



National Prescribing Service Limited

Case Study 6:

Management of Hypertension

2000

Scenario

Mr Ellis is a fit 61-year-old, semi-retired market gardener. He is a moderate (10/day) smoker with minimal alcohol intake and there are no other cardiovascular risk factors. His average blood pressure from several readings over the last 4 months is 190/102, despite taking heed of non-pharmacological advice of more exercise and restriction of salt intake. Physical examination is unremarkable. Electrolytes, FBC, lipids, glucose and uric acid tests are normal. There is no history of asthma. At this stage you decide to treat Mr Ellis' hypertension.

Inside

Results	page 3
Expert commentary	
Dr Fred de Looze	page 6
Neil Cottrell & Ian Coombes	page 9
References	page 11

Case Study Results

Results in summary

One hundred and fifty three responses to this case have been received. A sample of one hundred responses has been aggregated to provide a snapshot of how your colleagues responded to this case.

The majority of respondents rated Mr Ellis' cardiovascular risk level as high (42%)* to very high (32%)*.

All respondents chose to write a prescription and 43% of respondents selected angiotensin converting enzyme (ACE) inhibitors as their first choice. 42% of respondents felt that Mr Ellis would benefit from substituting or adding in another drug or drug class to achieve an appropriate blood pressure response. The most frequently chosen agents were thiazide diuretics (13%)* and beta-blockers (11%)*. 28% of respondents identified a third and/or a fourth choice, the most popular being an ACE inhibitors and calcium channel blockers.

With drug treatment, 35% of respondents would aim to achieve a target blood pressure of below 130/85 mmHg whilst 62% would be satisfied with a target of 130-140 mmHg systolic and 80-90 mmHg diastolic.

If Mr Ellis' ECG showed evidence of left ventricular hypertrophy, 50% of respondents would use an alternative agent with 97% favouring to prescribe ACE inhibitors. The remaining 50% of respondents would continue to treat with an initial agent chosen and of those 72% had prescribed ACE inhibitors as first-line.

Results in detail

Question 1

**How would you rate his cardiovascular risk level?
low/medium/high/very high**

Respondents rated Mr Ellis' cardiovascular risk level as:

Cardiovascular risk level	Percentage of Respondents
Medium	26
High risk	42
Very high risk	32

* Figure in the bracket denotes percentage respondents in case study results.

Question 2

If you choose to write a prescription, which agent would you choose?

The first choice of agent selected by the respondents were:

Agent	Percentage of Respondents
ACE inhibitor	43
Beta-blocker	17
Calcium channel blocker	12
Angiotensin II receptor antagonist	8
Frusemide	2

42% of respondents identified that they would either substitute or add in another agent.

Agent	Percentage of Respondents
Thiazide diuretic	13
Beta-blocker	11
Calcium channel blocker	10
ACE inhibitor	4
Angiotensin II receptor antagonist	4

A third and fourth choice of antihypertensive agent was identified by 19% and 9% of respondents respectively.

Agent	Percentage of Respondents	
	3rd Choice	4th Choice
ACE inhibitor	3	3
Beta-blocker	3	1
Calcium channel blocker	8	2
Thiazide diuretic	3	0
Angiotensin II receptor antagonist	0	1
Aspirin	2	2

Question 3

What would you regard as an appropriate blood pressure response?

The blood pressure targets identified by the respondents are shown below with 35% identifying a target blood pressure of < 130/85 mmHg.

Target Blood Pressure	Percentage of Respondents
< 130/85 mmHg	35
130/90 mmHg to 140/80 mmHg	27
140/85 mmHg to 140/90 mmHg	35
> 150/85 mmHg	3

Question 4

Would you prescribe differently for Mr Ellis if an ECG demonstrated left ventricular hypertrophy?

Of the respondents 50% would change their initial choice of antihypertensive agent. Of this group, 97% would use ACE inhibitors as their agent of choice.

Of the remaining 50% who claimed that they would not change their agent, 72% had already chosen an ACE inhibitor as their initial choice for treatment of Mr Ellis. The table shown below details the remainder of agents chosen as initial therapy and respondents would pursue the same treatment unchanged in the light of coexisting complication.

Choice	Percentage of Respondents
Angiotensin II receptor antagonist	13
Thiazide diuretic	7
Beta-blocker	4
Calcium channel blocker	4

Expert Commentary

Dr Fred de Looze

Director, Inala Health Centre General Practice

Senior Lecturer in General Practice, University of Queensland

Based on the information given in this case study, Mr Ellis is at very high risk (absolute risk (AR) >20%) of experiencing a cardiovascular (CVD) event within the next 5 years. This is based on the fact that he is male, aged > 55 years, smokes and has an average blood pressure of 190/102 mmHg which is classified as severe hypertension. Given that this is the situation and he has been newly diagnosed as having raised blood pressure, his initial management at this consultation should include the following steps if not already performed previously.

Initial management

Further history:

- ▲ In particular looking for possible causes of his hypertension (recent or past illness involving the kidneys, phaeochromocytoma etc), possible symptoms from end organ involvement and concomitant conditions (e.g. gout)
- ▲ Family history of hypertension, cardiovascular disease, polycystic kidney disease or diabetes.
- ▲ Ingestion of drugs / medications that may raise blood pressure.
- ▲ Allergies / allergic reactions.

Physical examination:

- ▲ Height, weight and BMI
- ▲ General appearance (e.g. Conn's, Cushingoid etc)
- ▲ Full cardiovascular examination including fundi and all peripheral pulses
- ▲ Abdominal examination (mass, polycystic kidneys, bruits)

Investigations:

- ▲ Urinalysis by dipstick
- ▲ Blood tests (renal function, FBC, lipid profile, glucose and uric acid)
- ▲ ECG
- ▲ CXR
- ▲ Echocardiogram (important to know LV mass, ejection fraction, valve function)
- ▲ Further tests may be indicated based on history and examination findings

Initial treatment:

- ▲ Advice about smoking cessation and counselling regarding the significant CVD risk reduction that can be achieved by this. Showing Mr Ellis this by using an AR calculator would most likely be very useful.
- ▲ Dietary advice / information brochures about a low saturated fat diet should be given. The use of plant sterol margarines should be encouraged.

Drug management

Given that Mr Ellis' further history, physical examination and tests are all unremarkable and "normal", antihypertensive medication should be started to help lower his blood pressure and other medications considered to help reduce his cardiovascular risk further. This could be done as follows:

Antihypertensive drug management:

While his blood pressure is very high and it is unlikely that it will be controlled on monotherapy, nevertheless it is prudent to follow the "start low, go slow" maxim. (There is no indication for lowering his blood pressure rapidly and in fact this is contraindicated in this situation).

I would start with a low dose thiazide (e.g. hydrochlorothiazide 25mg) and monitor his response over the next 4 – 6 weeks. If his blood pressure is still raised, I would add another antihypertensive agent. Given that he is physically active I would choose to use a calcium channel blocker such as nifedipine e.g. Adalat oros[®] (30mg daily) or ACE inhibitor e.g. perindopril (2mg daily) second line rather than a low dose beta-blocker at this stage. Blood pressure should be reviewed 2 – 4 weekly to enable dose adjustments to be made. Electrolytes and renal function should be checked after 1 month if adding an ACE inhibitor.

Now that diuretic containing combination therapies are available, it could be advantageous thinking about using one of the agents in a combination formulation e.g. Monoplus[®], Karvezide[®], Avapro HCT[®]. This would allow Mr Ellis to be changed to a single medication later to assist with adherence to treatment. A third line agent could be added later if indicated to control blood pressure. It is important to monitor for medication side effects as well as response to treatment. His target blood pressure should be 130 – 138 mmHg systolic and <84 mmHg diastolic.

Even if Mr Ellis had left ventricular hypertrophy on ECG I would follow a similar drug management plan although I would lean to an ACE inhibitor second line. This is because the evidence indicates that it is lowering the blood pressure that is the most important thing rather than the agent used to do it.

Other medications:

- ▲ Aspirin. On current evidence it would be beneficial to commence low dose aspirin (100 – 150 mg daily).
- ▲ Depending on the total cholesterol / HDL cholesterol ratio, there may be an indication for medication to lower LDL or raise HDL cholesterol levels after reassessment of the effect of dietary modification.

Other management

If Mr Ellis' blood pressure was difficult to control, it would be necessary to do further investigations looking for secondary causes of hypertension such as renal artery stenosis, hyperaldosteronism or phaeochromocytoma. Ambulatory blood pressure monitoring would be indicated. Referral to a hypertension clinic could be considered at this stage. Ongoing monitoring of electrolytes, renal function, glucose and uric acid is indicated when using diuretics.

Neil Cottrell
Assistant Director of Pharmacy (Clinical)
Royal Brisbane Hospital, Brisbane
Conjoint Senior Lecturer, University of Queensland
NPS Clinical Mentor

Ian Coombes
Assistant Director of Pharmacy (Clinical)
Princess Alexandra Hospital, Brisbane
Conjoint Senior Lecturer, University of Queensland
NPS Clinical Mentor

Question 1

How would you rate his cardiovascular risk level?
low/medium/high/very high

Considering Mr Ellis risk factors, he has moderate/severe hypertension (SBP 190 mmHg, DBP 102 mmHg), and is a smoker. His cholesterol is assured to be normal and he has no history of diabetes.

Mr Ellis has a cardiovascular risk profile between high to very high as shown by 74% of respondents. This means he has between a 15 to > 20% risk of experiencing a cardiovascular event in the next 5 years based on the New Zealand Risk Calculator.¹

Question 2

If you choose to write a prescription, which agent would you choose?

It is appropriate to introduce medication at this stage and the choice of agent should be individualised to the patient. From the history of Mr Ellis there appears to be no compelling indications or contraindications to the selection of an agent e.g. gout, diabetes, ischaemic heart disease, or heart failure. Thiazides or a beta-blocker are equal in efficacy to other agents where no specific indication or contraindication exists.^{2,3}

A thiazide such as very low dose hydrochlorothiazide 12.5mg daily would be an appropriate choice of agent (18%)*. Concerns about effects on lipid profile and sexual dysfunction should be considered and monitored for, but should be balanced by their relatively low incidence when very low doses of thiazides are used. The diuretic effect of low dose thiazides is short lived and usually occurs during the first two to three days of therapy. Their continuing antihypertensive action is related to their vasodilating properties.

Monotherapy will usually reduce blood pressure by about 20/10 mmHg and this fall may not be sufficient for Mr Ellis and further medication will be required. The choice of a second agent will help reduce blood pressure and decrease the likelihood of adverse effects i.e. lower doses of two agents. The choice should again be based on the individual patient, and a beta-blocker (11%)* or a long acting calcium channel blocker (10%)*, would be appropriate.

* Figure in the bracket denotes percentage respondents in case study results.

From the case responses it is interesting that the antihypertensive chosen by 43% was an ACE inhibitor. It is important to remember that all antihypertensives are equally effective at lowering blood pressure and reducing cardiovascular events,² in the population such as Mr Ellis who do *not* have compelling indications or contraindications to specific therapy.

Question 3

What would you regard as an appropriate blood pressure response?

In deciding on the ideal target blood pressure the following factors need to be considered: such as age < 65 years, presence of renal insufficiency or presence of diabetes. Any or all of which would suggest an ideal target of < 130/85 mmHg.⁴ In Mr Ellis case the single factor of age < 65 years would suggest a target of <130/85 mmHg to help to reduce his long-term risk of experiencing cardiovascular event. This was the level selected by 35% of respondents.

It is important to ensure that Mr Ellis will tolerate this degree of blood pressure lowering and this concern is reflected by the 27% of respondents who would aim for a target blood pressure of 130/90 mmHg to 140/80 mmHg.

Question 4

Would you prescribe differently for Mr Ellis if an ECG demonstrated left ventricular hypertrophy?

There is no evidence to change your initial choice of antihypertensive agent(s) for Mr Ellis. Although he has an indication of left ventricular hypertrophy on his ECG (an expected complication of uncontrolled hypertension) he exhibits no signs or symptoms of heart failure. The current evidence is that all classes of agent (thiazide, beta-blocker, calcium channel blocker, alpha-blocker and ACE inhibitor) reduced left ventricular mass per se and where no compelling indication or contraindication still existed a thiazide would be suitable.²

If there were any concerns that pre-clinical/asymptomatic heart failure existed (may only be picked up through reduced ejection fraction as shown on echocardiogram) that would be a compelling indication for using an ACE inhibitor.

References

1. The National Heart Foundation of New Zealand. *New Zealand Risk Calculator*.
2. Neaton JD, Grimm RH, et al. Treatment of Mild Hypertension Study. *JAMA* 1993;270:713-24.
3. Hansson L, et al. Effect of angiotensin-converting-enzyme inhibition compared with conventional therapy on cardiovascular morbidity and mortality in hypertension: the Captopril prevention project (CAPPP) randomized trial. *Lancet* 1999;353:611-16.
4. National Heart Foundation of Australia. *1999 Guide to Management of Hypertension for Doctors*.