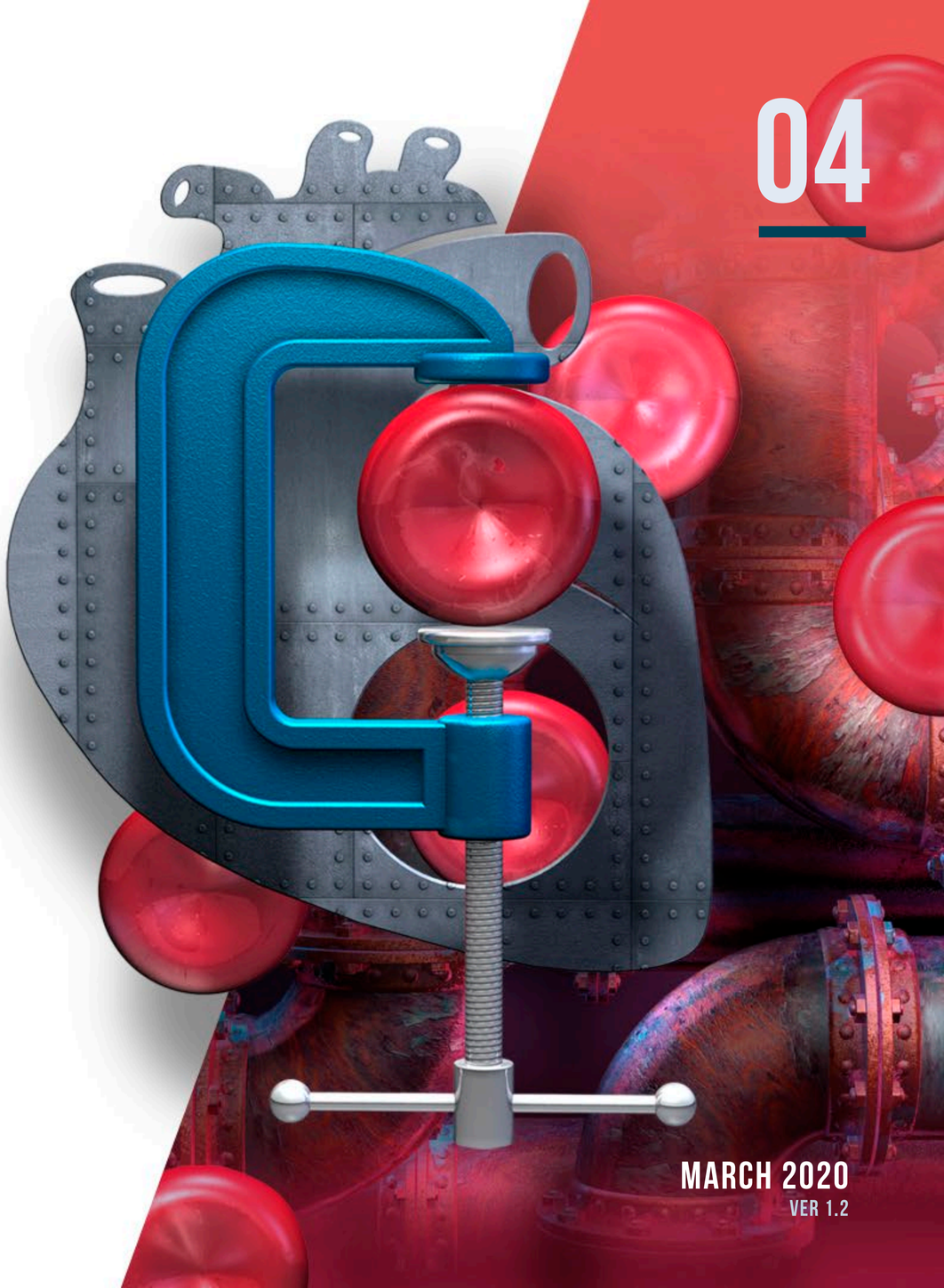
bpacnz
PRIMARY CARE
UPDATE SERIES

04

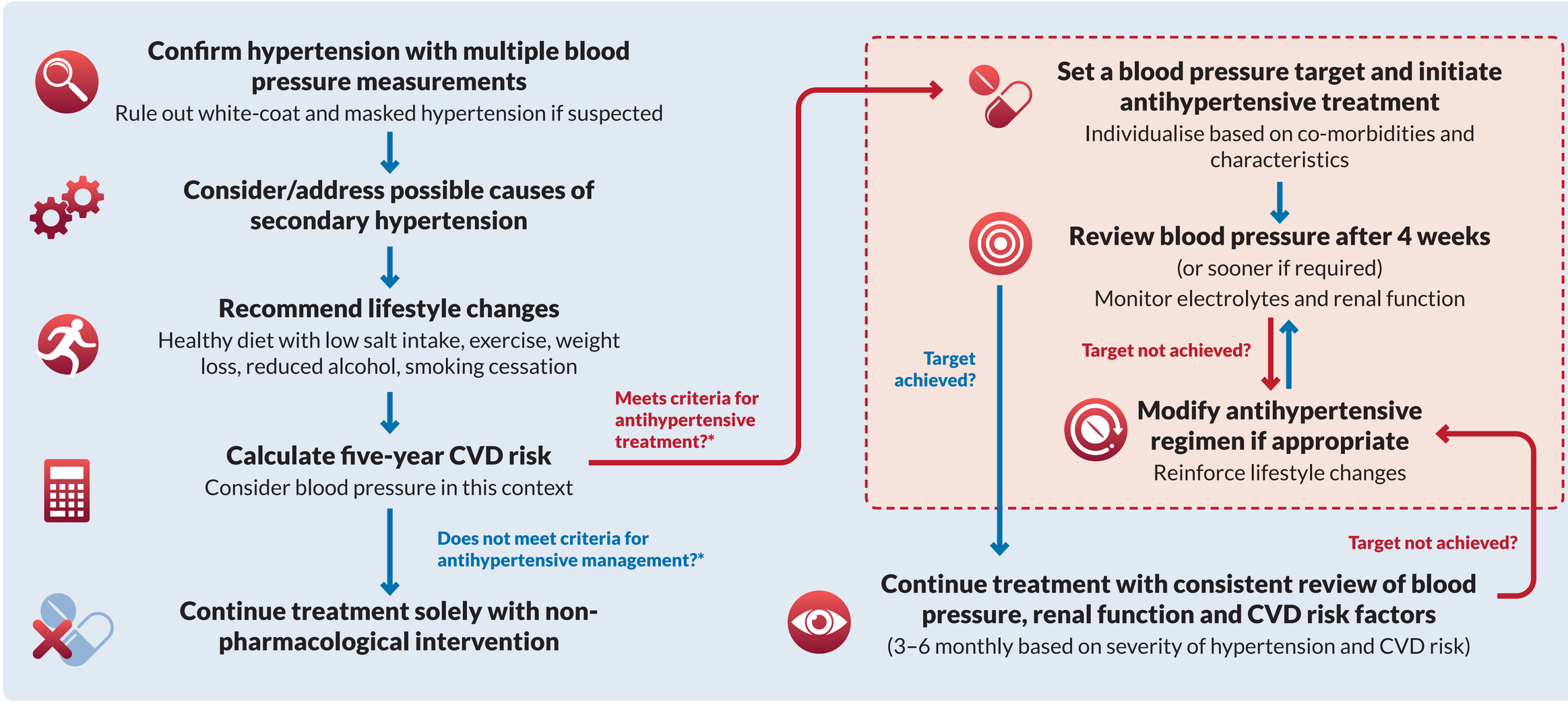
HYPERTENSION:
CONTROLLING THE "SILENT KILLER"

Welcome to the latest slidecast in bpac[nz]'s primary care update series. Today we'll be looking at the final topic in our cardiovascular theme, which is hypertension, with guest commentary from **Associate Professor Gerry Wilkins** from the Southern DHB. Hypertension is an extremely common condition in New Zealand, and although initial consequences are minimal, years of untreated high blood pressure can cause severe damage to blood vessels and the tissues and organs they supply.



MARCH 2020
VER 1.2

Overview: A risk-based approach to blood pressure management is best



* See the "Using CVD risk to guide the use of antihypertensive medicines" slide for information on the thresholds for antihypertensive treatment. CVD, cardiovascular disease.

1. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 2. Williams B, Mancia G, Spiering W, et al. J Hypertens. 2018;36:2284–309.

Identifying elevated blood pressure

Clinic assessment every five years is reasonable in most adults – annual check ups are appropriate for those with additional risk factors

See the accompanying "practice tool" for information on blood pressure examinations

International guidelines differ in how they categorise hypertension in adults

	American guidelines		European/Australian guidelines		NICE guidelines	
	SBP	DBP	SBP	DBP	SBP	DBP
Optimal	<120 SBP and <80 DBP					
Normal	<120	<80	<130	80–84	<130	80–84
Elevated normal	120–129	<80	130–139	85–89	130–139	85–89
Stage/grade 1 hypertension	130–139	80–89	140–159	90–99	140–159	90–99
Stage/grade 2 hypertension	140–179	90–119	160–179	100–109	160–179	100–119
Emergency/grade 3 hypertension	≥180	≥120	≥180	≥110	≥180	≥120
	With target organ damage					
Isolated systolic hypertension	≥140 SBP and <90 DBP				≥160	<90

DBP, diastolic blood pressure; NICE, National Institute for Health and Care Excellence; SBP, systolic blood pressure

1. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 2. Williams B, Mancia G, Spiering W, et al. J Hypertens. 2018;36:2284–309; 3. Guideline for the diagnosis and management of hypertension in adults. National Heart Foundation of Australia. 2016. Available at: https://www.mja.com.au/journal/2016/205/2/guideline-diagnosis-and-management-hypertension-adults-2016 (Accessed Mar, 2020); Boffa RJ, Constanti M, Floyd CN, et al. BMJ. 2019;367:I5310.

Identifying elevated blood pressure

Clinic assessment every five years is reasonable in most adults – annual check ups are appropriate for those with additional risk factors

See the accompanying “practice tool” for information on blood pressure examinations

International guidelines differ in how they categorise hypertension in adults

Patients with a blood pressure persistently ≥ 130/80 mmHg should undergo a clinical evaluation and likely require some form of management (starting with lifestyle changes)

At-home or 24h ambulatory monitoring is recommended where white-coat or masked hypertension is suspected to reduce the possibility of under and over-treatment

Rule out white-coat hypertension if clinic blood pressure measurements are consistently elevated despite the absence of obvious risk factors

Rule out masked hypertension if clinic blood pressure measurements are consistently normal but there are clinical features consistent with hypertension, e.g. signs of end-organ damage

1. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 2. Williams B, Mancia G, Spiering W, et al. J Hypertens. 2018;36:2284–309; 3. Ministry of Health. Cardiovascular Disease Risk Assessment and Management for Primary Care. 2018. Available at: https://www.health.govt.nz/publication/cardiovascular-disease-risk-assessment-and-management-primary-care (Accessed Mar, 2020) ; Boffa RJ, Constanti M, Floyd CN, et al. BMJ. 2019;367:l5310.

Consider the possibility of secondary hypertension

Certain groups are more likely to experience secondary hypertension, such as patients:

- Aged < 30 years
- With uncontrolled blood pressure despite treatment with multiple antihypertensive medicines
- With malignant hypertension (i.e. abrupt or accelerated hypertension)

Common causes of secondary hypertension include:

Alcohol or medicine induced
e.g. NSAIDs, oestrogen, corticosteroids, immunosuppressants, methylphenidate, atypical antipsychotics

Renovascular disease

Sleep apnoea

See the “practice tool” for more information, including rarer causes of secondary hypertension

If secondary hypertension is suspected and cannot be managed, the patient should be referred to a clinician with specific expertise for diagnostic confirmation and treatment

NSAIDs, non-steroidal anti-inflammatory drugs.

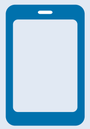
1. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 2. Ministry of Health. Cardiovascular Disease Risk Assessment and Management for Primary Care. 2018. Available at: https://www.health.govt.nz/publication/cardiovascular-disease-risk-assessment-and-management-primary-care (Accessed Mar, 2020).

Lifestyle changes are important for everyone

Lifestyle changes should be recommended for every patient with a blood pressure ≥ 130/80 mmHg

- In some cases, they may delay the need for pharmacological intervention or complement its BP-lowering effect

Lifestyle change	Guidance		Approximate impact on SBP in patients with hypertension
Weight loss	• Even small losses are associated with a reduction in blood pressure		**– 1 to 2 mmHg per kg lost**
Healthy diet	• A diet rich in fruits, vegetables, whole grains, low-fat dairy and reduced saturated and total fat is recommended		**–11 mmHg**
Reduce sodium intake	• < 1.5 g/day is optimal, but aim for at least a 1 g/day reduction	In general, less than 5–6 g of total salt daily should be recommended	**–5 to 6 mmHg**
Optimise potassium intake	• 3.5–5.0 g/day	Potassium increases sodium excretion and induces vasodilation	**–4 to 5 mmHg**
Physical activity	• Of moderate intensity, e.g. walking for at least 30 minutes, five days per week		**–4 to 5 mmHg**
Reduce alcohol intake	• Two standard drinks* per day for women and no more than 10 per week • Three standard drinks per day for men and no more than 15 per week	At least two alcohol-free days per week	**– 4 mmHg** (potentially more for heavier drinkers)
Avoid smoking	• There is inconsistent evidence about the chronic effects of smoking on blood pressure • Acute effects are well documented; the first cigarette of the day can increase SBP by approximately 20 mmHg and blood pressure begins to fall 10–15 minutes after smoking cessation. If smoking is continued during the day, blood pressure measurements remain elevated.		



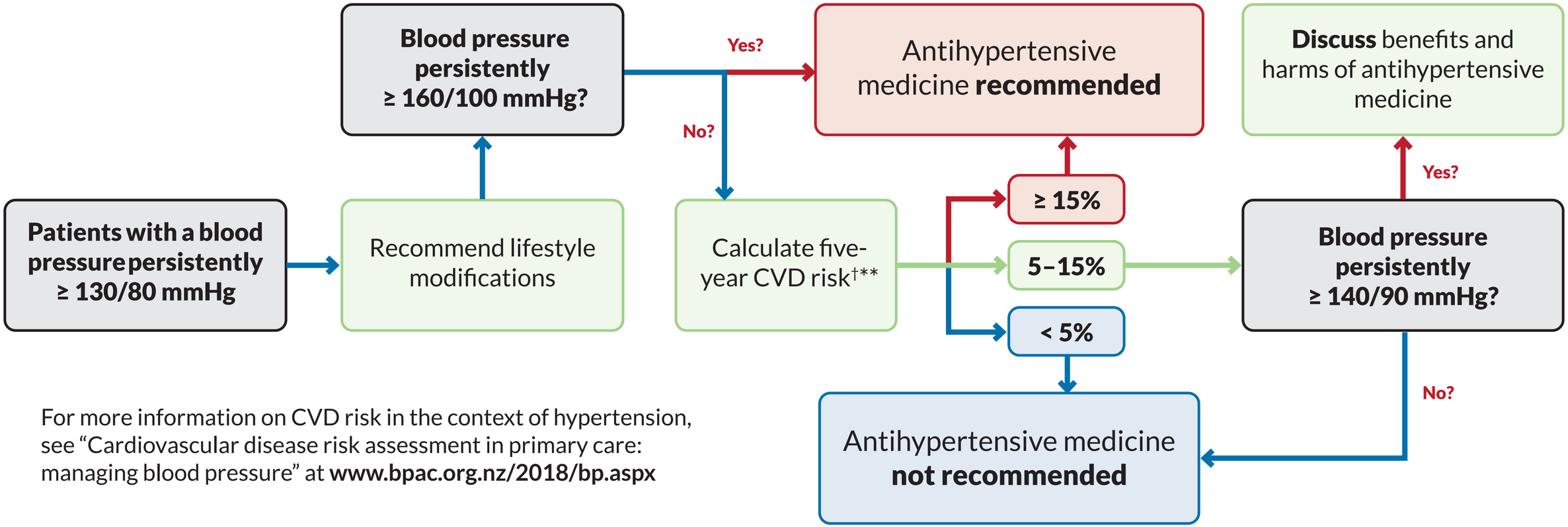
Smartphone apps, e.g. “FoodSwitch”, can help people assess nutritional content of labelled products and identify healthier alternatives

* A standard drink is approximately 330 mL of 4% beer or 100 mL of 12.5% wine. BP, blood pressure; SBP, systolic blood pressure.

1. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 2. Health Promotion Agency. Low-risk alcohol drinking advice. Available from: www.alcohol.org.nz/help-advice/advice-on-alcohol/low-risk-alcohol-drinking-advice (Accessed Mar, 2020).

Using CVD risk to guide the use of antihypertensive medicines*

Unless blood pressure measurements are very high, they are insufficient to direct use of antihypertensive medicines alone



For more information on CVD risk in the context of hypertension, see "Cardiovascular disease risk assessment in primary care: managing blood pressure" at **www.bpac.org.nz/2018/bp.aspx**

* In patients aged < 75 years. All blood pressure recommendations are for clinic-based measurements; † A calculation of the five-year CVD risk is still recommended in patients with a blood pressure persistently ≥ 160/100 mmHg to guide other treatment decisions, however, it is not required to qualify the patient for use of antihypertensive medicines; ** See Ministry of Health CVD consensus guidelines[1] for more information on measuring CVD risk. CVD, cardiovascular disease.

1. Ministry of Health. Cardiovascular Disease Risk Assessment and Management for Primary Care. 2018. Available at: https://www.health.govt.nz/publication/cardiovascular-disease-risk-assessment-and-management-primary-care (Accessed Mar, 2020)

Using CVD risk to guide the use of antihypertensive medicines*

NZ Primary Prevention (NZPP) equations* are now used to calculate five-year CVD risk

These incorporate a wide range of variables that contribute to CVD risk

NZPP equations are now incorporated into the BPAC Clinical Solutions *bestpractice* CVD Management module†

In general, begin CVD risk assessments at:

- **age 45 years for males**
- **age 55 years for females**

However, assessments should be:

- **10 years earlier** for people with personal or family risk factors for CVD
- **15 years earlier** for people of M□ori, Pacific or South-Asian ethnicity
- **20 years earlier** for people with severe mental illness
- **From diagnosis** for people with type 1 or 2 diabetes

For further information on the age of CVD risk assessment based on patient characteristics, see "What's new in cardiovascular disease risk assessment and management for primary care clinicians" at **www.bpac.org.nz/2018/cvd.aspx**

* These replace the previously used equations that were based on the Framingham study.

† Access the CVD risk tool via bestpractice Decision Support on your patient management system. If your practice does not have access to this, contact BPAC Clinical Solutions: https://bpacsolutions.co.nz/contact/; alternatively, an online CVD risk calculator, with the option of using the Predict data, is available from: http://chd.bestsciencemedicine.com/calc2.html

1. Ministry of Health. Cardiovascular Disease Risk Assessment and Management for Primary Care. 2018. Available at: https://www.health.govt.nz/publication/cardiovascular-disease-risk-assessment-and-management-primary-care (Accessed Mar, 2020)

Antihypertensive treatment – *what's in the guidelines?*

The blood pressure lowering effect of different antihypertensive medicines is similar. These include:*

ACE inhibitor or ARB

CCB

Thiazidediuretic

* Beta-blockers are no longer considered a first-line antihypertensive medicine unless there is a clinical need e.g. in patients with atrial fibrillation; † Either as separate agents or in a fixed-dose combination; ** Such as another diuretic, alpha-blocker or beta-blockers

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

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Historical practice:

- Monotherapy with any first-line medicine unless contraindicated
  (choice depends on co-morbidities, age, tolerance, concomitant medicine use, and patient choice)
- Increase dose or switch to a different antihypertensive medicine if there is a sub-optimal response
- Consider combination treatment if targets are still not met

This may not be the most effective approach…

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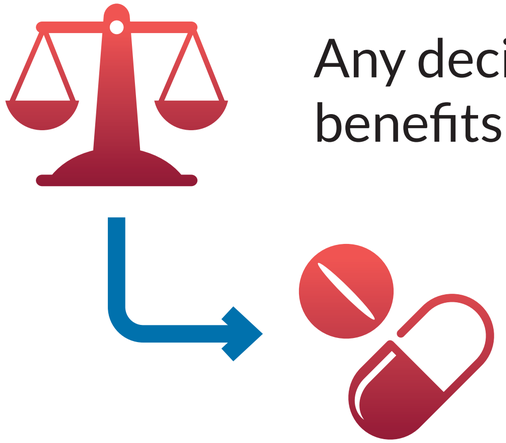
Deciding how to intensify antihypertensive treatment



Any decision to intensify treatment involves weighing the potential benefits gained against the increased risk of adverse effects

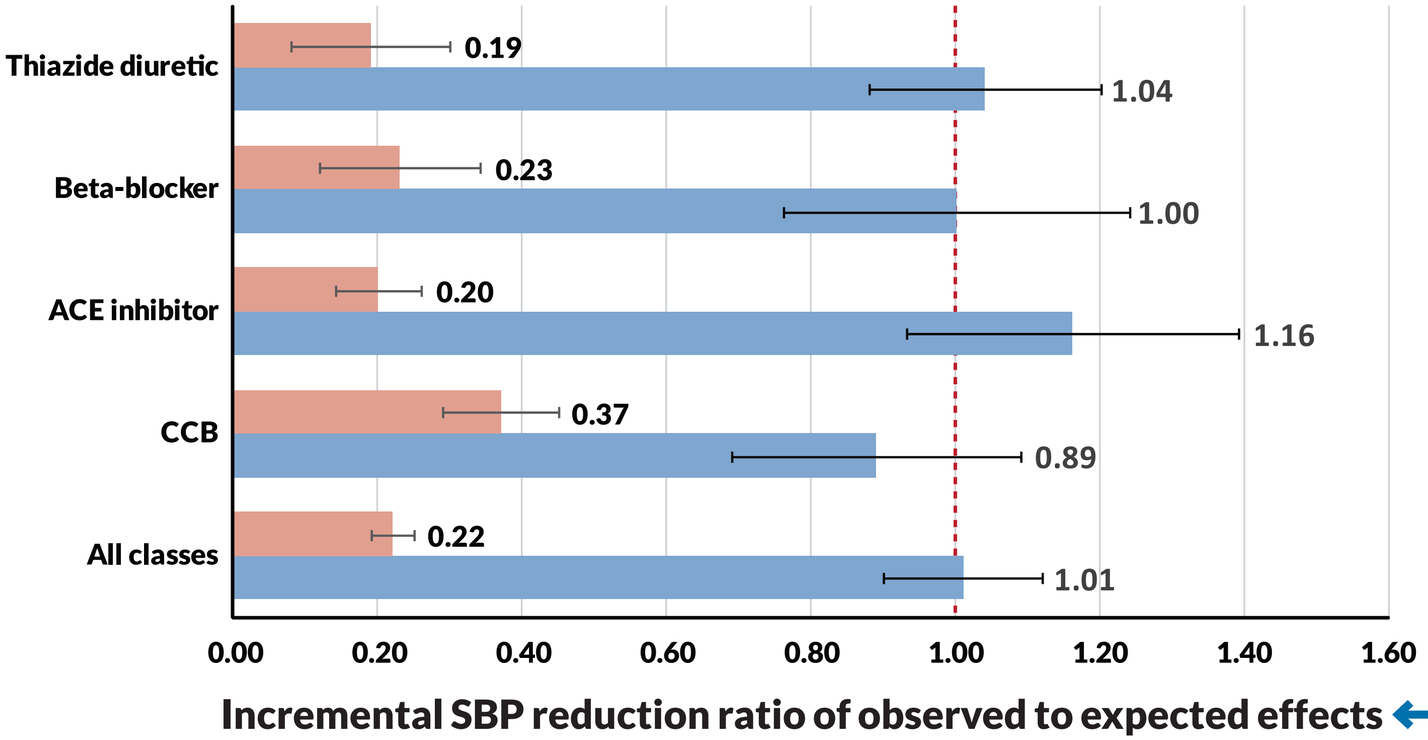
- On average, any single antihypertensive will only lower SBP by <10 mmHg[1]
- Half the standard dose of any first-line antihypertensive still provides around 80% of the blood pressure lowering effect[1]

SBP, systolic blood pressure

1. Law MR, Wald NJ, Morris JK, et al. BMJ. 2003;326:1427; 2. Wald DS, Law M, Morris JK, et al. Am J Med. 2009;122:290–300; 3. Manica G, Rea F, Carrao G, et al. Circ Res. 2019;124:1113–23.

Deciding how to intensify antihypertensive treatment

Two low-dose antihypertensives used together have a much greater SBP-lowering effect than increasing the dose of one antihypertensive



Double the dose of the same antihypertensive*

Adding an antihypertensive from another class†

Note: An incremental effect of 1.0 indicates that the SBP-lowering effect is exactly additive, 0.5 indicates a sub-additive effect (equivalent to 50% of the additive effect) etc

Figure adapted from: Wald DS, Law M, Morris JK, et al. Am J Med. 2009;122:290–300. doi: 10.1016/j.amjmed.2008.09.038.

* From a standard initial dose to twice the standard initial dose; † Both antihypertensives at the standard initial dose.

ACE, angiotensin-converting enzyme; CCB, calcium channel blocker; SBP, systolic blood pressure

1. Law MR, Wald NJ, Morris JK, et al. BMJ. 2003;326:1427; 2. Wald DS, Law M, Morris JK, et al. Am J Med. 2009;122:290–300; 3. Manica G, Rea F, Carrao G, et al. Circ Res. 2019;124:1113–23.

Deciding how to intensify antihypertensive treatment

Any decision to intensify treatment involves weighing the potential benefits gained against the increased risk of adverse effects

The risk of adverse effects is often greater with a single high dose antihypertensive compared with low doses of two different antihypertensives

	Percentage of patients with adverse effects compared with placebo (%)*		
	½ standard dose	Standard dose	2x standard dose
ACE inhibitor	3.9	3.9	3.9
ARB	−1.8	0	1.9
CCBs	1.6	8.3	14.9
Thiazide diuretic	2.0	9.9	17.8

Table adapted from: Law MR, Wald NJ, Morris JK, et al. BMJ. 2003;326:1427. doi: 10.1136/bmj.326.7404.1427

* Figures are based on 96 randomised control trials (RCTs) for ACE inhibitors, 96 RCTs for CCBs and 59 RCTs for thiazide diuretics.ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; CCB, calcium channel blocker; SBP, systolic blood pressure

1. Law MR, Wald NJ, Morris JK, et al. BMJ. 2003;326:1427; 2. Wald DS, Law M, Morris JK, et al. Am J Med. 2009;122:290–300; 3. Manica G, Rea F, Carrao G, et al. Circ Res. 2019;124:1113–23.

Deciding how to intensify antihypertensive treatment

Any decision to intensify treatment involves weighing the potential benefits gained against the increased risk of adverse effects

Antihypertensives generally do not potentiate the adverse effects of each other, i.e. the risk of adverse effects is not additive* when using combinations of antihypertensives

Results from 50 randomised controlled trials for patients with hypertension

testing antihypertensives of two different classes separately and in combination:

One antihypertensive

5.2%

of patients report adverse effects

Two antihypertensives

7.5%

of patients report adverse effects

No increase in the risk of serious adverse effects when using two low-dose antihypertensives of separate classes versus one

* Based on the data below, if the adverse effects of two medicines were additive, then one would expect the percentage of patients experiencing adverse effects with two medicines to be around 10.4%.ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; CCB, calcium channel blocker; SBP, systolic blood pressure

1. Law MR, Wald NJ, Morris JK, et al. BMJ. 2003;326:1427; 2. Wald DS, Law M, Morris JK, et al. Am J Med. 2009;122:290–300; 3. Manica G, Rea F, Carrao G, et al. Circ Res. 2019;124:1113–23; 4 Markovitz AA, Mack JA, Nallamothu BK. BMJ. 2017;359:j5542.

Antihypertensive treatment – *what's in the guidelines?*

The blood pressure lowering effect of different antihypertensive medicines is similar. These include:*

ACE inhibitor or ARB | **CCB** | **Thiazidediuretic**

Historical practice:

- Monotherapy with any first-line medicine unless contraindicated
  (choice depends on co-morbidities, age, tolerance, concomitant medicine use, and patient choice)
- Increase dose or switch to a different antihypertensive medicine if there is a sub-optimal response
- Consider combination treatment if targets are still not met

Current perspective:

- Monotherapy is unlikely to be successful unless patients are close to their target
- In many patients, initial low-dose combination treatment† using two medicines is recommended
- If two antihypertensives are not successful, add another medicine or increase dose(s) after confirming adherence
- For patients with resistant hypertension, add spironolactone or another medicine**

* Beta-blockers are no longer considered a first-line antihypertensive medicine unless there is a clinical need e.g. in patients with atrial fibrillation; † Either as separate agents or in a fixed-dose combination; ** Such as another diuretic, alpha-blocker or beta-blockers ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; CCB, calcium channel blocker

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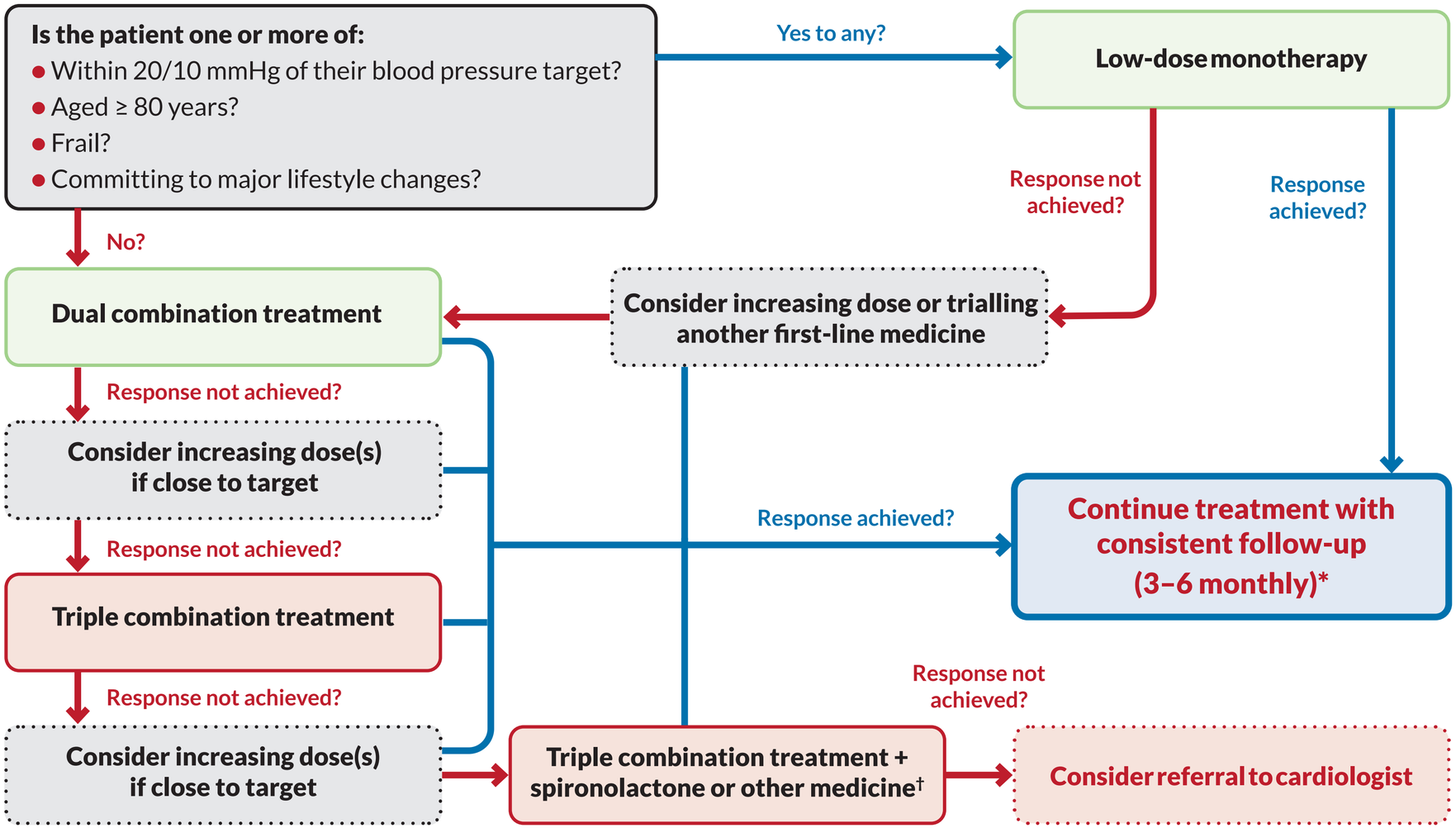
A pragmatic approach to antihypertensive treatment works best



Review at least every four weeks to assess the efficacy of a new regimen (unless urgent)
Regularly reconsider possible causes if not meeting targets

Inform the patient from the outset that **most people end up requiring multiple antihypertensives**

An **ACE inhibitor or ARB + a dihydropyridine CCB** (e.g. amlodipine) is the preferred dual combination in international guidelines

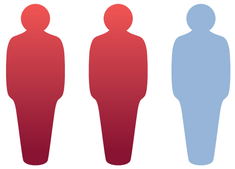
Fixed dose dual-combinations may be preferred to promote adherence if available

* The frequency of follow-ups will differ between practices and should depend on the severity of hypertension in the context of the patient's overall CVD risk; † Such as a beta-blockers or an alpha blocker.

ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; CCB, calcium channel blocker; CVD, cardiovascular disease.

1. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 2. Williams B, Mancia G, Spiering W, et al. J Hypertens. 2018;36:2284–309; 3. Boffa RJ, Constanti M, Floyd CN, et al. BMJ. 2019;367:l5310; 4. Manica G, Rea F, Carrao G, et al. Circ Res. 2019 29;124:1113-23.

Co-morbidities influence management decisions



Two out of every three people with hypertension have a co-morbidity

Co-morbidity	Potentially beneficial	Avoid
CKD	• ACE inhibitors/ARBs; regular review of electrolytes/renal function	• High salt-intake
Diabetes	• ACE inhibitors/ARBs, followed by low-dose thiazide diuretic or CCB as second-line in T1D; ACE inhibitors first-line in T2D	• High-dose thiazide diuretics
Heart failure or asymptomatic left ventricular dysfunction	• ACE inhibitors/ARBs + beta-blockers without ISA* (if stable) • Add a thiazide(-like) diuretic if blood pressure remains uncontrolled	• CCBs (particularly verapamil, diltiazem) • Alpha blockers in aortic stenosis, beta blockers in uncontrolled heart failure
Acute myocardial infarction	• Beta-blockers without ISA* • ACE inhibitors/ARBs	• No specific cautions
Atrial fibrillation	• ACE inhibitors/ARBs • Beta blocker or rate limiting CCB, e.g. diltiazem	• No specific cautions
Angina	• Beta-blockers • CCBs • ACE inhibitors/ARBs	• No specific cautions
Cerebrovascular disease (i.e. stroke)	• ACE inhibitors/ARBs • CCBs • Low-dose thiazide diuretics	• Beta-blockers, particularly atenolol • Thiazides in very elderly patients or those with poor daily fluid intake as they could contribute to hypoperfusion
Asthma/COPD	• No specific recommendations	• Beta-blockers; however, low-dose bisoprolol (or metoprolol) can be used if required in patients with asthma/COPD and heart failure
Gout	• Losartan has a uricosuric effect	• Thiazide diuretics

* Such as carvedilol. Treatment should be initiated at a low dose. If blood pressure is not controlled after six weeks, either a full dose of the initial medicine can be given, or patients can be switched to a medicine of a different class (starting at a low dose and then increasing). If blood pressure control is not reached, low doses of two medicines is preferable to increasing to a maximum dose of a single medicine. This approach maximises efficacy while minimising adverse effects.

ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; CCB, calcium channel blocker; CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease; ISA, intrinsic sympathomimetic activity; T1D, type 1 diabetes; T2D, type 2 diabetes.

1. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 2. Williams B, Mancia G, Spiering W, et al. J Hypertens. 2018;36:2284–309; 3. Kennard L, O'Shaughnessy KM. BMJ. 2016;352:i101.

Establishing a blood pressure target

A target clinic blood pressure of < 140/90 mmHg is suitable for uncomplicated hypertension

However, “treatment targets” should never override clinical judgement and lower objectives should be used for patients with a high risk of CVD

* Such as prior history of coronary heart disease, prior stroke or transient ischemic attack, prior history of peripheral artery disease

ASCVD, atherosclerotic cardiovascular disease; CKD, chronic kidney disease; CVD, cardiovascular disease; SBP, systolic blood pressure.

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Establishing a blood pressure target

A target clinic blood pressure of < 140/90 mmHg is suitable for uncomplicated hypertension
However, "treatment targets" should never override clinical judgement and lower objectives should be used for patients with a high risk of CVD

Rules of thumb for blood pressure targets

- Ensure consistency in the method of measurement
- Use the possible absolute CVD risk reduction to guide decisions
- Balance any benefits against the risk of adverse effects

	Clinic measurement	Ambulatory or at-home measurement
"High" CVD risk, including current ASCVD*, heart failure, reduced ejection fraction, diabetes mellitus, CKD, aged ≥65 years, 5-year CVD risk of ≥15%	<130/80 mmHg	<125/80 mmHg
"Lower" CVD risk None of the above risk factors	<140/90 mmHg	<135/90 mmHg
Frailty, dementia, limited life expectancy	Discuss treatment goals to guide decision making; targets can be more lenient and antihypertensives may need to be stopped	

For more information on intensive blood pressure management, see "Go low or no?" at **www.bpac.org.nz/2017/blood-pressure.aspx**

Intensive blood pressure management (SBP targets < 120 mmHg) may benefit some patients, however, its suitability in primary care has not been firmly established

* Such as prior history of coronary heart disease, prior stroke or transient ischemic attack, prior history of peripheral artery disease

ASCVD, atherosclerotic cardiovascular disease; CKD, chronic kidney disease; CVD, cardiovascular disease; SBP, systolic blood pressure.

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The crux of antihypertensive success: patient adherence

patients treated with antihypertensives do not consistently achieve a SBP < 140 mmHg

Non-adherence is very common; particularly when multiple antihypertensives are prescribed

- Starting with two medicines reduces discontinuation rates compared with patients that are initially prescribed monotherapy and subsequently progress to two medicines[1]

* As of Feb 2020, available fixed dose combinations in New Zealand contain hydrochlorothiazide. Two Danish case-control studies have indicated there may be increase in the risk of non-melanoma skin cancer if taken long-term. Although the mechanism is unknown, this association may be due to the photosensitising effect of hydrochlorothiazide. However, a series of Taiwanese case-control studies did not demonstrate this association. If this medicine is hydrochlorothiazide-containing medicines are prescribed, ensure patients are aware of, and adhere to, Sunsmart practices, i.e. wearing protective clothing, seeking shade, applying sufficient sunscreen, and that regular skin checks are performed. For more information, see: https://medsafe.govt.nz/safety/Alerts/Hydrochlorothiazide.asp

SBP, systolic blood pressure.1 Manica G, Rea F, Carrao G, et al. Circ Res. 2019;124:1113–23. 2 Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 3 Williams B, Mancia G, Spiering W, et al. J Hypertens. 2018;36:2284–309

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Tips for encouraging adherence:

- Educate the patient at the time of initial prescription about what the medicine is and how it works; reinforce this message at every scheduled review
- Use pill boxes, blister packaging, or electronic reminders (e.g. phone app)
- Prescribe once daily dosing and consider fixed-dose combinations if available

There is a potential association between hydrochlorothiazide-use (contained in currently funded fixed-dose combinations in NZ) and the development of non-melanoma skin cancers*

The supplier of cilazapril with hydrochlorothiazide will no longer supply this medicine in New Zealand; current supplies are expected to run out in July 2020 (see medicine table for alternative options)

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1. Manica G, Rea F, Carrao G, et al. Circ Res. 2019;124:1113–23. 2. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 3. Williams B, Mancia G, Spiering W, et al. J Hypertens. 2018;36:2284–309

The crux of antihypertensive success: patient adherence

patients treated with antihypertensives do not consistently achieve a SBP < 140 mmHg

Non-adherence is very common; particularly when multiple antihypertensives are prescribed

- Starting with two medicines reduces discontinuation rates compared with patients that are initially prescribed monotherapy and subsequently progress to two medicines[1]

Tips for encouraging adherence:

- Encourage night-time dosing of antihypertensives[2]
  - Improves BP-control and reduces primary CVD outcomes by 45%* compared with morning dosing
  - Can be associated with a bed-time routine
  - May limit perceptions of adverse effects

* Hazard ratio, 0.55; 95% confidence interval, 0.50–0.61; p<0.001.

BP, blood pressure; CVD, cardiovascular disease; SBP, systolic blood pressure.

1. Manica G, Rea F, Carrao G, et al. Circ Res. 2019;124:1113–23. 2. Herminda RC, Crespo JJ, Domínguez-Sardiña M, et al. Eur Heart J. 2019. ehz754. 3. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 4. Williams B, Mancia G, Spiering W, et al. J Hypertens. 2018;36:2284–309.

Hypertension in elderly (aged ≥80 years) and/or frail patients

Antihypertensives should continue to be given to most elderly patients to reduce the risk of death

- Biological – rather than chronological – age may be a reason for avoiding use based on treatment goals

Emphasise lifestyle modifications first (if appropriate), then consider antihypertensives if needed

CCBs and thiazide diuretics are often favoured in monotherapy

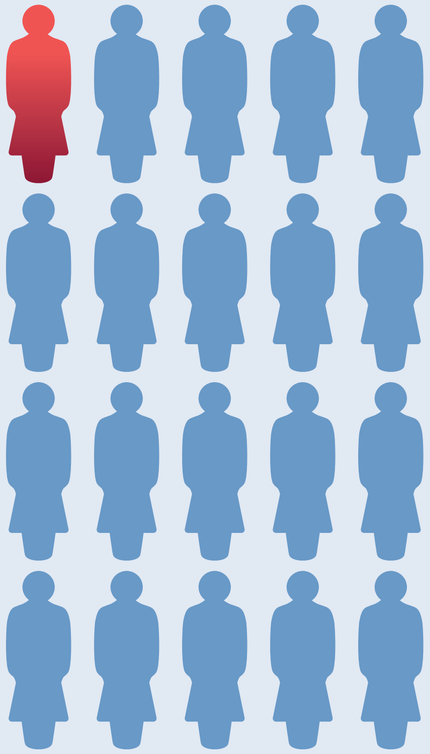
Blood pressure targets may be harder to achieve; more lenient targets are often appropriate

Reduce blood pressure gradually, particularly to avoid postural hypotension – lower the dose if adverse effects occur

CCB, calcium channel blocker.

1. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 2. Williams B, Mancia G, Spiering W, et al. J Hypertens. 2018;36:2284–309.

Hypertension and pregnancy



1 in 20

women have pre-existing hypertension before pregnancy

Concerns:

Some antihypertensive medicines are harmful to the developing fetus

Pregnant women with pre-existing hypertension have a **higher risk of pre-eclampsia**

See the 2018 MOH hypertension in pregnancy guidelines for more information (link in references below)

Recommended antihypertensives during pregnancy (all fully subsidised)	**Avoid during pregnancy**
• Labetalol • Nifedipine • Methyldopa	• ACE inhibitors • ARBs

ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; MOH, ministry of Health.

1. Diagnosis and treatment of hypertension and pre-eclampsia in pregnancy in New Zealand. A clinical preactice guideline. Ministry of Health. Available at: https://www.health.govt.nz/system/files/documents/publications/diagnosis-and-treatment-of-hypertension-and-pre-eclampsia-in-pregnancy-in-new-zealand-v3.pdf (Accessed Mar, 2020). 2. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83.

Hypertension and pregnancy

In pregnant women with pre-existing hypertension:

Target pre-pregnancy blood pressure or lower with antihypertensive treatment (ideally 130–150/80–100 mmHg)

If risk factors are present for pre-eclampsia (e.g. antiphospholipid antibodies, a history of pre-eclampsia during previous pregnancies, renal disease), initiate **calcium supplementation*** once the pregnancy is confirmed and initiate **aspirin** at 12 weeks (100 mg every evening)

Monitor for symptoms of pre-eclampsia throughout, e.g. severe headache, visual disturbances, vomiting, severe epigastric/right upper quadrant pain, sudden swelling of the face, hands or feet

Evaluate fetal growth every 3–4 weeks in non-severe cases; closer surveillance† is recommended for severe pre-existing hypertension (≥160 mmHg SBP or ≥110 mmHg DBP)

Women with worsening hypertension or symptoms of pre-eclampsia at any stage of pregnancy should be referred to an obstetrician (or hospital if urgent)

* Offer calcium supplementation alongside dietary advice to achieve a daily elemental intake of 1 g; † Including ultrasound scan, amniotic fluid volume, umbilical artery Doppler evaluations and cardiotocographs where appropriate in accordance with availability.

DBP, diastolic blood pressure; SBP, systolic blood pressure.

1. Diagnosis and treatment of hypertension and pre-eclampsia in pregnancy in New Zealand. A clinical preactice guideline. Ministry of Health. Available at: https://www.health.govt.nz/system/files/documents/publications/diagnosis-and-treatment-of-hypertension-and-pre-eclampsia-in-pregnancy-in-new-zealand-v3.pdf (Accessed Mar, 2020). 2Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83.

Treatment options for patients with hypertension (first-line antihypertensives)

Class		Medicine*		Usual dose range for hypertension	Notes
ACE inhibitor		Cilazapril		Initially 1 mg once daily; maintenance dose 2.5–5 mg once daily; max 5 mg daily	Do not use ACE inhibitors in combination with ARBs Monitor electrolytes and renal function There is an increased risk of acute renal failure in patients with severe bilateral renal artery stenosis, and increased risk of hyperkalaemia, especially in patients with CKD or in those on potassium-supplements or -sparing drugs Avoid during pregnancy
		Enalapril		Initially 5 mg once daily; maintenance dose 20 mg once daily; max 40 mg daily	
		Quinapril		Initially 10 mg once daily; maintenance dose 20–40 mg daily in 1–2 divided doses	
ARB		Candesartan		Initially 8 mg once daily, increase if necessary every 4 weeks to max 32 mg once daily; usual maintenance dose 8 mg once daily	
		Losartan		Initially 50 mg once daily (less if aged ≥75 years), increase if necessary every 3–6 weeks to max 100 mg once daily; usual maintenance dose 50 mg once daily	
CCB	Dihydropyridines	Amlodipine		Initially 5 mg once daily; max 10 mg once daily	Avoid in patients with heart failure with reduced ejection fraction (amlodipine or felodipine may be used if CCBs are required) Dihydropyridines have a higher risk of dose-related pedal oedema Avoid using non-dihydropyridines with beta blockers (increased risk of bradycardia)
		Felodipine		Initially 5 mg once daily in morning (2.5 mg if elderly); maintenance dose 5–10 mg once daily	
	Non-Dihydropyridines	Diltiazem	MR	180–240 mg once daily, increase if necessary every 14 days; maintenance dose 240–360 mg once daily	
		Verapamil	IR	Initially 80 mg 2–3 times daily, increase if necessary to 160 mg 2–3 times daily	
			MR	Initially 120–240 mg daily, increase if necessary to 240 mg twice daily	
Thiazide (-type) diuretic		Bendroflumethiazide		2.5 mg once daily in the morning	Chlortalidone is often preferred due to its prolonged half-life and SBP-lowering effect Monitor electrolytes and renal function Avoid during pregnancy and with gout
		Chlortalidone		12.5–25 mg once daily in the morning	
		Indapamide		2.5 mg once daily in the morning	

* The selection process is generally determined by clinical preference and patient characteristics. Not all available antihypertensives are listed here; refer to the NZF for additional options. ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; CCB, calcium channel blocker; CKD, chronic kidney disease; IR, immediate release; MR, modified release.

1. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 2. NZ Formulary. NZF v93. 2020. Available from: www.nzf.org.nz (Accessed Mar, 2020)

Treatment options for patients with hypertension (other medicines to consider)

Class		Medicine		Usual dose range for hypertension	Notes
Non-thiazide diuretic		Furosemide		40–80 mg daily	Consider furosemide over thiazide diuretics if the patient has an eGFR <30 mL/min/1.73 m^2
		Spironolactone		25 mg once daily; ongoing monitoring of serum potassium and creatinine is important	Avoid during pregnancy
Alpha-blocker		Doxazosin		1 mg daily, increase after 1–2 weeks to 2 mg once daily, and thereafter to 4 mg once daily, if necessary; max 16 mg daily	May cause urinary stress incontinence and loss of bladder control in some women; may be beneficial in men with benign prostatic hyperplasia to alleviate nocturia Avoid during pregnancy or if there is a history of postural hypotension
Beta-blocker	Without ISA	Metoprolol succinate	MR	Initially 47.5 mg once daily increased if necessary; max 190 mg daily	Now play a limited role (fourth-line) in the management of hypertension and are usually only considered if there is a clinical need e.g. atrial fibrillation, acute myocardial infarction and heart failure All beta-blockers are considered equally as effective for treating hypertension Dose adjustments may be required in patients with renal dysfunction
		Atenolol		25–50 mg daily (higher doses not usually necessary)	
		Carvedilol		Initially 12.5 mg once daily, increase after 2 days to usual dose of 25 mg; max 50 mg daily	
		Bisoprolol		10 mg once daily (5 mg may be adequate in some patients); max 20 mg daily	
	With ISA	Celiprolol		200 mg once daily in the morning, increase to 400 daily if necessary	
		Pindolol		Initially 5 mg 2–3 times daily or 15 mg once daily; increase as required at weekly intervals; maintenance 15–30 mg daily (doses >15 mg given in 2 divided doses); max 45 mg daily	
Fixed-dose combinations (Currently available, Mar 2020)		Losartan + hydrochlorothiazide		Initially 1 tablet once daily; max 2 tablets once daily	Useful in patients with poor adherence to multiple prescribed antihypertensives Avoid during pregnancy Hydrochlorothiazide may be associated with an increased long-term risk of non-melanoma skin cancer
		Quinapril + hydrochlorothiazide		Initially 10/12.5 mg daily, increase to 20/12.5 mg daily if necessary	

* The selection process is generally determined by clinical preference and patient characteristics. Not all available antihypertensives are listed here; refer to the NZF for additional options. ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; CCB, calcium channel blocker; CKD, chronic kidney disease; IR, immediate release; MR, modified release.

1. Whelton PK, Carey RM, Aronow WS, et al. Circulation. 2018;138:e426-83; 2. NZ Formulary. NZF v93. 2020. Available from: www.nzf.org.nz (Accessed Mar, 2020)