

Hypertension – Q&A and Case Studies



Presented by:

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Case 1

A 33-year old married Caucasian female has a sustained BP of 148/102 mmHg. She is not on any regular medications. All her laboratory investigations are normal. Which drug would you use to control her hypertension?

1. Candesartan
2. Furosemide
3. Enalapril
4. Labetalol
5. Minoxidil

Management of pregnancy with chronic hypertension

- Tell women who take angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs):
 - that there is an increased risk of congenital abnormalities if these drugs are taken during pregnancy
 - to discuss other antihypertensive treatment with the healthcare professional responsible for managing their hypertension, if they are planning pregnancy. **[1.2.1.1]**
- In pregnant women with uncomplicated chronic hypertension aim to keep blood pressure lower than 150/100 mmHg. **[1.2.3.1]**

Case 2

A 62-year old Ghanaian man with Chronic kidney disease and eGFR 45% presents with a BP of 168/99 mmHg. He is on bendroflumethiazide 5mg od. Which drug would you add to control his blood pressure?

1. Frusemide
2. Amlodipine
3. Diltiazem
4. Atenolol
5. Ramipril

Case 3

A 53-year old patient attends several times with BP of 168/102 mmHg. She is prescribed amlodipine 10mg, ramipril 10mg, indapamide 1.5mg, doxazosin 8mg. What would add to improve her BP control?

1. Candesartan
2. Furosemide
3. Enalapril
4. Labetalol
5. Minoxidil
6. Other

Case scenario 1 : Mary

Presentation

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

Medical history

From her records you notice that Mary'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

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

You are considering a diagnosis of hypertension and therefore take another reading in Mary's other arm. There is no notable difference between readings.

Next steps for diagnosis

Question 1.1

What would you do next?

Case scenario 1 : Mary

Answer 1.1

You would take Mary's blood pressure a third time during the consultation.

Question 1.2

The third reading is 149/93 mmHg. You suspect hypertension – what would you do next?

Case scenario 1 : Mary

Answer 1.2

Organise for Mary 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 Mary's usual waking hours (for example, between 8 am and 10 pm). You would use the average value of at least 14 measurements taken during Mary's usual waking hours to confirm a diagnosis of hypertension.

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

Move to the next slide for a lists of tests and further investigations

Case scenario 1 : Mary

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
- take a 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 scenario 1 : Mary

Answer 1.2 (continued)

You would also carry out a formal assessment of cardiovascular risk (Mary's clinic blood pressure must be used in the calculation of cardiovascular risk) using a cardiovascular risk assessment tool, in line with [Identification and assessment of CVD risk](#) in 'Lipid modification' (NICE clinical guideline 67).

Additionally, you would also 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 Mary's notes.

Case scenario 1 : Mary

Question 1.3

You identify her dietary sodium intake is greater than recommended levels. NICE PH25 on prevention of cardiovascular disease recommends that as part of preventing cardiovascular disease at a population level there should be a reduction in salt intake. By 2015 an adults maximum intake of salt per day should not exceed 6g and by 2025 this should be reduced to 3g. Additionally, Mary's exercise patterns are not in line with national guidance. (For the Chief Medical Office current recommendations for physical activity see UK physical activity guidelines)

What advice would you offer?

Case scenario 1 : Mary

Answer 1.3

You would advise that healthy diet and regular exercise can reduce blood pressure. You would also encourage her to keep her dietary sodium intake low as this can reduce blood pressure. You should also inform her about local initiatives

Case scenario 1 : Mary

Question 1.4

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

Case scenario 1 : Mary

Answer 1.4

This result shows that Mary 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.

You would use the results of the cardiovascular risk assessment to discuss prognosis and healthcare options with Mary.

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.

See the [definitions slide](#) for ABPM diagnosis criteria

Case scenario 1 : Mary

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 scenario 1 : Mary

Answer 1.5

Further assessment

You would consider seeking specialist 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 scenario 1 : Mary

Answer 1.5 (continued)

Mary does not have target organ damage, established cardiovascular disease, renal disease, diabetes or a 10-year cardiovascular risk equivalent to 20% or greater, therefore you would not offer antihypertensive drug treatment.

You would continue to provide further tailored lifestyle advice (recommendation 1.4.1 – 1.4.9) periodically in accordance with the NICE clinical guideline. The NICE clinical guideline recommends that you would provide Mary with an annual review of care to monitor blood pressure, provide her with support and discuss her lifestyle and symptoms.

Case scenario 1 : Mary

Question 1.6

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

Case scenario 1 : Mary

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 the woman is planning a pregnancy she should discuss this with you. If a woman taking ACE inhibitors or ARBs becomes pregnant, these antihypertensive drugs should be stopped and alternatives offered.

Link to related recommendations from the 'Hypertension in Pregnancy' (NICE clinical guideline 107):

- [Management of pregnancy with chronic hypertension](#)
- [Breastfeeding](#)

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 scenario 1 : Mary

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. Although not a NICE recommendation, expert opinion would suggest that devices should be maintained annually and there should be a person accountable for recalibrating the devices in order to ensure consistency.
- Provide a relaxed environment for the person whose blood pressure is being measured.
- Ensure the use of an appropriate cuff size.

Link to [British Hypertension Societies](#) list of validated blood pressure monitoring devices

Case scenario 2 : Danny

Presentation

Danny is a 39-year-old black male of Caribbean family origin. He presents to you with a sore ankle after 'going over' on it.

Medical history

Danny 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 Danny'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 scenario 2 : Danny

Answer 2.1

You would record Danny's clinic blood pressure as 149/91 mmHg. In order to diagnose hypertension, you organise ambulatory blood pressure monitoring (ABPM) to confirm a diagnosis of hypertension. When organising this you ensure that at least two measurements per hour are taken during Danny's usual waking hours. You would use the average value of at least 14 measurements taken during Danny's usual waking hours to confirm a diagnosis of hypertension.

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

Case scenario 2 : Danny

Answer 2.1 (continued)

You would:

- 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
- take a 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 scenario 2 : Danny

Answer 2.1 (continued)

You would also carry out and a formal assessment of cardiovascular risk (Danny's clinic blood pressure must be used in the calculation of cardiovascular risk) using a cardiovascular risk assessment tool, in line with the recommendations on [Identification and assessment of CVD risk](#) in 'Lipid modification' (NICE clinical guideline 67).

Additionally, you would ascertain information about lifestyle in areas such as diet, exercise, alcohol, smoking and caffeine consumption and dietary sodium intake and offer appropriate lifestyle advice. Given the history provided you ensure that you include lifestyle advice about smoking, alcohol consumption and diet and exercise

Record the results of the investigations and assessments in Danny's notes.

Case scenario 2 : Danny

Question 2.2

ABPM indicates that Danny'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 your diagnosis and what would you do next?

Case scenario 2 : Danny

Answer 2.2

You would diagnose stage 1 hypertension and consider referring Danny for a specialist 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

You would use the results of the initial cardiovascular risk assessment to discuss prognosis and healthcare options with Danny.

You would also offer Danny lifestyle advice in accordance with the guideline on areas such as diet (including sodium and caffeine intake), exercise, alcohol consumption and smoking.

See the [definition slide](#) for ABPM diagnosis criteria

See section 1.4 of the NICE guideline for recommendations about lifestyle interventions

Case scenario 2 : Danny

Question 2.3

The results of the tests you arranged (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 = 5.6mmol/L, HDL cholesterol 1.1mmol/L.

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

Case scenario 2 : Danny

Answer 2.3

You would consider seeking specialist 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.

You decide to refer Danny for the specialist assessment.

Case scenario 2 : Danny

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, Danny has evidence of target organ damage.

What would you do next?

Case scenario 2 : Danny

Answer 2.4

You would offer Danny treatment with a calcium-channel blocker, for example amlodipine. You would also offer him appropriate information about the drug and unwanted side effects.

You would see the results of the more detailed cardiovascular risk assessment, which included the cholesterol levels to discuss prognosis and healthcare options with Danny (detailed in answer 2.2).

As appropriate, you would repeat the lifestyle advice that was given in answers 2.1 and 2.2 in accordance with the guideline on areas such as diet (including sodium and caffeine intake), exercise, alcohol consumption and smoking. As Danny'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.

You would ask Danny to return to your practice in 4 weeks for a review of his blood pressure

Case scenario 2 : Danny

Question 2.5

You have previously concluded that Danny's sprained ankle has healed and all swelling had cleared. Danny 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 scenario 2 : Danny

Answer 2.5

Danny'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 indapamide 2.5 mg once daily. You would arrange for him to return to clinic to check his blood pressure again in 4 weeks.

Case scenario 3 : Doris

Presentation

Doris is an 81-year-old female non-smoker. 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

Doris has no significant medical history.

Question 3.1

What would you have expected your colleague to have initiated with Doris?

Case scenario 3 : Doris

Answer 3.1

You would have expected your colleague to have:

Arranged and reviewed the results of all appropriate tests for target organ damage and cardiovascular risk assessment in line with the NICE guideline.

Provided tailored advice about lifestyle interventions

Started treatment with a calcium-channel blocker.

Offered Doris information and guidance about her diagnosis and treatment options.

Asked Doris 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 Doris. Additionally, given her age, Doris will score very highly in all cardiovascular risk assessments.

Case scenario 3 : Doris

Question 3.2

From Doris' 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.

Doris 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.

Doris's total cholesterol is 4.8mmol/L and her HDL is 1.6mmol/L. Glucose is 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 scenario 3 : Doris

Answer 3.2

Doris'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 hypertension¹.

Question 3.3

Doris 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 scenario 3 : Doris

Answer 3.3

You would review Doris's antihypertensive medication and ensure that it is at the optimal or best tolerated dose.

You would also consider her adherence to the drug regimen and ensure that any factors that may reduce her adherence are managed.

At her next clinic appointment Doris's blood pressure is 145/85 mmHg.. This is an acceptable blood pressure for a person over 80. Doris can stay on current treatment.

Case scenario 4 : Derek

Presentation

Derek 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 ambulatory blood pressure monitoring (ABPM) because Derek 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 scenario 4 : Derek

Answer 4.1

You could offer Derek home blood pressure monitoring (HBPM).

Question 4.2

When instructing Derek in how to use HBPM, what instructions should you give him and what measurements would you base your diagnosis on?

Case scenario 4 : Derek

Answer 4.2

You should ensure that each blood pressure recording is based on two consecutive measurements taken at least one minute apart with Derek seated. You should ask Derek to record his blood pressure 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.

Question 4.3

The average HBPM results was 155/97 mmHg. You therefore note Derek has a '[white-coat effect](#)'. However despite this, his HBPM measurements indicate a diagnosis of stage 2 hypertension and he had target organ damage. You offer lifestyle interventions in line with recommendations 1.4.1 to 1.4.9 in the guideline and start Derek on step 1 treatment. What drug regimen would you offer Derek and how would you monitor his response to treatment?

Case scenario 4 : Derek

Answer 4.3

You would offer Derek treatment with an ACE inhibitor or a low cost ARB and use HBPM to monitor his response to treatment. 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 hypertension¹.

Question 4.4

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

Case scenario 4 : Derek

Answer 4.4

For people aged under 80 the target HBPM blood pressure is below 135/85 mmHg.

Derek'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, Derek's HBPM result is still above 135/85 mmHg. What would you do next?

Case scenario 4 : Derek

Answer 4.5

You would check Derek's adherence to treatment in line with recommendations 1.7.1 to 1.7.4 of the guideline.

You would review his medication to ensure that step 2 treatment is optimal.

Question 4.6

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

Case scenario 4 : Derek

Answer 4.6

You would offer Derek a thiazide-like diuretic in addition to his ACE inhibitor and calcium-channel blocker.

Question 4.7

Derek returns to your clinic and his blood pressure is still not controlled. What would you do next?

Case scenario 4 : Derek

Answer 4.7

- Check that Derek has received optimal medication at step 3 and reassess his adherence to his antihypertensive medication.
- Ensure that Derek has been involved in treatment decisions throughout his care and that you have adapted your consultation style in order to facilitate this involvement.
- Review Derek's knowledge, understanding and concerns about his antihypertensive medication and .explore whether or not Derek believes that he needs the medication.

Link to [Medicines adherence](#) (NICE clinical guideline 76)

Case scenario 4 : Derek

Answer 4.7 (continued)

- If you identify practical problems, consider interventions such as suggesting Derek records his medicine-taking and monitors his condition, simplifying the dosing regimen, using alternative packaging for the medicine or using a multi-compartment medicines system.
- Ensure that Derek has received appropriate guidance and materials about the benefits of the drugs and unwanted side effects.
- Repeat all of these actions on a regular basis when reviewing or prescribing antihypertensive drug treatment for Derek.

Question 4.8

You conclude that Derek 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 scenario 4 : Derek

Answer 4.8

You seek a specialist opinion for Derek. You anticipate he will be started on step 4 treatment.

Case scenario 5 : Philip

Presentation

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

Medical history

Philip 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

Philip'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 Philip's dizziness?

Case scenario 5 : Philip

Answer 5.1

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

Question 5.2

Philip's standing blood pressure is 90/50 mmHg.

What would you do next?

Case scenario 5 : Philip

Answer 5.2

You would review Philip's medication. His recent weight loss may mean that the dose of beta-blocker needs to be reduced

You would note the postural hypertension in Derek'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 Derek's dizziness you would consider referral to a specialist.

South West London Hypertension and Lipids Improvement Forum

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