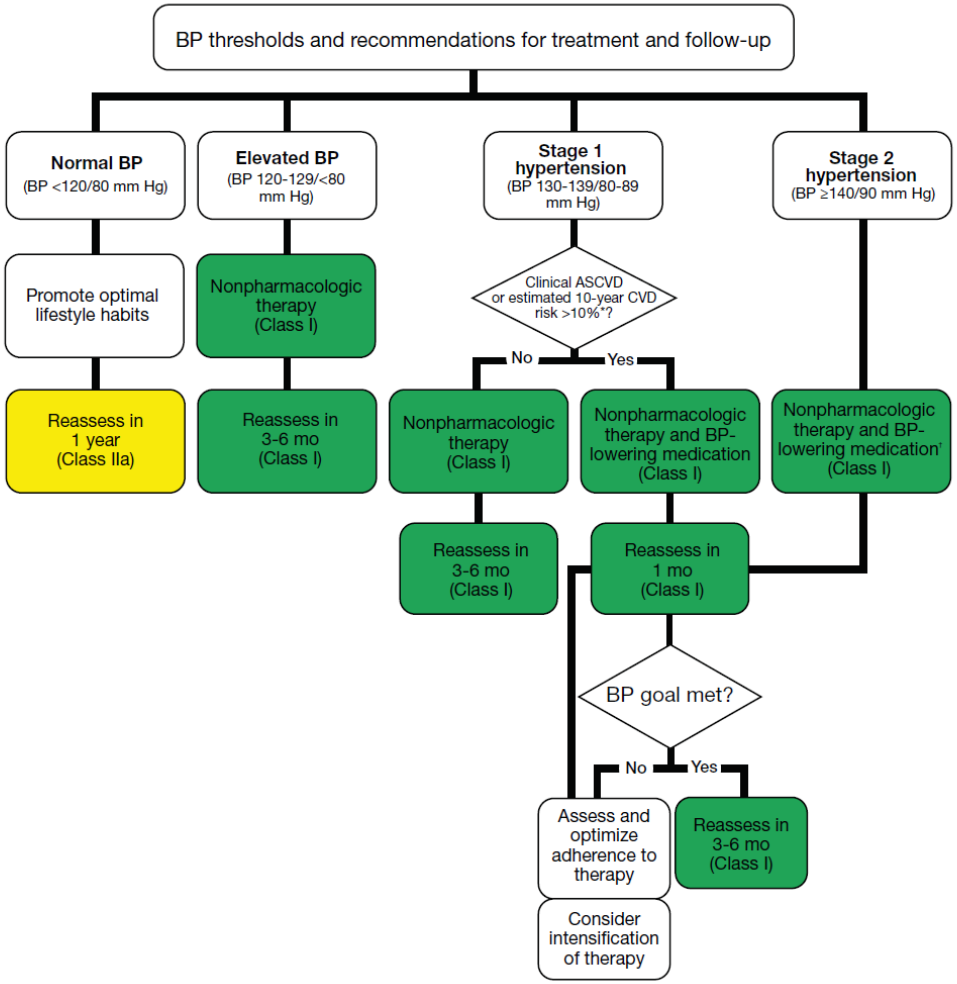
Guidelines

2017 ACC/ AHA Hypertension Guidelines

BP Category	Systolic BP		Diastolic BP	Treatment or Follow-up
Normal	<120 mm Hg	**and**	<80 mm Hg	Evaluate yearly; encourage healthy lifestyle changes to maintain normal BP
Elevated	120-129 mm Hg	**and**	<80 mm Hg	Recommend healthy lifestyle changes and reassess in 3-6 months
Hypertension: stage 1	130-139 mm Hg	**or**	80-89 mm Hg	Assess the 10-year risk for heart disease and stroke using the atherosclerotic cardiovascular disease (ASCVD) risk calculator • If risk is less than 10%, start with healthy lifestyle recommendations and reassess in 3-6 months • If risk is greater than 10% or the patient has known clinical cardiovascular disease (CVD), diabetes mellitus, or chronic kidney disease, recommend lifestyle changes and BP-lowering medication (1 medication); reassess in 1 month for effectiveness of medication therapy – If goal is met after 1 month, reassess in 3-6 months – If goal is not met after 1 month, consider different medication or titration – Continue monthly follow-up until control is achieved
Hypertension: stage 2	≥140 mm Hg	**or**	≥90 mm Hg	Recommend healthy lifestyle changes and BP-lowering medication (2 medications of different classes); reassess in 1 month for effectiveness • If goal is met after 1 month, reassess in 3-6 months • If goal is not met after 1 month, consider different medications or titration • Continue monthly follow-up until control is achieved

ACC/AHA Clinical Practice GuidelinesWhelton PK et al. Hypertension. 2017 Nov 13. pii: HYP.0000000000000066

2017 ACC/ AHA Hypertension Guidelines BP thresholds and recommendations for treatment and follow-up



ACC/AHA Clinical Practice Guidelines . Whelton PK et al. Hypertension. 2017 Nov 13. pii: HYP.0000000000000066

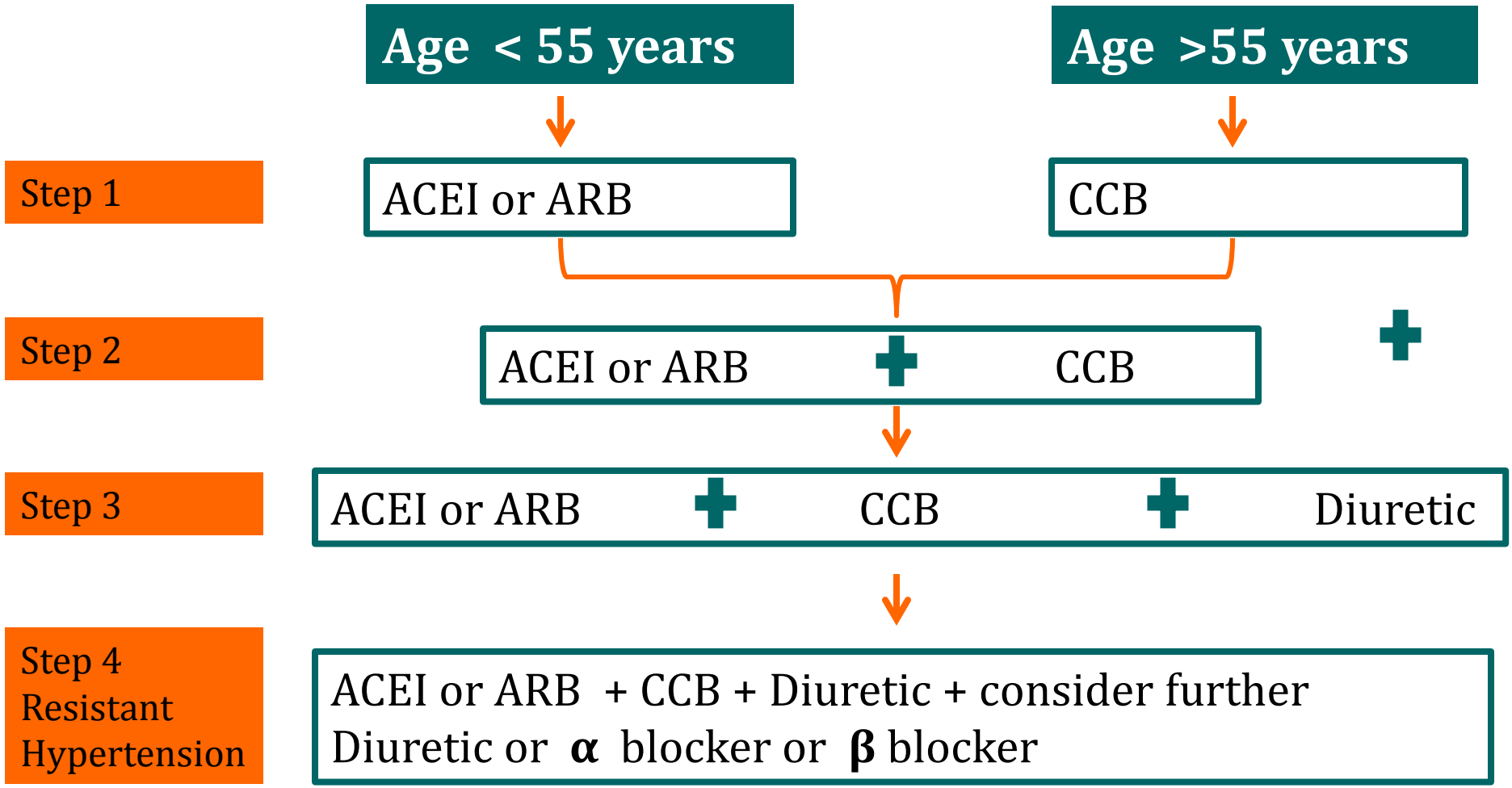
2017 ACC/ AHA Hypertension Guidelines BP thresholds and recommendations for treatment

BP Thresholds for and Goals of Pharmacological Therapy in Patients With Hypertension According to Clinical Conditions

Clinical Condition(s)	BP Threshold, mm Hg	BP Goal, mm Hg
General		
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
Older persons (≥65 years of age; noninstitutionalized, ambulatory, community-living adults)	≥130 (SBP)	<130 (SBP)
Specific comorbidities		
Diabetes mellitus	≥130/80	<130/80
Chronic kidney disease	≥130/80	<130/80
Chronic kidney disease after renal transplantation	≥130/80	<130/80
Heart failure	≥130/80	<130/80
Stable ischemic heart disease	≥130/80	<130/80
Secondary stroke prevention	≥140/90	<130/80
Secondary stroke prevention (lacunar)	≥130/80	<130/80
Peripheral arterial disease	≥130/80	<130/80

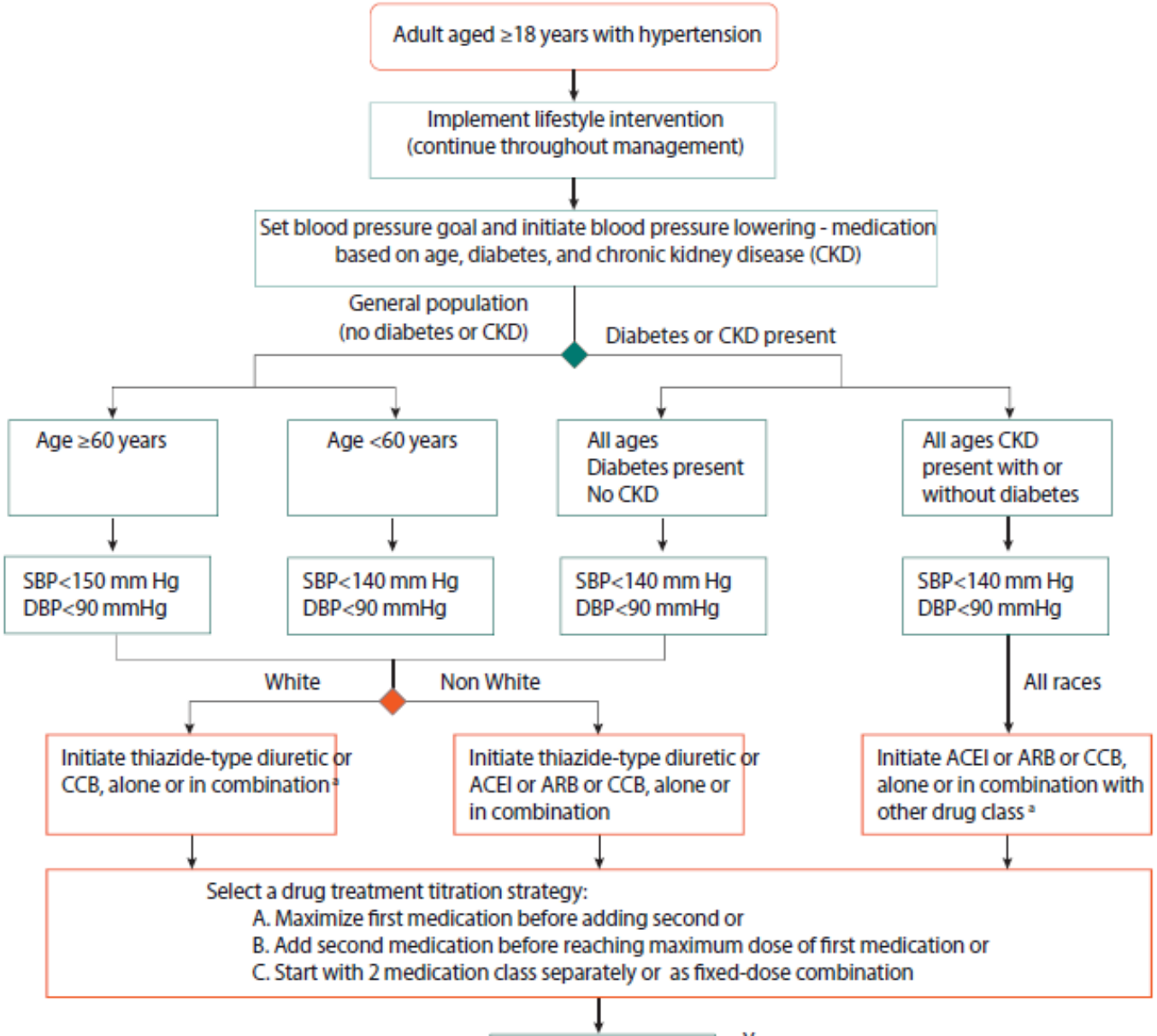
ACC/AHA Clinical Practice Guidelines . Whelton PK et al. Hypertension. 2017 Nov 13. pii: HYP.0000000000000066

NICE Clinical Guideline 2011

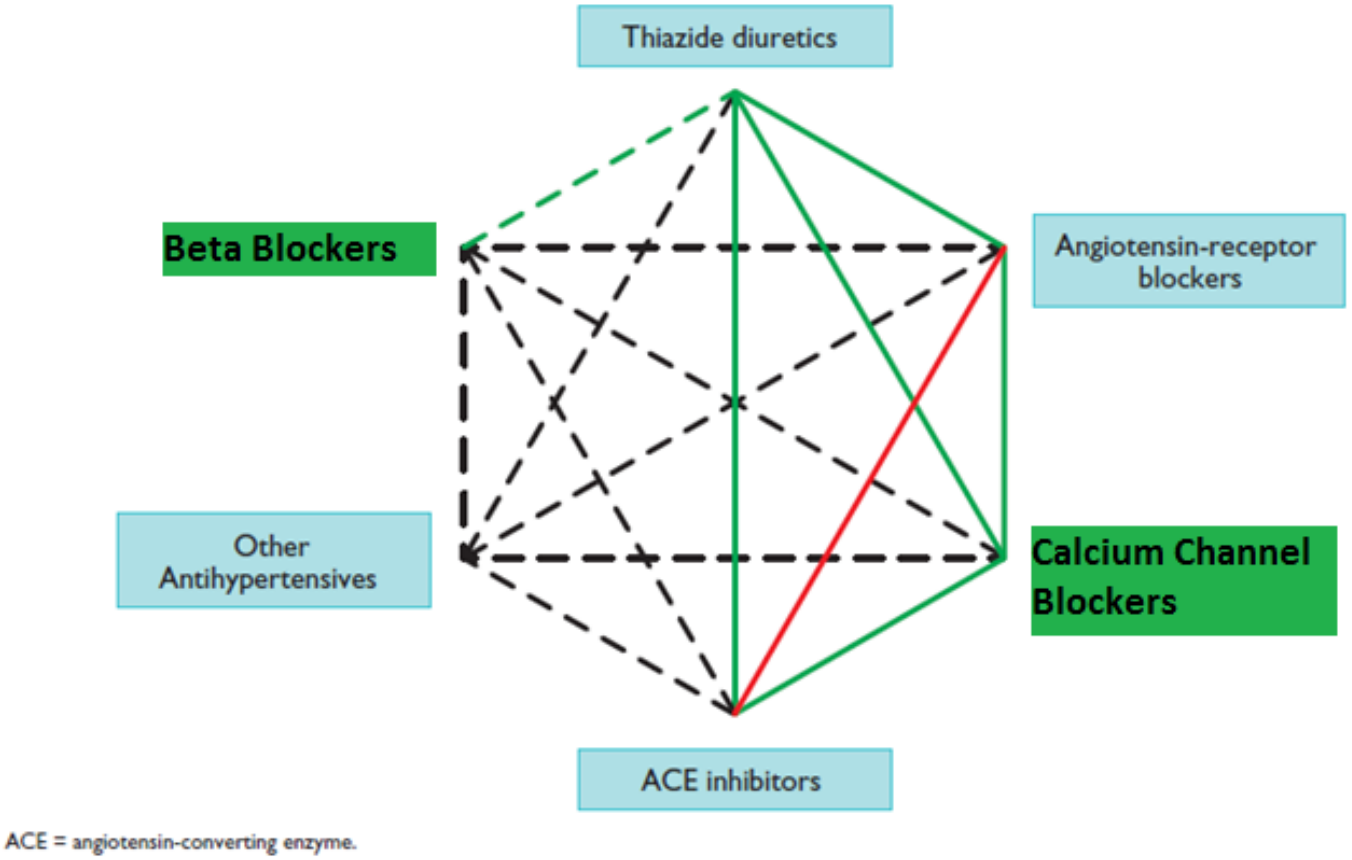


ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blockers; CCB- calcium channel blockers

2014 guidelines for management of hypertension in adults



European Society of Hypertension / European Society of Cardiology Guidelines



ACE = angiotensin-converting enzyme.

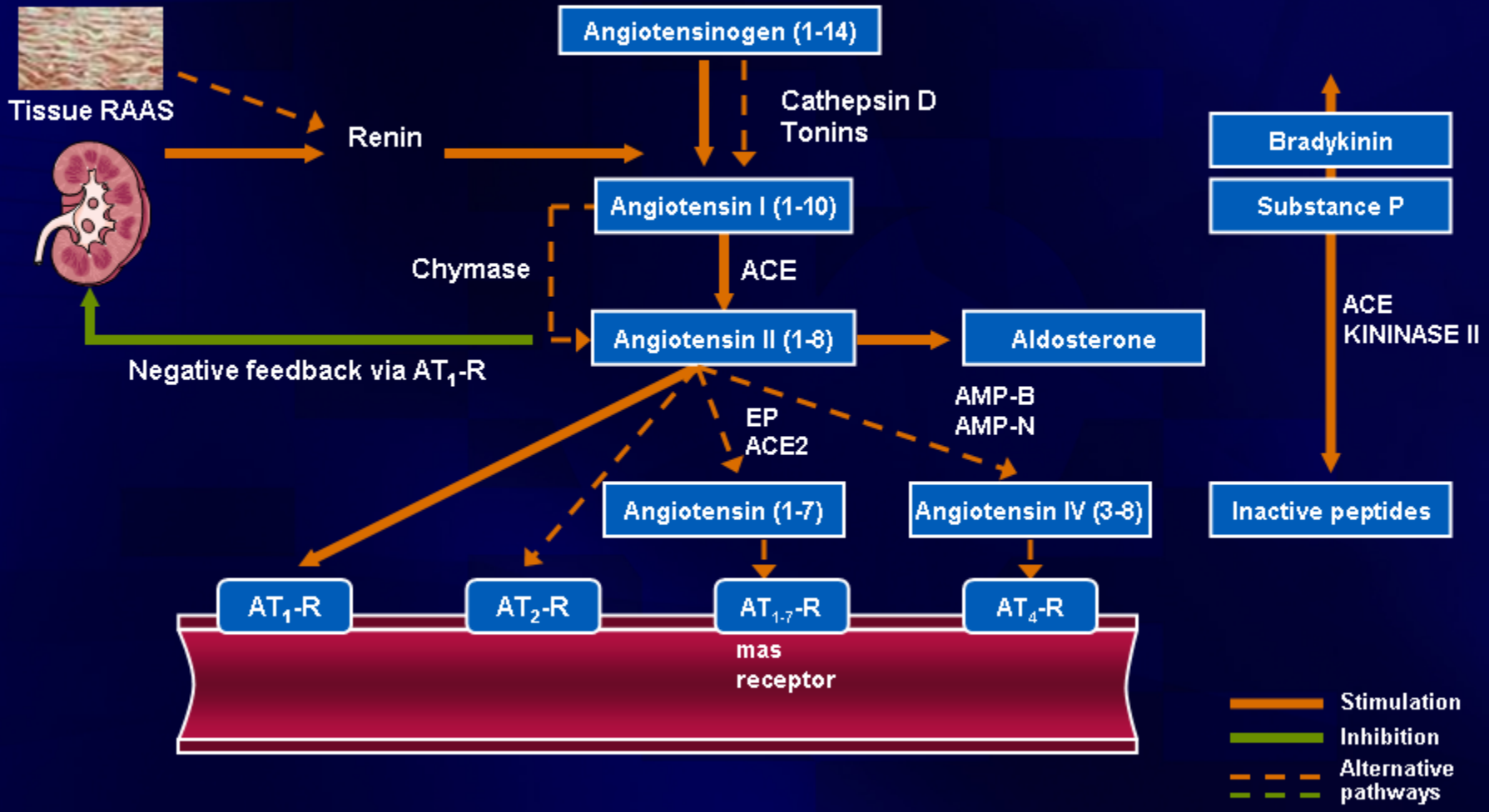
Possible combinations of classes of antihypertensive drugs. Green continuous lines: preferred combinations; green dashed line: useful combination (with some limitations); black dashed lines: possible but less well-tested combinations; red continuous line: not recommended combination.

Mancia G et al. Blood Press. 2014 Feb;23(1):3-16

Hypertension

Role of RAAS

RAAS overview: Key targets



Adapted from Staessen JA et al. *Lancet*. 2006;368:1449-56.

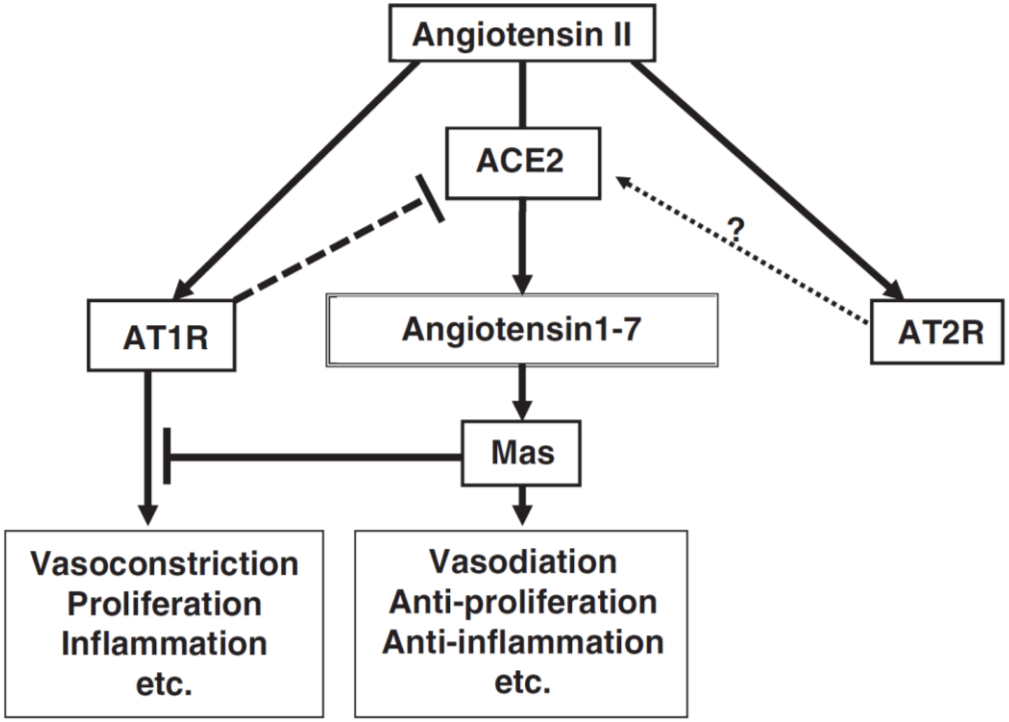
Role of the ACE2/angiotensin1–7/Mas axis

- Angiotensin (Ang) 1–7 is a new bioactive product in the renin–angiotensin system.
- Ang 1–7 is produced by the protease activity of ACE2 as a derivative of Ang I and Ang II.
- Ang1–7 together with ACE2 and Mas form a separate pathway in renin–angiotensin system

Iwai M *et al.* Hypertens Res. 2010 Nov;33(11):1108-9.

Novel Pathway of RAAS

- Blockage of AT1 receptor-mediated signaling directly modulates the Ang1–7-mediated pathway.



ACE2/angiotensin1–7/Mas axis, a new direction in Hypertension Management

Iwai M *et al.* Hypertens Res. 2010 Nov;33(11):1108-9.

RAAS Blockers

- British guidelines and ESH-ESC guidelines, recommend RAAS blockers as initial therapy.

Compelling indications for antihypertensive drug classes according to comorbidities

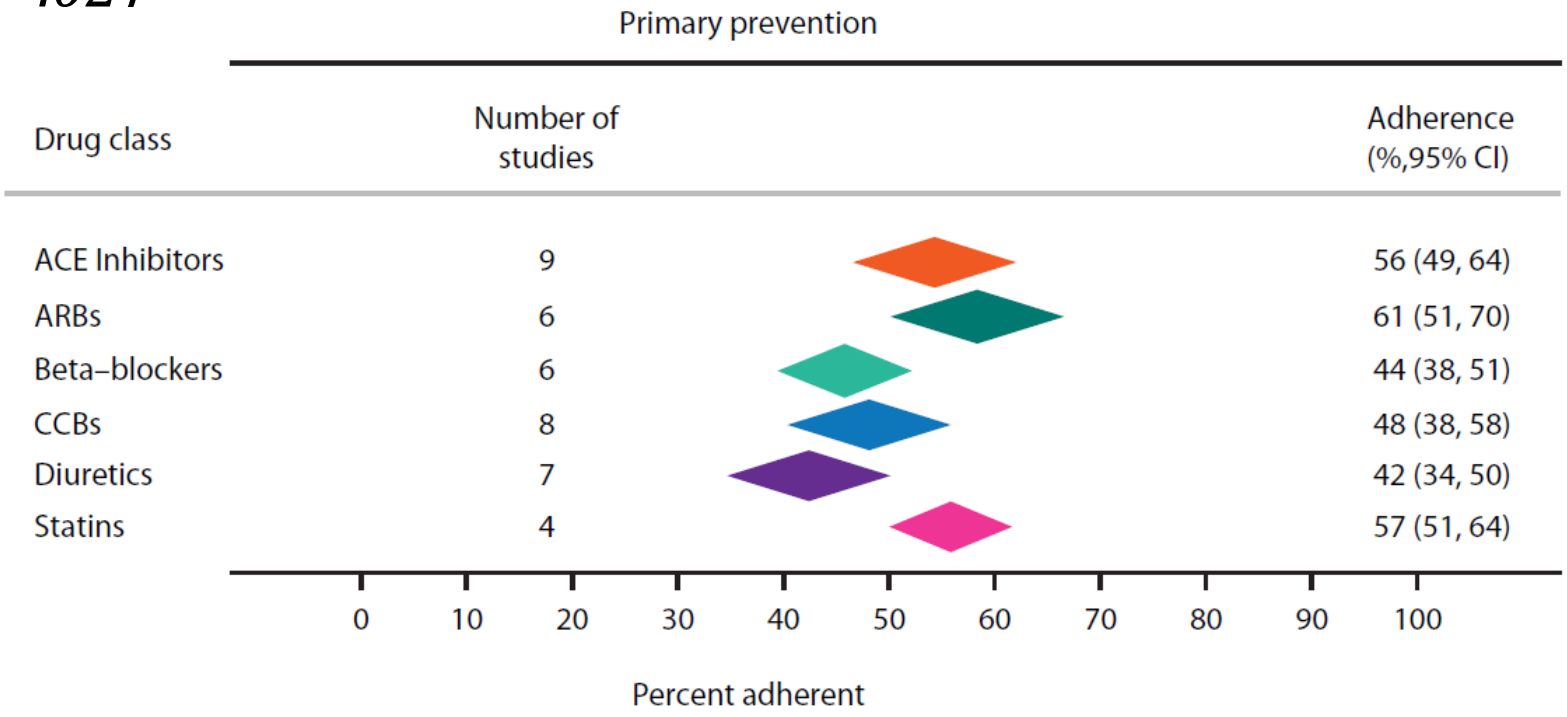
	RAS blocker	D	CCB
Isolated systolic hypertension	●	●	●
Hypertension in blacks	●	●	●
Angina pectoris	●		●
Post-myocardial infarction	●		
Left ventricular hypertrophy	●		
Arterial fibrillation	●		
Heart failure	●	●	
Cartoid/coronary atherosclerosis			●
Metabolic syndrome	●		●
Non–diabetic nephropathy	●		
Diabetic nephropathy	●		
Proteunuria/microalbuminuria	●		

CCB- calcium channel blockers; D- diuretics; RAS - renin-angiotensin system.

Burnier M *et al.* Eur Heart J. 2013; 35(9):557-62.

Role of ARBs in Hypertension Management

- Longer duration of action
- Have the lowest discontinuation rate
- Higher adherence in primary prevention of CV disease (*P = .02*)

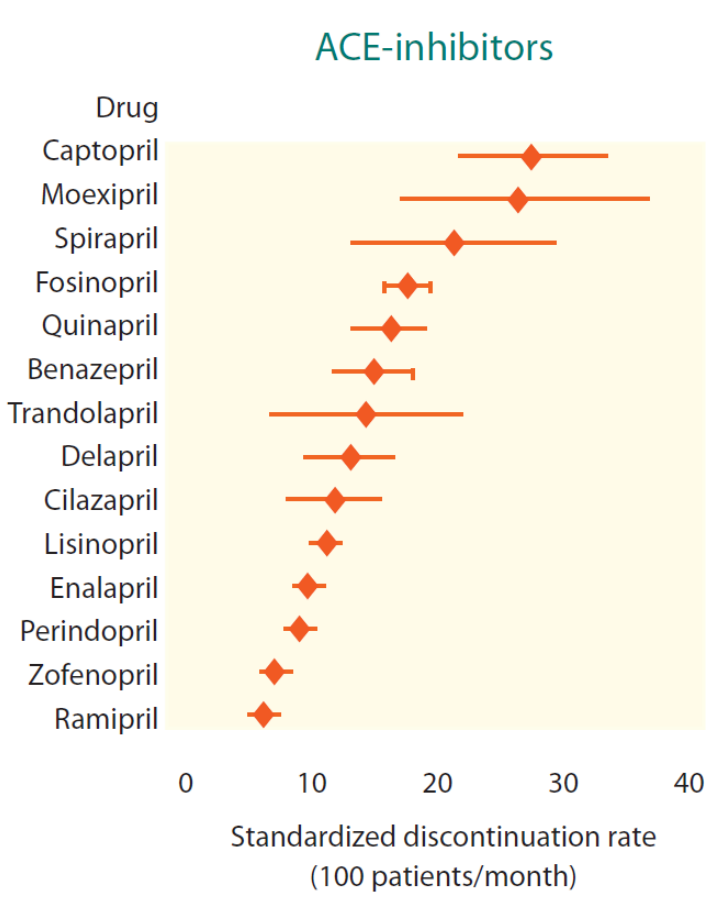


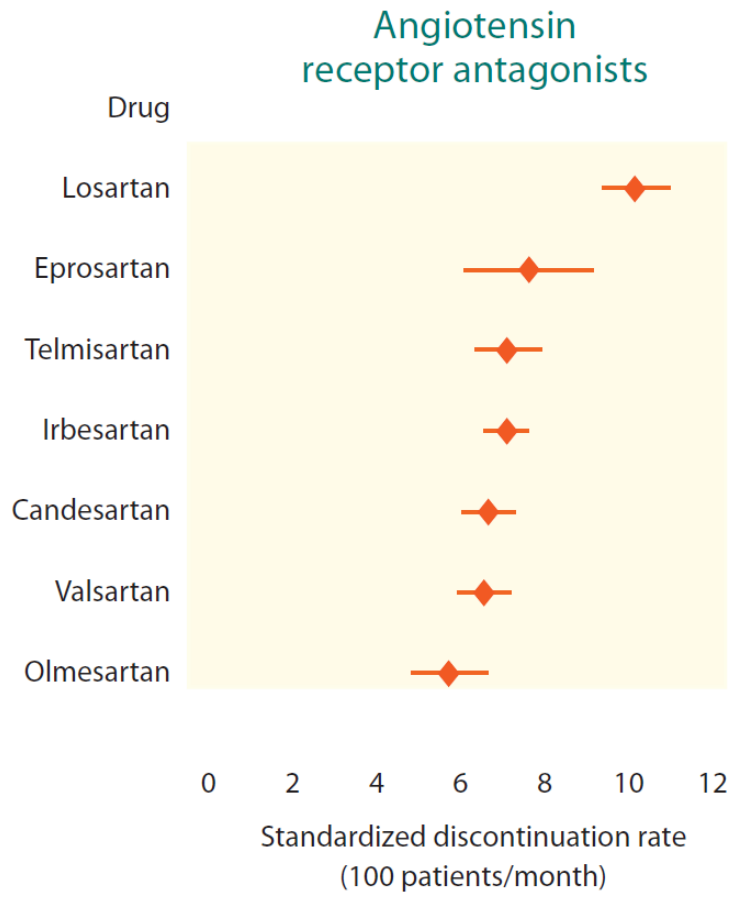
ACE- angiotensin converting enzyme, ARB – angiotensin receptor blocker, CCB – calcium channel blocker

Mancia G *et al.* J Hypertens. 2011; 29(5):1012-18.

ARBs have better compliance than ACEIs

- Cumulative evaluation of databases for discontinuation rates with monotherapy over 1 year in 44,5356 patients:





Mancia G *et al.* J Hypertens. 2011; 29(5):1012-18.

Benefits of ARBs Beyond BP Reduction

- Effective and safe treatment for patients with CV disease.
- Combine well with other antihypertensive and CV drugs, including aspirin, statins, and antidiabetic drugs.
- Combination of ARBs with low-dose thiazides, calcium channel blockers (CCBs), or both increases their efficacy.

James P *et al*. JAMA. 2014; 311(5):507.

Hypertension

Early and Intensive Intervention

Non-pharmacologic Intervention

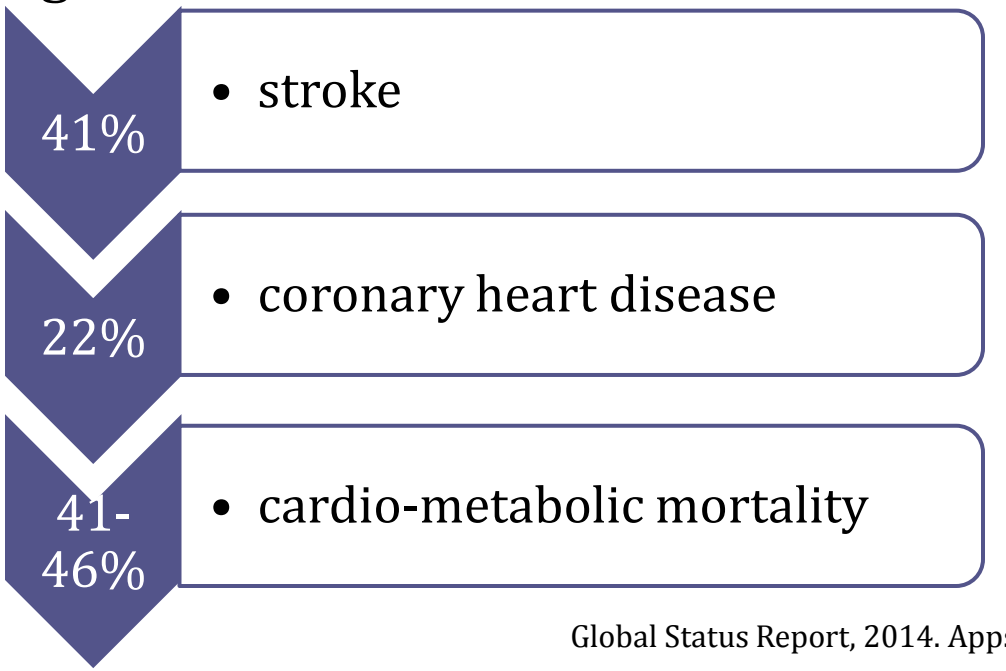
Modification	Recommendation
Weight reduction	Maintain normal body weight(BMI : 18.5 - 24.9 kg/m^2)
Adopt DASH (Dietary Approach to Stop Hypertension) eating plan	Consume a diet rich in fruits, vegetables, and low-fat dairy products with a reduced content of saturated and total fat
Dietary sodium reduction	Reduce dietary sodium intake to no more than 100 mmol/d (2.4 gm sodium or 6 gm sodium chloride)
Physical activity	Engage in regular aerobic physical activity such as brisk walking (at least 30 min/d, most days of the week)
Moderation of alcohol consumption	Limit consumption to no more than two drinks (1 oz or 30 ml ethanol; 24 oz beer, 10 oz wine, or 3 oz 80-proof whiskey) per day for most men, and to no more than one drink per day for women and lighter weight persons
Tobacco	Total abstinence

Yaxley et al. J Family Med Prim Care. 2015;4(2): 193–199.
Gulati *et al.* JAPI Sept 2014; 62: 1-7

Early Intervention

- The WHO 2014 report stresses on early detection and effective management in minimizing the risk of heart attacks, heart failure, stroke, and kidney failure.

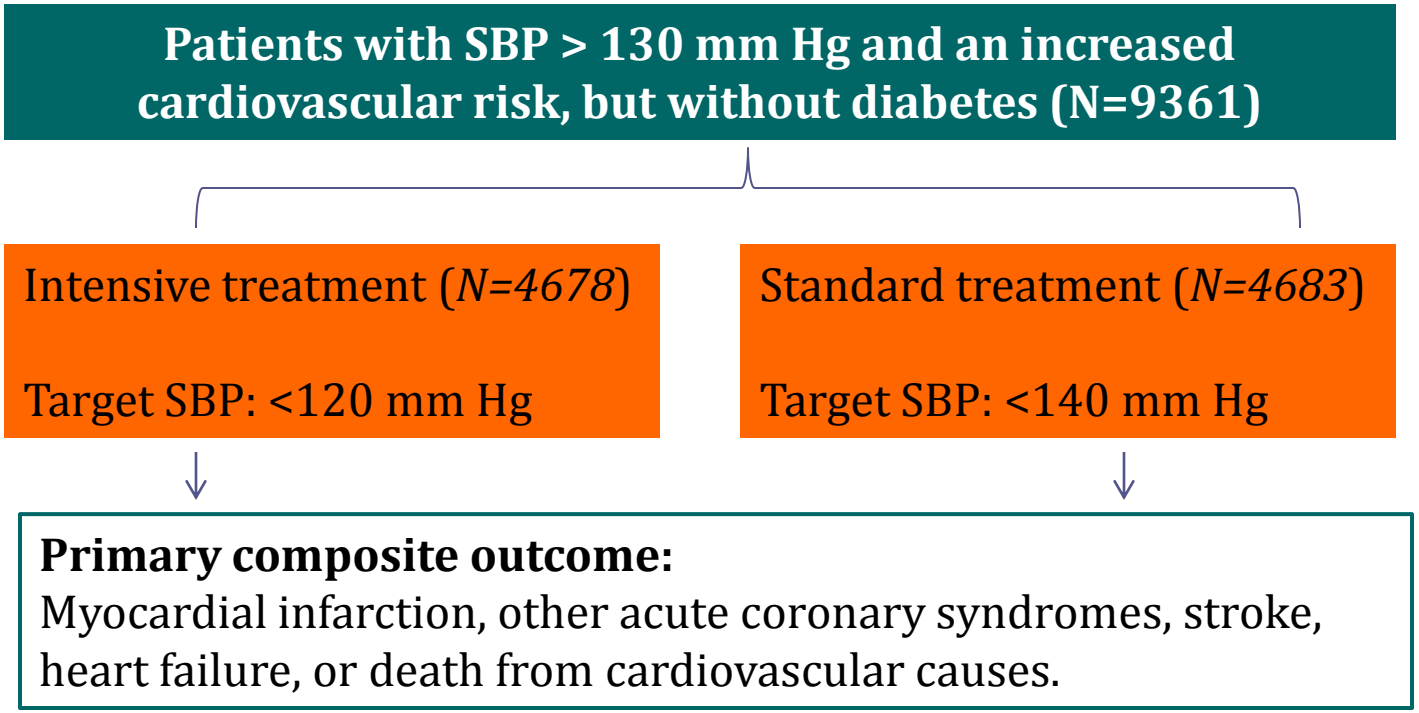
- A 10 mmHg reduction in BP reduces the risk:



Global Status Report, 2014. Apps.who.int. [Internet]. 2015

A Randomized Trial of Intensive *versus* Standard Blood-Pressure Control

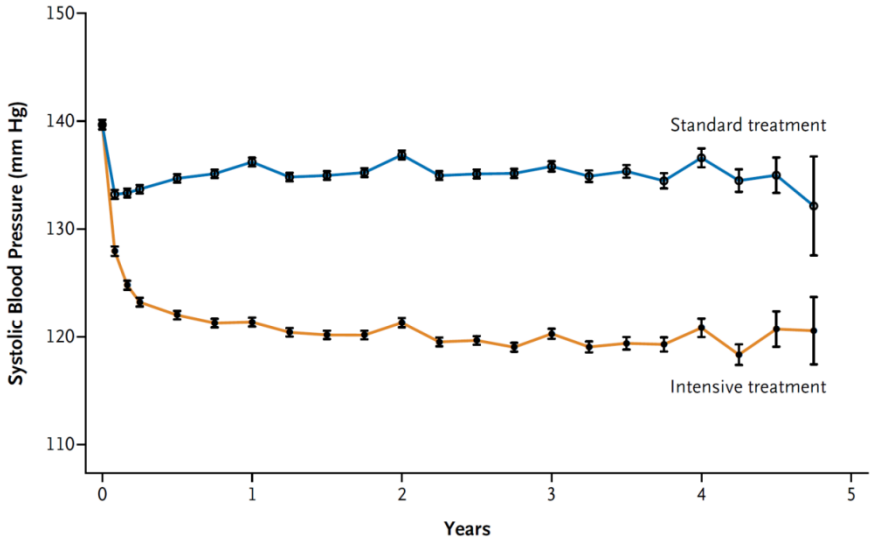
A randomized, controlled, open-label Systolic Blood Pressure Intervention Trial (SPRINT Trial) conducted at 102 clinical sites

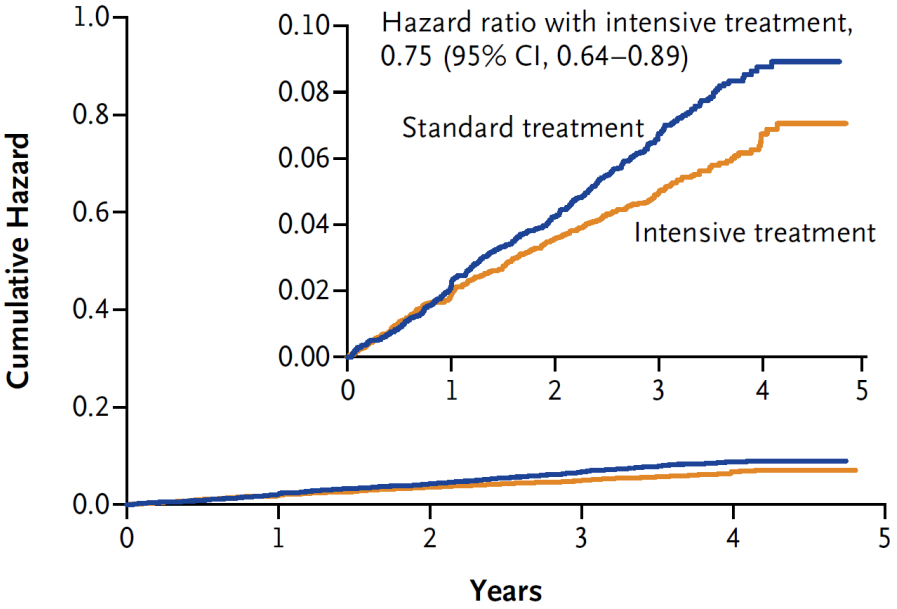


SPRINT Research Group *N Engl J Med.* 2015 Nov 26;373(22):2103-16

SPRINT Results

- At 1 year in the *Intensive group:*
  - mean SBP: 121.4 mm Hg *vs* Standard treatment (136.2 mm Hg)
  - Significantly lower rate of composite outcome





SPRINT Research Group *N Engl J Med.* 2015 Nov 26;373(22):2103-16

SPRINT Results

- The intervention was stopped early after **3.26 years** owing to a significantly lower rate of primary outcome.
- Treating BP to a lower goal in older or high-risk patients can be beneficial and yield better health results.
- Achieving the target systolic pressure of 120 mm Hg reduces:
  - CV events and stroke, by almost ≈33%
  - Risk of death by ≈25%

SPRINT Research Group *N Engl J Med.* 2015 Nov 26;373(22):2103-16

Case Scenarios

In Daily Practice

Definitions

Stage 1 hypertension:
- Clinic blood pressure (BP) is 140/90 mmHg or higher **and**
- ABPM or HBPM average is 135/85 mmHg or higher.

Stage 2 hypertension:
- Clinic BP 160/100 mmHg is or higher **and**
- ABPM or HBPM daytime average is 150/95 mmHg or higher.

Severe hypertension:
- Clinic systolic BP is 180 mmHg or higher **or**
- Clinic diastolic BP is 110 mmHg or higher.

White-coat effect:
- A discrepancy of more than 20/10 mmHg between clinic and average daytime ABPM or average HBPM blood pressure measurements at the time of diagnosis

Case 1

Case 1: *Patient Initials*- **MA**

Presentation

38 year old, attending for routine appointment about her contraception, for which she uses a diaphragm.

Medical history

From her records MA's blood pressure has increased since her last check twelve months ago. She does not smoke, drinks 10-12 units of alcohol a week and has no notable medical history.

On examination

MA's first clinic blood pressure measurement is 158/94 mmHg. Her heart rate is 72 beats per minute and regular

Considering a diagnosis of hypertension and therefore take another reading in MA's other arm. There is no notable difference between readings.

Next steps for diagnosis

Question 1.1

What would you do next?

Case 1

Answer *1.1*

- Advisable to take MA's blood pressure a third time during the consultation.

Question 1.2

- **The third reading is 149/93 mmHg. One suspects hypertension – what to do next?**

Case 1

Answer 1.2

- Organise for MA to receive ambulatory blood pressure monitoring (ABPM) through your GP practice.

- If you are responsible for setting up the monitoring device, you ensure that at least two measurements per hour are taken during MA's usual waking hours (for example, between 8 am and 10 pm).

- Average value of at least 14 measurements taken during MA's usual waking hours to be used to confirm a diagnosis of hypertension.

- At the same time carry out investigations for target organ damage (such as left ventricular hypertrophy, chronic kidney disease and hypertensive retinopathy).

Case 1

- ***Answer 1.2 (continued)***
  - Test for the presence of protein in the urine by sending a urine sample for estimation of the albumin:creatinine ratio and test for haematuria using a reagent strip
  - Blood sample to measure plasma glucose, electrolytes, creatinine, estimated glomerular filtration rate, serum total cholesterol and HDL cholesterol
  - Examine the fundi for the presence of hypertensive retinopathy
  - Arrange for a 12-lead electrocardiograph to be performed.

Case 1

- ***Answer 1.2 (continued)***
- Formal assessment of CV risk using risk assessment tool.

- Ascertain information about lifestyle in areas such as diet, exercise, alcohol, smoking and caffeine consumption and dietary sodium intake and offer appropriate lifestyle advice.

- Record the results of all investigations and assessment in MA's notes.

Case 1

Question 1.3

- Dietary sodium intake is greater than recommended levels.

  Additionally, MA's exercise patterns improper.

- **What advice would you offer?**

Case 1

- ***Answer 1.3***
- Advise that healthy diet and regular exercise can reduce blood pressure.
- Encourage her to keep her dietary sodium intake low as this can reduce blood pressure.

Case 1

Question 1.4

- The result of MA's ABPM shows daytime average blood pressure of 145/92 mmHg.
- **What would your diagnosis and your next steps be?**

Case 1

Answer 1.4

- This result shows that MA has stage 1 hypertension.
- If you had not already done so (answer 1.2), you would estimate cardiovascular risk and offer tests for target organ damage.
- Use the results of the cardiovascular risk assessment to discuss prognosis and healthcare options with MA.
- Continue to ascertain information about her lifestyle in order to provide tailored lifestyle advice in accordance with the guideline on areas such as diet (including sodium and caffeine intake) and exercise and alcohol consumption.

Case 1

- ***Question 1.5***
- The results of the investigations for target organ damage and formal assessment of cardiovascular risk are:
  - no evidence of target organ damage
  - 10-year cardiovascular risk less than 20%.
- Nothing abnormal was detected in the other investigations you organised.
- **What is your next step and what treatment and follow up would you offer?**

Case 1

- ***Answer 1.5***

- **Further assessment**

- Consider seeking evaluation of secondary causes of hypertension and a more detailed assessment of potential target organ damage. This is because 10-year cardiovascular risk assessments can underestimate the lifetime risk of cardiovascular events in these people.

- Additionally, people under 40 years with stage 1 hypertension are less likely to have overt evidence of target organ damage or vascular disease.

Case 1

Answer 1.5 (continued)

- MA does not have target organ damage, diabetes or a 10-year CV risk equivalent to 20% or greater, therefore antihypertensive drug treatment not required.

- Advise annual review of care to monitor blood pressure

- Advise further for tailored lifestyle modifications

Case 1

Question 1.6

- **If MA had been eligible to receive antihypertensive drug treatment, what should you consider when prescribing antihypertensive drugs for a woman of child-bearing potential?**

Case 1

- ***Answer 1.6***

There is an increased risk of congenital abnormalities if women take angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) during pregnancy, and it is important that women of child-bearing age know this.

If a woman taking ACE inhibitors or ARBs becomes pregnant, these antihypertensive drugs should be stopped and alternatives offered.

Question 1.7

- **What are the key points to remember when measuring blood pressure to ensure that the reading is as accurate as possible?**

Case 1

- ***Answer 1.7***
  - Ensure that staff measuring blood pressure are trained.
  - Ensure the person having their blood pressure measured has a regular pulse before using an automated blood pressure monitoring device.
  - Ensure automated devices are validated, maintained and regularly recalibrated.
  - Provide a relaxed environment for the person whose blood pressure is being measured.
  - Ensure the use of an appropriate cuff size.

Case 2

Case 2 : *Patient Initials*- DA

Presentation

- DA is a 39-year-old male. He presents to you with a sore ankle after 'going over' on it.

Medical history

- DA has no significant past medical history. Previous presentations have been related to coughs and colds.
- He smokes 25 cigarettes a day, alcohol consumption around 20 units/week and has done for 18 years. He works shifts and says that he considers his diet to be unhealthy as a result.

On examination

- You conclude that DA's ankle is sprained. As part of your routine examination you measure his blood pressure. The first measurement in his left arm is 150/92 mmHg, the second measurement in his right arm is 149/91 mmHg and the third measurement in his left arm is 151/92 mmHg.

Question 2.1

- **What would you do next?**

Case 2

Answer 2.1

- Record DA's clinic blood pressure as 149/91 mmHg.

- In order to diagnose hypertension, organise ambulatory blood pressure monitoring to confirm a diagnosis of hypertension.

- When organising this you ensure that at least two measurements per hour are taken during DA's usual waking hours.

- Use the average value of at least 14 measurements taken during DA's usual waking hours to confirm a diagnosis of hypertension.

- At the same time you would also carry out investigations for target organ damage

Case 2

- ***Answer 2.1 (continued)***

- Test for the presence of protein in the urine

- Advise lab tests for measuring plasma glucose, electrolytes, creatinine, estimated glomerular filtration rate, serum total cholesterol and HDL cholesterol

- Examine the fundi for the presence of hypertensive retinopathy

- Arrange for a 12-lead electrocardiograph to be performed.

Case 2

- ***Answer 2.1 (continued)***

  - Formal assessment of CV risk using risk assessment tool.

  - Ascertain information about lifestyle in areas such as diet, exercise, alcohol, smoking and caffeine consumption and dietary sodium intake and offer appropriate lifestyle advice.

  - Record the results of all investigations and assessment in DA's notes.

Case 2

Question 2.2

- ABPM indicates that DA's daytime average blood pressure is 147/89 mmHg.

- There is no evidence of target organ damage, cardiovascular disease, renal disease or diabetes. You identify a 10-year cardiovascular risk equivalent to under 20%.

- **With this information, what is the diagnosis and what to do next?**

Case 2

- ***Answer 2.2***
- You would diagnose stage 1 hypertension and consider referring DA for evaluation of secondary causes of hypertension and a more detailed assessment of potential target organ damage.
- If you had not already done so (answer 2.1) you would also assess cardiovascular risk and offer to test for target organ damage
- use the results of the initial cardiovascular risk assessment to discuss prognosis and healthcare options with DA.
- Also offer DA lifestyle advice in accordance with the guideline on areas such as diet (including sodium and caffeine intake), exercise, alcohol consumption and smoking.

Case 2

Question 2.3

- The results of the tests (presence of protein in the urine, estimation of the albumin:creatinine ratio, haematuria, plasma glucose, electrolytes, creatinine, estimated glomerular filtration rate, cholesterol, hypertensive retinopathy, 12-lead electrocardiograph) have been returned.

- All are normal

- With the exception of cholesterol which was total cholesterol = 216 mg/dL , HDL cholesterol 42.5 mg/dL.

- **What would you consider next in order to help you decide on the best management strategy for DA?**

Case 2

Answer 2.3

- Consider seeking evaluation of secondary causes of hypertension and a more detailed assessment of potential target organ damage.
- This is because 10-year cardiovascular risk assessments can underestimate the lifetime risk of cardiovascular events in these people.
- Additionally, people under 40 years with stage 1 hypertension are less likely to have overt evidence of target organ damage or vascular disease.
- refer DA for the further assessment.

Case 2

Question 2.4

- The results of the specialist assessment are returned.
- There are no secondary causes of hypertension; however, he was noted to have left ventricular hypertrophy and early evidence of impaired diastolic relaxation on his echocardiogram.
- The report suggests that these changes are most likely related to hypertension.
- Thus, DA has evidence of target organ damage.
- **What would you do next?**

Case 2

- ***Answer 2.4***
- Advise DA treatment with a CCB, for example amlodipine.

- Repeat the lifestyle advice on exercise, alcohol consumption and smoking.

- As DA's cholesterol level is marginally elevated, you would also enquire about the fat content of his diet and recommend that he reduces his fat intake. You would note that his cholesterol needs rechecking.

- Ask DA to return to clinic in 4 weeks for a review of his blood pressure

Case 2

- ***Question 2.5***
- You have previously concluded that DA's sprained ankle has healed and all swelling had cleared.

- DA returns to the clinic and you notice both ankles are very swollen, which are new to him. This is likely to indicate that he is not tolerating his calcium-channel blocker.

- His clinic blood pressure is 135/86 mmHg.

- **Would you consider that his blood pressure has been controlled? What would you do next?**

Case 2

- ***Answer 2.5***
- DA's blood pressure has been controlled as his clinic blood pressure is now below 140/90 mmHg which is what you were aiming for.

- However, he was not tolerating the calcium channel blocker.

- You would change the calcium-channel blocker to a thiazide like diuretic such as chlortalidone once daily.

- You would arrange for him to return to clinic to check his blood pressure again in 4 weeks.

Case 3

Case 3 : *Patient Initials-* : RS

Presentation

- RS is an 81-year-old female.
- She was diagnosed with stage 2 hypertension, by a practice colleague 1 month ago. It is thought the cause is probably arterial stiffening.
- Her clinic blood pressure was 174/100 mmHg and her ABPM average was 170/95 mmHg
- She was not identified as having 'white-coat' hypertension. She has now returned to the practice after your colleague requested she return for a follow up appointment.

Medical history

- RS has no significant medical history.

Question 3.1

- **What would you have expected your colleague to have initiated with RS?**

Case 3

- ***Answer 3.1***
- Expected to have arranged and reviewed the results of all appropriate tests for target organ damage and CV risk assessment
- Provided tailored advice about lifestyle interventions
- Started treatment with a calcium-channel blocker.
- Offered RS information and guidance about her diagnosis and treatment options.
- Asked RS to return to your practice clinic in 1 month to check her blood pressure (this is the purpose of her current visit to you).

Please note some cardiovascular risk assessments have a maximum age and may not be applicable for use with RS. Additionally, given her age, RS will score very highly in all cardiovascular risk assessments.

Case 3

- ***Question 3.2***
- From RS' notes you can see that your colleague had initiated the management plan in line with the NICE clinical guideline and as identified in answer 3.1.

- RS is taking the calcium channel blocker.

- You have checked adherence with step 1 treatment and do not believe there is anything you can do, for instance, modify dosing regimen, provide a record for her to monitor her medicine taking, to help enhance adherence further.

Case 3

- ***Question 3.2***

- RS's total cholesterol is 185 mg/dL and her HDL is 37 mg/dL. Glycemic parameters : normal.

- There is no left ventricular hypertrophy or atrial fibrillation on ECG.

- Her 10-year cardiovascular risk is greater than 20% (using QRISK2).

- You measure her clinic blood pressure and it is 165/95 mmHg.

- **What would you do next?**

Case 3

- ***Answer 3.2***
- RS's blood pressure is not controlled.
- Check her adherence to the regimen and provide interventions to specific needs.
- You would offer step 2 hypertensive treatment with the addition of an ACE or a low cost ARB inhibitor. You would follow local protocols for checking bloods prior to commencing and following initiation of the ACE inhibitor or low cost ARB for a diagnosis of hypertension[1].

Question 3.3

- **RS returns to the clinic one month later. Her clinic blood pressure is 154/90 mmHg and her blood results are acceptable.**

What would you do next?

Case 3

- ***Answer 3.3***
- Review RS's antihypertensive medication and ensure that it is at the optimal or best tolerated dose.
- Consider her adherence to the drug regimen and ensure that any factors that may reduce her adherence are managed.
- At her next clinic appointment RS's blood pressure is 145/85 mmHg..
- This is an acceptable blood pressure for a person over 80. RS can stay on current treatment.

Case 4

Case 4 : *Patient Initials-* : DT

Presentation

- DT is a 53-year-old male

On examination

- His clinic blood pressures is 176/108 mmHg. Additionally, you have identified left ventricular hypertrophy on ECG.
- You are unable to confirm the diagnosis of hypertension with ABPM.
- *because DT has refused it because he is a bus driver and it would interfere with his driving.*

Question 4.1

- **What alternative test could you use to diagnose hypertension?**

Case 4

- ***Answer 4.1***
- You could offer DT home blood pressure monitoring (HBPM).

- ***Question 4.2***
- **When instructing DT in how to use HBPM, what instructions should you give him and what measurements would you base your diagnosis on?**

Case 4

- ***Answer 4.2***

- Ensure that each BP recording is based on two consecutive measurements taken at least one minute apart with DT seated.

- You should ask DT to record his BP twice daily (ideally in the morning and evening) and this should continue for at least four days and ideally for seven days.

- To diagnose hypertension based on HBPM, you discard the measurements taken on the first day and take an average of all of the remaining measurements.

Case 4

- ***Question 4.3***

- The average HBPM results was 155/97 mmHg. You therefore note DT has a 'white-coat effect'.

- However despite this, his HBPM measurements indicate a diagnosis of stage 2 hypertension and he had target organ damage.

- Advise lifestyle interventions in line with recommendations.

- **What drug regimen would you offer EK and how would you monitor his response to treatment?**

Case 4

Answer 4.3

- Advise DT with an ACE inhibitor or a low cost ARB and use HBPM to monitor his response to treatment.
- follow local protocols for checking bloods prior to commencing and following initiation of the ACE inhibitor or low cost ARB for a diagnosis of hypertension[1].

Question 4.4

- DT has returned to you with the results of his monitoring HBPM following step 1 treatment.
- During the past week, his average BP was 150/94 mmHg. **What is the target BP for HBPM when monitoring response to treatment and what would you do about this result?**

Case 4

- ***Answer 4.4***
- For people aged under 80 the target HBPM blood pressure is below 135/85 mmHg.
- DT's blood pressure is not controlled so you would offer him step 2 treatment with a calcium-channel blocker in addition to his current ACE inhibitor or low cost ARB.

- **Question *4.5***
- **When he returns to you 1 month later, DT's HBPM result is still above 135/85 mmHg. What would you do next?**

Case 4

Answer 4.5

- Check DT's adherence to treatment in line with recommendations
- Review his medication to ensure that step 2 treatment is optimal.

Question 4.6

- **DT's medication adherence is good and step 2 treatment is optimal. What would you do next?**

Case 4

- ***Answer 4.6***
- You would offer DT a thiazide-like diuretic in addition to his ACE inhibitor and calcium-channel blocker.

- ***Question 4.7***
- **DT returns to your clinic and his blood pressure is still not controlled. What would you do next?**

Case 4

- ***Answer 4.7***
- Check that DT has received optimal medication at step 3 and reassess his adherence to his antihypertensive medication.

- Ensure that DT has been involved in treatment decisions throughout his care and that you have adapted your consultation style in order to facilitate this involvement.

- Review DT's knowledge, understanding and concerns about his antihypertensive medication

Case 4

- ***Question 4.8***

- **You conclude that DT is adherent to his medication regime and that he is on the optimal doses of the ACE inhibitor, calcium channel blocker and thiazide-like diuretic. What would you do next?**

Case 4

- ***Answer 4.8***
- Seek a specialist opinion for DT. Anticipate he will be started on step 4 treatment.

Case 5

Case 5 : *Patient Initials-* : PP

Presentation

- PP is a 56-year-old male who presents to you with feelings of dizziness every time he stands up.

Medical history

- PP has migraines and takes propranolol modified-release 160 mg daily, which has reduced the frequency.
- He attends the GP surgery's weight loss clinic. He has lost four stones in 12 months as part of a controlled weight loss programme.

On examination

- PP's ECG is normal and his blood pressure is 126/82 mmHg.

Question 5.1

- **What would you do next to investigate the cause of PP's dizziness?**

Case 5

- ***Answer 5.1***
- As he was seated for the first readings, you would ask PP to stand up for one minute and then measure his blood pressure again.

- ***Question 5.2***
- PP's standing blood pressure is 90/50 mmHg.
- **What would you do next?**

Case 5

- ***Answer 5.2***
- Review PP's medication. His recent weight loss may mean that the dose of beta-blocker needs to be reduced

- Note the postural hypertension in PP's records so that colleagues measuring his blood pressure in the future are aware that they should measure his standing blood pressure, as well

- If changes to the migraine prophylaxis do not relieve PP's dizziness you would consider referral to a specialist.

Summary

- Hypertension exerts a substantial health burden on CV health status and healthcare systems
- Adequate BP control is a surrogate marker for fatal and nonfatal CV events
- Treating blood pressure to a lower goal in older or high-risk patients can be beneficial and yield better health results.