Hypertension Management - Summary

Who should have blood pressure assessed?

All patients over the age of 40 years, every 1-3 years in order to determine their cardiovascular risk (ie. Framingham Risk Score)

How do I assess blood pressure?

Ideal assessment is using continuous ambulatory BP monitoring (ABPM) but this is often not available. Home BP monitoring (HBPM) is more closely related to cardiovascular risk than office BP monitoring (OBPM).

Diagnosis of hypertension:

OBPM	**ABPM**	**HBPM**
Hypertensive urgency or emergency (SBP greater than 200mmHg or DBP greater than 130mmHg)	Awake SBP 135 mmHg or DBP 85mmHg	Average SBP 135 mmHg or DBP 85mmHg
Greater than 180/100mmHg	24 hour average SBP 130mmHg or DBP 80mmHg	
140-179/90-109mmHg with organ damage or diabetes		
SBP 160mmHg or DBP 100mmHg over 3 visits		
SBP 140mmHg or DBP 90mmHg over 4-5 visit		

Check BP in both arms at least once and use the arm with the highest measurement for all subsequent measurements.

Proper technique:
See appendix 1 or
http://www.hypertension.ca/images/2013_EducationalResources/2013_MeasureBPPoster_EN_HCP1040.pdf

Wrist blood pressure machines are not recommended for use in this study. For the purposes of this study, use the same arm in the same position for all blood pressure measurements. A list of devices recommended by Hypertension Canada may be found here: http://www.hypertension.ca/devices-endorsed-by-hypertension-canada-dp1

Medical emergencies requiring urgent referral to an emergency room:[1]
Asymptomatic diastolic blood pressure (DBP) greater than 130mmHg
Also, any severe elevations of BP along with any one of the following conditions

- Hypertensive encephalopathy
- Acute aortic dissection
- Acute left ventricular failure
- Acute coronary syndrome
- Acute kidney injury
- Intracranial hemorrhage
- Acute ischemic stroke

- Eclampsia of pregnancy

What are the blood pressure targets?
All patients should target a blood pressure less than 140/90mmHg[1]

Exceptions:
- Diabetics: less than 130/80mmHg[1]

For very elderly (older than 80years), consider a target systolic BP less than 150mmHg because of their high risk of falls due to hypotension[1]

How do I treat hypertension?
Once diagnosed with hypertension (according to criteria above), consider starting treatment if BP greater than 140/90mmHg[1]
Always reinforce lifestyle modification[1,2]

Hypertensive with no heart disease, cerebrovascular disease, kidney disease or diabetes[3]

Situation	Medication	Comments
Initial therapy	Thiazide, beta-blocker (if less than 60yrs), ACEi (except not in African American), long-acting CCB or ARB	"Start low, go slow" Avoid hypokalemia with thiazide (add supplemental potassium chloride if required)
Initial therapy but SBP more than 20mmHg or DBP more than 10mmHg above goal	As above, but monitor closely for the need for an additional antihypertensive agent	Likely require combination therapy
Adverse effects from initial therapy	Substitute with another first line agent (thiazide, beta-blocker, ACEi, long-acting CCB or ARB)	ACEi induced cough
Uncontrolled with initial therapy, SBP 1-19mmHg or DBP 1-9mmHg above goal	Address compliance/adherence Combinations include: thiazide or CCB with ACEi, ARB or beta-blocker Do not use ACEi + ARB Consider other reasons for poor response	Caution using diltiazem or verapamil with a beta-blocker
Uncontrolled with initial therapy, SBP more than 20mmHg or DBP more than 10mmHg above goal	Address compliance/adherence Add additional antihypertensive drug	May require several antihypertensives, but combinations may cause significant hypotension
SBP and DBP below goal	Continue current regime	

Individualization of therapy by comorbid conditions:[1]

Disease	Initial Therapy	Comments
Coronary artery disease	ACEi/ARB, beta-blocker, ACEi + (amlodipine, nifedipine, felodipine)	
Recent MI	ACEi + beta-blocker (or ARB + beta-blocker)	If beta-blocker is not tolerated or contraindicated use CCB

Heart failure	ACEi/ARB + beta-blocker + spironolactone and add thiazide or loop diuretic for volume control if can't tolerate ACEi or ARB, use hydralazine and isosorbide dinitrate	do not use verapamil or diltiazem
Diabetes	ACEi/ARB; amlodipine/nifedipine/felodipine, thiazide diuretic; combination ACEi/ARB + dihydropuridine CCB	ACEi/ARB especially if microvascular complications or macrovascular disease Suggest not using ACEi/ARB + thiazide May require 2 or more drugs
Stroke	72 hours after stroke: ACEi + diuretic	No treatment recommended during acute phase unless severely elevated BP
Left ventricle hypertrophy	ACEi/ARB, long-acting CCB, thiazide diuretic	Do not use hydralazine or minoxidil
Non-diabetic chronic kidney disease	ACEi/ARB; add thiazide for antihypertensive effect ; add loop diuretic for volume control	ARB is recommended if patient has proteinuria or albuminuria; Thiazides have little diuretic effect at very low GFR
Renal artery stenosis		Caution with ACEi/ARB in solitary kidney or bilateral disease due to risk of acute kidney injury

How do I monitor and follow up patients with hypertension?

Recommend regular home BP monitoring and keeping a log

Ie. several times per week including in the morning and in the evening

See Appendix 2 for a monitoring form for patients

Ask about postural dizziness, check for postural hypotension by measuring sitting or supine BP with standing BP

Encourage lifestyle modification at every visit/interaction including smoking cessation

Blood tests: serum creatinine, potassium, HgB A1C in diabetics

<u>Possible reasons for poor response</u>[1]

Non-compliance: diet or medications

NSAIDS, oral contraceptive pills, sex hormones, corticosteroids, anabolic steroids, sympathomimetics and decongestants, cocaine, amphetamines, erythropoietin, cyclosporine, tacrolimus, licorice, midodrine, MAOI, SSRI and SNRI

Dosage too low, inappropriate combinations

Obesity, smoking, alcohol consumption, sleep apnea, persistent pain, volume overload, excessive salt, renal sodium retention

Secondary hypertension: renal insufficiency, renovascular disease, primary hyperaldosteronism, hyperthyroidism, obstructive sleep apnea, other rare endocrine disease

What should I tell the patient?
Focus on adherence, lifestyle modification, postural hypotension and dizziness, appropriate laboratory monitoring

Key points for drug therapy[4]

Medication Class	Examples	Possible adverse effects
Thiazide diuretic	hydrochlorothiazide, chlorthalidione, indapamide	Hypokalemia, photosensitivity, GI upset. **Cautions:** Avoid in severe hepatic or renal disease. May precipitate gout in clients with history of gout
Loop diuretic	furosemide	Electroltye depletion, muscle cramps. **Caution:** need potassium rich foods/supplements with long term use. Monitor potassium closely when also on digoxin or potassium depleting steroids.
Potassium sparing diuretic	spironolactone, amiloride triamterene	Gynecomastia (breast development in men), fatigue, impotence. **Caution:** elevated potassium with clients with renal disease, or on NSAIDS, ACEi or ARB
ACEi	captopril , cilazapril, enalapril, fosinopril, lisinopril, quinipril, ramipril, perindopril, trandolapril	Cough, angioedema, leucopenia (low white blood cell count, loss of taste or metallic taste. **Caution** for all ACEi: Don't use in pregnancy, use with caution in renal insufficiency and may cause hypotension when used with diuretic. May need to discontinue or reduce diuretic 2-3 days prior starting this medication. A rise in serum creatinine of up to 15% after initiating an ACE is common, but acute kidney injury is possible especially in patients with renovascular disease.
ARB	candesartan, eprosartan, irbesartan, losartan, valsartan, telmisartan	Fatigue, dizziness, hyperkalemia. **Caution:** Don't use in pregnancy or in bilateral renal stenosis. A rise in serum creatinine of up to 15% after initiating an ARB is common, but acute kidney injury is possible especially in patients with renal stenosis. May cause hypotension when used with diuretic. May need to discontinue or reduce diuretic 2-3 days prior starting this medication. Advise client to consult with MD.
Beta blocker	nadolol, sotalol , timolol	Bradycardia, masks hypoglycemia, fatigue, aggravate arterial insufficiency, bronchospasms, congestive heart failure. **Cautions:** Do not increase dose if heart rate is less than 45 beats per minute. Avoid or use with caution in asthmatics and type 1 diabetes; avoid in those with a heart block (Although beta blockers may rarely precipitate or worsen heart failure, research shows beneficial outcomes with the use of carvedilol, bisoprolol and metoprolol SR in those with heart failure.)
Cardioselective beta blocker	acebutolol, atenolol, bisoprolol, metoprolol, propranolol	
Alpha-beta blocker	carvedilol	
Non-dihydropuridine CCB	verapamil , diltiazem	Headaches,flushing, ankle swelling, lightheadedness, gingival hyperplasia, constipation. **Caution** with severe aortic stenosis/severe liver disease; with BB or digoxin may result in conduction disorders; Avoid grapefruit or
Dihydropuridine CCB	amlodipine, felodipine, nifedipine	

		grapefruit juice which may enhance effect.
Direct vasodilator	hydralazine, minoxidil	Increased hair growth, headache, angina in CAD clients, tachycardia, edema. **Cautions**: Avoid in mitral valve rheumatic fever (may→ drug induced lupus syndrome)
Alpha blocker	doxazosin, terazosin	Postural hypotension, dizziness, weakness, palpitations, headache. Since relaxes muscles in prostate and bladder may be used to treat pain of prostatis but should not be used in patients with prostate cancer or surgery, neurogenic bladder. Not recommended in severe renal or hepatic failure.
Central alpha agonists	clonidine (tablet, patch), methyldopa	Nasal congestion, drowsiness, dizziness, pruritis with the patch, dry mouth. **Cautions:** don't use in liver disease current or past; or with MAOI therapy. Clonidine – requires a slow withdrawal or rebound hypertension is possible. Methyldopa effectiveness is decreased with iron supplementation
Direct renin inhibitor	aliskiren	Aliskiren is no longer indicated for use in combination with ACE inhibitors or ARBs in Type 2 Diabetes (due to increases in non-fatal strokes, renal issues, hypotension and hyperkalemia).

Lifestyle adjustment tips for patients with hypertension

Refer to Lifestyle education materials

Non-drug measures:[1,2]

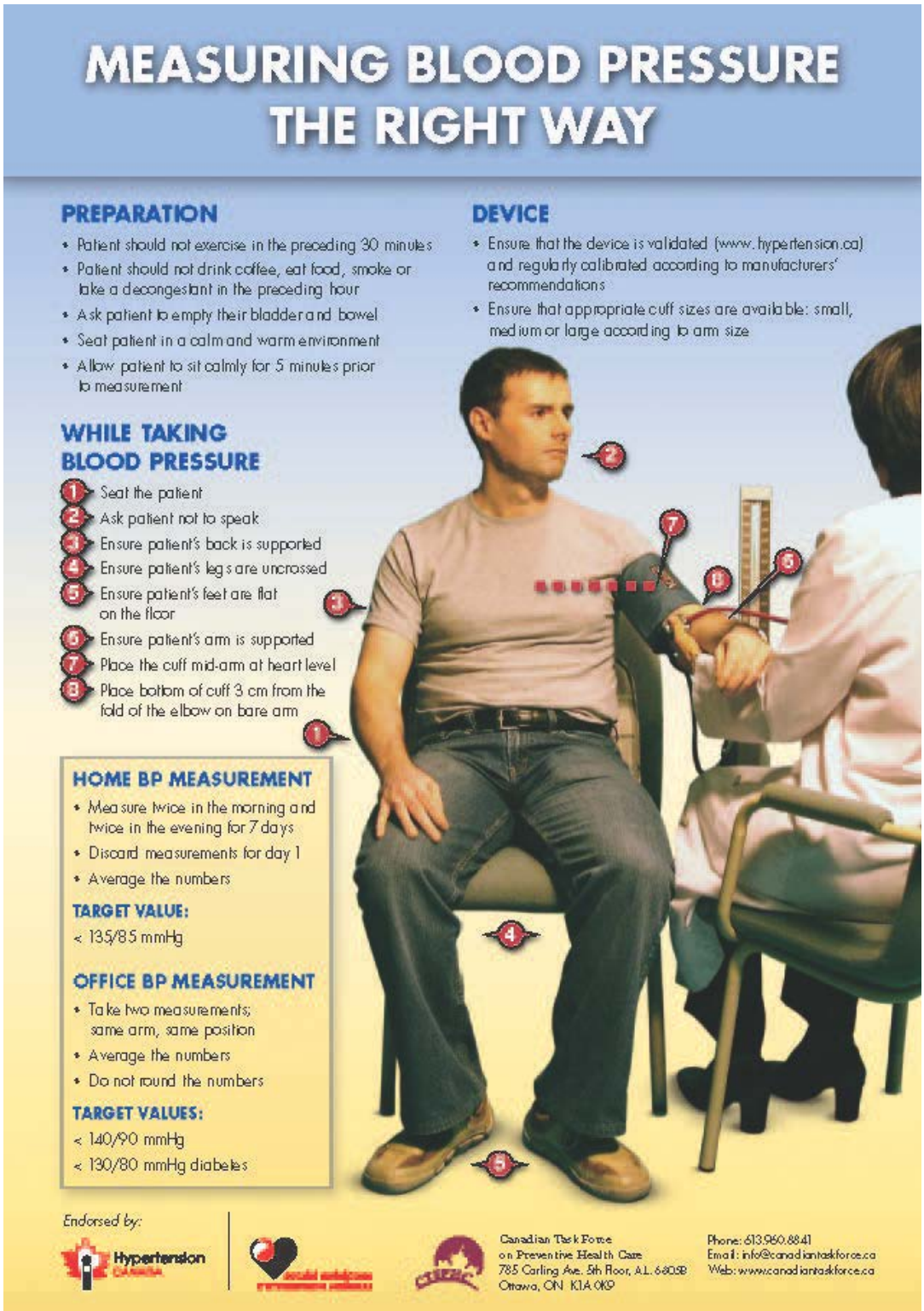
- Physical Exercise
- Weight Reduction
- Alcohol Consumption
- Dietary Recommendations
- Sodium Intake
- Stress Management

References

1. Hackam D, Quinn R, Ravani P, et al. The 2013 Canadian Hypertension Education Program Recommendations for Blood Pressure Measurement, Diagnosis, Assessment of Risk, Prevention, and Treatment of Hypertension. Canadian Journal of Cardiology 2013; 29: 528-542.
2. Tobe S, Stone J, Brouwers M, et al. Harmonnization of guidelines for the prevention and treatment of cardiovascular disease: the C-CHANGE initiative. Canadian Medical Association Journal 2011; 183(15): E1135-E1150
3. Margolis KL, Asche SE, Bergdall AR, et al. Effect of home blood pressure telemonitoring and pharmacist management on blood pressure control: a cluster randomized clinical trial. JAMA 2013; 310(1):46-56, online supplementary etable 1
4. Hypertension Module 2013.05. Endocrinology and Metabolism Program Calgary Zone. https://blackboard.ucalgary.ca/webapps/portal/frameset.jsp?tab_id=_2_1&url=%2fwebapps%2fblackboard%2fexecute%2flauncher%3ftype%3dCourse%26id%3d_27719_1%26url%3d Updated May 2013, accessed July 23, 2013

Appendix 1

Measuring blood pressure



Appendix 2

Home blood pressure monitoring form for patients

Hypertension CANADA

My Home Blood Pressure Log

My target home blood pressure is less than _____/_____ mm/Hg. I use my ❑ Right ❑ Left arm
Systolic / Diastolic

REST for 5 minutes before taking the first blood pressure reading (#1).
WAIT 1 minute before taking the second blood pressure reading (#2).
MEASURE before taking your blood pressure medication & before eating or 2 hours after eating.
TAKE your blood pressure 10 to 12 hours apart when doing AM & PM measurements.
READ "How to Measure Your Blood Pressure at Home" for more information about proper home blood pressure measurements techique at www.hypertension.ca
DISCARD the readings of the first day and do the average of the last 6 days.
BRING my log and my medications to every appointment with my health care professional.

SAMPLE

DATE		TIME	COMMENTS	Heart Rate (beats per minute)	BP Reading #1 (mmHg)		BP Reading #2 (mmHg)	
					Systolic	Diastolic	Systolic	Diastolic
June 15	Sample Morning	8:00 AM	Meds at 9 AM		138	82	135	80
	Sample Evening	8:00 PM	Upset		157	92	154	90
	Day 1 Morning							
	Day 1 Evening							
	Day 2 Morning							
	Day 2 Evening							
	Day 3 Morning							
	Day 3 Evening							
	Day 4 Morning							
	Day 4 Evening							
	Day 5 Morning							
	Day 5 Evening							
	Day 6 Morning							
	Day 6 Evening							
	Day 7 Morning							
	Day 7 Evening							
	Average							

DATE		TIME	COMMENTS	Heart Rate (beats per minute)	BP Reading #1 (mmHg)		BP Reading #2 (mmHg)	
					Systolic	Diastolic	Systolic	Diastolic
	Day 1 Morning							
	Day 1 Evening							
	Day 2 Morning							
	Day 2 Evening							
	Day 3 Morning							
	Day 3 Evening							
	Day 4 Morning							
	Day 4 Evening							
	Day 5 Morning							
	Day 5 Evening							
	Day 6 Morning							
	Day 6 Evening							
	Day 7 Morning							
	Day 7 Evening							
	Average							

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