

2009 Canadian Hypertension Education Program Recommendations: The Scientific Summary - An Annual Update

Programme
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Canadien sur
l'Hypertension



Canadian
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Program

On behalf of the Canadian Hypertension Education Program

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Hypertension recommendations designed for patient and public education have been developed in 2008. Bulk orders of 25 or more copies can be obtained by contacting hyperten@ucalgary.ca.

Hypertension recommendations for patients with diabetes, developed in 2009, are also available. These summaries are available electronically at www.hypertension.ca/bpc.

A free, confidential web-based tool for people is available at www.heartandstroke.ca/BP. Developed by the Heart and Stroke Foundation, the Blood Pressure Action Plan enables people to get a personalized action plan tailored to their risk profile, promote self-management and help people to make lifestyle changes, monitor their blood pressure and print reports to take to their healthcare provider.

Summary: Words 100

The 2009 Canadian Hypertension Education Program (CHEP) recommendations are the 10th annual update. Recent surveillance data indicates that 2/3rds of diabetic people with hypertension have uncontrolled blood pressure. The focus of this year's update is on improving the blood pressure management in these people. Other management gaps include suboptimal use of pharmacotherapy in younger hypertensive people with multiple cardiovascular risk factors and a low uptake of lifestyle changes after a hypertension diagnosis. In 2009 CHEP specifically recommends not to combine an ACE inhibitor with an angiotensin receptor blocker in people with uncomplicated hypertension, diabetes (without micro or overt albuminuria), chronic kidney disease (without proteinuria) and ischemic heart disease (without heart failure).

Abstract: Words 206

This report highlights the key messages of the 2009 Canadian Hypertension Education Program recommendations for management of hypertension and the supporting clinical science. In 2009 CHEP emphasizes the need to improve control of hypertension in people with diabetes. Intensive reduction in blood pressure (<130 /80 mmHg) in people with diabetes leads to significant reductions in mortality rates, disability rates, and overall health care system costs and may lead to improved quality of life. The CHEP recommendations continue to emphasize the important role played by patient self-efficacy by promoting lifestyle change to prevent and control hypertension and by encouraging home measurement of blood pressure. Unfortunately, most Canadians make only minor changes in lifestyle after a diagnosis of hypertension. Routine blood pressure measurement at all appropriate visits and screening for and management of all cardiovascular risks are key to blood pressure management. Many young hypertensive Canadians with multiple cardiovascular risks are not treated with antihypertensive drugs. This is despite the evidence that those with multiple cardiovascular risks and hypertension should be strongly considered for antihypertensive drug therapy regardless of age. In 2009, CHEP now specifically recommends not to combine an ACE inhibitor with an angiotensin receptor blocker in people with uncomplicated hypertension, diabetes (without micro or macro albuminuria), chronic kidney disease (without nephropathy (micro or overt proteinuria)) or ischemic heart disease (without heart failure).

Key Words Hypertension

High Blood Pressure

Clinical Practice Guidelines

Knowledge Translation

2009 marks the tenth consecutive year that the Canadian Hypertension Education Program (CHEP) has had updated recommendations for the management of hypertension. CHEP is a program of the Canadian Hypertension Society, Blood Pressure Canada, the Public Health Agency of Canada, the Heart and Stroke Foundation of Canada, the Canadian Council of Cardiovascular Nurses, the Canadian Pharmacists Association and the College of Family Physicians of Canada. CHEP makes substantive efforts to harmonize recommendations for the management of hypertension with other organizations that also produce guidelines that include blood pressure lowering therapy. In particular the 2009 CHEP recommendations are harmonized with those of the Canadian Diabetes Association, the Canadian Society of Nephrology and the Canadian Stroke Network.

CHEP's leadership in guidelines processes is characterized by the routine cycles of surveillance, evaluation of care gaps, and development of programs and educational resources to address the care gaps. In 2008, CHEP was aided by data that allowed identification both of successes that could be attributed to the program but also important clinical care gaps that continue to exist. A survey (ONBP) conducted by the Heart and Stroke Foundation found that while Ontario had a low prevalence of hypertension (21%) relative to other developed countries it had the worlds highest published rates of awareness, treatment and control of hypertension ^{1,2}. Nevertheless, the survey found that two thirds of Ontarians with hypertension and diabetes have uncontrolled blood pressure (1/2 the control rate of those without diabetes). A national survey also demonstrated a care gap in that only 1/2 of younger people with hypertension were treated with medications and the rate of treatment did not increase with increasing number of concomitant cardiovascular risk factors ³. In fact hypertensive people who smoked were less likely to be treated and those with five additional cardiovascular risk factors were no more likely to be treated than those with hypertension alone. The CHEP recommendations continue to emphasize the importance of patient self-efficacy by promoting lifestyle change to prevent and control hypertension and by home measurement of blood pressure. In

a prospective national cohort survey there was little indication that a diagnosis of hypertension triggered overall healthy lifestyle change for most people ⁴. After being diagnosed with hypertension there was a slight increase in smoking cessation, and an increase in physical activity however body mass index (BMI) increased and there was no change in excess alcohol consumption. Those who were not prescribed medications were not more likely to make lifestyle changes. CHEP will make efforts to develop resources and tools to improve care in these areas.

There were several major hypertension clinical trials in 2008 as well as new information from trials published in 2007. The major changes in the evidence have resulted in new CHEP recommendations to specifically not combine an ACE inhibitor with an angiotensin receptor blocker in people with uncomplicated hypertension, ischemic heart disease in the absence of heart failure, past stroke, non-proteinuric chronic kidney disease or diabetes without nephropathy (albuminuria, see table 1). The HYVET trial supported a previous CHEP recommendation to treat hypertension in those over age 80. The same cautions as indicated in the past need to be exercised when prescribing antihypertensive therapy in those who are at risk for adverse effects of blood pressure lowering (e.g. the frail elderly). The recent publication of the ADVANCE trial has resulted in CHEP recommending consideration of initial therapy with 2 antihypertensive drugs for people with diabetes and blood pressures >150/90 mmHg ^{5,6}.

This is a short scientific summary of the new clinical hypertension evidence and the 2009 CHEP recommendations as well as the opinions of the CHEP executive regarding important issues in hypertension management in Canada. The full CHEP recommendations are available at www.hypertension.ca and will be published in the May 2009 issue of the Canadian Journal of Cardiology. Tables 2, and 3 contain the target values for treating hypertension, and recommended lifestyle respectively.

New evidence has allowed CHEP to address additional clinical questions in the management of hypertension for the 2009 recommendations.

Why should I treat people with diabetes and hypertension to a target of less than 130/80 mmHg?

In 2008, the ONBP survey found two thirds of people with diabetes and hypertension had blood pressure that was 130/80 mmHg or above. Up to 80% of people with diabetes die of cardiovascular complications and up to three quarters of specific diabetic complications can be attributed to high blood pressure ⁷. In people with diabetes and hypertension reducing blood pressure results in a large reduction in death and disability ^{6, 8-12}. In the Syst Eur trial of isolated systolic hypertension, hypertensive therapy in people with diabetes reduced total mortality by 55%, cardiovascular mortality by 76%, and all cardiovascular events by 67% ¹³. In the HOT trial, people with diabetes who had more intensive treatment of diastolic blood pressure had a 66% reduction in death from heart disease and stroke even though the difference in diastolic blood pressure was only 4 mmHg at the end of the trial ¹⁴. In a meta analysis of randomized controlled trials, more vs. less intensive lowering of blood pressure reduced total mortality by 24% and major cardiovascular events by 25% ¹⁵. The use of an ACE inhibitor or angiotensin receptor blocker based therapeutic regime to lower blood pressure has additional advantages in people with proteinuric chronic kidney disease ¹⁵. CHEP recommends treating systolic blood pressure to <130 mmHg and diastolic to <80 mmHg. Economic analysis indicates that more intensive reduction in blood pressure in people with diabetes is one of the few medical interventions that may reduce overall health costs ¹⁶.

What are the implications of new clinical trials for treating people with hypertension?

Should I prescribe the combination of an ACE inhibitor with an angiotensin receptor blocker in my patients?

The ONgoing Telmisartan Alone and in combination with Ramipril Global Endpoint Trial (ONTARGET) was a large, randomized double-blinded trial to determine if telmisartan was non-inferior to ramipril at full doses and whether the combination of telmisartan and ramipril was superior to ramipril alone ^{17, 18}. People were enrolled into the study if they were aged 55 years and older and had evidence of vascular disease or diabetes with target organ damage. 25,620 people were randomized to either telmisartan 80 mg/day, ramipril 10 mg/day, or a combination of telmisartan 80 mg/day and ramipril 10 mg/day. After a median follow-up of 56 months, the telmisartan (-0.9/-0.6 mmHg) and the combination therapy groups (-2.4/-1.4 mmHg) had significantly lower blood pressures compared to the ramipril monotherapy group. There was no significant difference in the primary outcome (cardiovascular death, myocardial infarction, stroke or hospitalisation for congestive heart failure) between the ramipril and telmisartan monotherapy groups as well as the combination therapy group compared with the ramipril monotherapy group. However, combination therapy was associated with significantly higher rates of discontinuation due to syncope and renal impairment compared with ramipril. Specifically, combination therapy was associated with a significantly increased rate of dialysis, and doubling of serum creatinine compared to ramipril monotherapy (HR: 1.09; 95%CI: 1.01-1.18, p=0.037). The findings of this study provide evidence that telmisartan is equally effective as ramipril for people with cardiovascular disease or diabetes with target organ damage. The findings also demonstrate that the combination of telmisartan and ramipril do not provide additional cardiovascular benefits above and beyond either therapy alone but does increase the adverse event rate in the ONTARGET population. The COOPERATE trial has been used as evidence in favour of prescribing the combination of an ACE inhibitor with an angiotensin receptor blocker ¹⁹. In 2008

serious concerns have been raised regarding several data inconsistencies in the study²⁰. To date the only data supporting improved patient related outcomes from prescribing the combination of an ACE inhibitor with an angiotensin receptor blocker have been from secondary outcome analysis of heart failure trials^{21, 22}. There are ongoing trials in proteinuric people with substantive chronic kidney disease. In the absence of evidence there is no recommendation to use the combination aside from in people with heart failure. CHEP recommends specifically to not prescribe the combination of an ACE inhibitor with an angiotensin receptor blocker in people with uncomplicated hypertension, ischemic heart disease in the absence of heart failure, past stroke, non-proteinuric chronic kidney disease or diabetes without albuminuria.

Should I prescribe an angiotensin receptor blocker in people who have had a stroke?

The PROFESS study was large randomized 2x2 factorial trial of angiotensin receptor blocker (ARB) based blood pressure lowering therapy and antiplatelet therapy to prevent recurrent strokes²³. Over twenty thousand patients aged 50 or older with a prior ischemic stroke were randomized to telmisartan vs. placebo regardless of their pre-treatment blood pressure. No statistically significant interaction effect between antiplatelet and telmisartan arms was observed. In the latter arm, the blood pressure was 3.8/2.0 mmHg lower than placebo, with a mean follow-up of 2.5 years. The ARB therapy did not reduce the primary endpoint of recurrent stroke (HR 0.95 (0.86-1.04, p=0.23)) nor the secondary outcome of major cardiovascular events (stroke, MI, vascular death, worsening CHF), HR: 0.94 (0.87-1.01, p=0.11)). Exploratory analyses suggested that a difference in outcome in favour of telmisartan began to emerge after the first 6 months of therapy. Although the absolute risk increase was small (~3%), adverse events, principally hypotensive symptoms, syncope and atrial fibrillation were more common in the telmisartan group compared to placebo. It is possible that the modest reduction in blood pressure in a PROFESS study population and the relatively low entry blood pressure (144/84 mmHg) may be the reason for the negative results. CHEP recommendations

currently support a target blood pressure of <140/90 mmHg in post stroke patients hence many of the PROFESS trial patients would have been within CHEP targets at the start of the trial. Taken within the context of a previous large randomized controlled trial (PROGRESS with a combination of a diuretic (indapamide) and ACE inhibitor (perindopril)) and meta analyses of blood pressure lowering trials showing a reduction in recurrent stroke^{24, 25}, the PROFESS trial has not impacted the CHEP recommendations. The PROGRESS trial entered people with an average blood pressure of 147/86mmHg. In the PROGRESS people who received ACE inhibitor therapy only, the reduction in stroke was not significant (post hoc analysis) but a large reduction in stroke was seen in the trial overall and in particular in those who received the ACE inhibitor with the diuretic indapamide. CHEP recommends strong consideration should be given to the initiation of antihypertensive therapy and preferably an ACE inhibitor plus diuretic combination after the acute phase of a stroke or transient ischemic attack.

In people who are intolerant to an ACE inhibitor and who have cardiovascular disease or diabetes should I prescribe an angiotensin receptor blocker?

The TRANSCEND study randomized 5926 people with coronary disease, prior stroke or diabetes mellitus with end-organ damage and who were intolerant of ACE inhibitors to telmisartan or placebo with an average blood pressure at baseline of 141/69 mmHg²⁶. The mean blood pressure difference was 3.2/1.3 mmHg lower at study end in the telmisartan group. Over a median follow-up of just over 2.5 years, the telmisartan therapy did not reduce the primary outcome (composite of cardiovascular death, myocardial infarction, stroke or hospitalization for heart failure, HR 0.92 (0.81-1.05, p=0.216)). The study does not exclude a small therapeutic benefit and a secondary endpoint of cardiovascular death, myocardial infarction or stroke was close to conventional significance level: HR 0.87 (0.76-1.00, p=0.068). Syncopal spells were more common in the telmisartan group but the absolute risk difference was small (0.44%) and overall adverse events were not different between the two groups.

The TRANSCEND trial has not changed the CHEP recommendation to prescribe an ACE inhibitor for most people with hypertension and documented coronary artery disease based on the HOPE, EUROPA and PEACE studies²⁷⁻²⁹.

Should I start people with diabetes and hypertension on a combination of two antihypertensive drugs?

The ADVANCE trial was a randomized controlled trial that included 11,140 people with type 2 diabetes and at least another cardiovascular risk factor⁶. The ADVANCE trial used a factorial design to assess both the effects of an intensive glucose lowering regimen and antihypertensive treatment. In the hypertension aspect of the trial people were randomized to a fixed combination tablet consisting of perindopril (an ACE inhibitor) and indapamide (a diuretic) or placebo. The treatment reduced both cardiovascular death (HR 0.82; 95% CI 0.68 – 0.98) and total mortality (HR 0.86; 95% CI 0.75 – 0.98). In 2008 it was established that there was no interaction between the glucose lowering and blood pressure lowering therapies; hence CHEP recommends consideration of initial therapy with a combination of first line drugs in people with diabetes if blood pressure is 150/90 mmHg or higher^{5,6}. Caution is required in people where a substantial fall in blood pressure is more likely or would be poorly tolerated (e.g. those with postural hypotension).

How do I optimally reduce cardiovascular risk in my patients?

Although it remains important to stay up to date with new evidence and recommendations much of what is important to improve patient outcomes remains unchanged.

Because most Canadians will develop hypertension during their lives routine assessment of blood pressure is recommended in all people at all appropriate visits. Most people with high normal blood pressure (130-139 systolic or 85-89 mmHg) will develop hypertension in the next 2-4 years and

require annual assessment of blood pressure. To encourage self-efficacy, people with hypertension are recommended to measure their blood pressure at home.

Nine in ten Canadians with hypertension will have other risks for cardiovascular disease. Hence optimum management of hypertension requires assessment of overall cardiovascular risk. This includes identifying and managing these other risks (e.g. smoking, dyslipidemia, dysglycemia (e.g. impaired fasting glucose, diabetes)), abdominal obesity, unhealthy diet, physical inactivity,. A comprehensive approach to cardiovascular risk reduction can more than double cardiovascular risk reduction compared to blood pressure management alone.

To optimally reduce cardiovascular risk, blood pressure should be lowered to less than 140/90 mmHg in most people and in those with diabetes or chronic kidney disease, to less than 130/80 mmHg. Although it is usually more difficult to lower systolic than diastolic blood pressure, the risk reduction from lowering the systolic blood pressure is as large if not larger than the diastolic blood pressure. Combinations of both lifestyle and drug therapies are generally necessary to achieve target blood pressures. Most people require more than one antihypertensive drug and many with diabetes or chronic kidney disease may require three or more drugs. People whose blood pressure is above target should be monitored at least every 2 months and the intensity of treatment increased until the targets are achieved.

Lack of adherence to therapy is an important cause of poor blood pressure control and poor outcomes. Patient adherence to therapy should be assessed on each visit and interventions to improve adherence should be a part of clinical routine.

What lifestyle changes are effective in preventing hypertension, treating people with hypertension and in reducing blood pressure?

High blood pressure as well as other cardiovascular risk factors can be prevented or reduced through simple sustained lifestyle changes. Lifestyle interventions can have a similar reduction in blood pressure to single antihypertensive drugs. A healthy diet, regular physical activity, moderation in alcohol consumption, reductions in dietary sodium, and a smoke free environment are the cornerstone of prevention and management of hypertension. In selected people, stress reduction including behaviour modification is helpful.

A recent meta-analysis found decreasing dietary sodium intake by 1860mg/day reduced blood pressure 5.1/2.7 mmHg³⁰. In Canada it has been estimated that a 1860mg/day decrease in dietary sodium would cause a substantive reduction in prevalence of hypertension, health costs and cardiovascular complications^{31, 32}. In the DASH trial, a diet rich in fruits, vegetables and low-fat dairy products with reduced saturated and total fat decreased blood pressure 5.5/3.0 mmHg overall and by 11.4/5.5 mmHg in those with hypertension³³. A meta-analysis on the effects of regular aerobic exercise showed physical activity reduced blood pressure 3.8/2.6 mmHg in people who were previously inactive³⁴. The TOHP study found a decrease in weight of 4.4 kg led to a blood pressure reduction of 4.0/2.8 mmHg³⁵.

Brief clinical interventions increase the probability of a patient adhering to lifestyle changes even for addictive behaviours such as smoking and problem alcohol consumption^{36, 37} and more comprehensive interdisciplinary care approaches are more effective^{33, 38-41}. Because few Canadians change their lifestyle after a diagnosis of hypertension it is important that health professionals assist people in implementing lifestyle interventions⁴. For this reason Blood Pressure Canada, the Heart and Stroke Foundation and CHEP have developed a variety of patient resources including paper

copies, videos and web based interactive monitoring systems to assist people making lifestyle changes ⁴. These resources can be found at www.hypertension.ca and www.heartandstroke.ca/bp.

Comments from the CHEP executive

The CHEP believes that reliable up to date evidence based recommendations that are broadly disseminated in easy to use formats are important to the care of Canadians with hypertension. The CHEP program has taken a number of steps to reduce personal and commercial bias (table 4). CHEP also supports regular evaluation of the impact of its program to identify ongoing clinical issues where care needs to improve. Further CHEP monitors ongoing changes in the health care system that will change the way hypertension will be managed in the future and is actively developing new partnerships, educational resources and dissemination strategies. Important to the prevention and control of hypertension is active involvement of people in their care. CHEP partners with Blood Pressure Canada, the Heart and Stroke Foundation of Canada, the Public Health Agency of Canada and other organizations to develop resources to assist people become more informed about hypertension and more engaged in their care (table 5). Recently the increase in treatment of hypertension has been found to be strongly associated with reductions in death and hospitalization of major cardiovascular events in Canada ⁴².

In 2010 the results of a national survey on hypertension prevalence treatment and control will be released by Statistics Canada. The survey results will allow CHEP to more carefully assess the hypertension care gaps that remain. Further in 2010 the results of another survey that assesses patient knowledge, attitudes and barriers to care will be released that will allow much more focused patient education programs to be developed. The development of a comprehensive hypertension evaluation program in Canada with ongoing assessment of care gaps and subsequent development of tailored intervention programs is expected to result in further reductions in cardiovascular disease.

Table 1: Considerations in the Individualization of Antihypertensive Therapy

ACE Angiotensin-converting enzyme; TIA transient ischemic attack; ARB angiotensin II receptor blocker (With permission of CHEP.)

	<i>Initial therapy</i>	<i>Second-line therapy</i>	<i>Notes and/or Cautions</i>
HYPERTENSION WITHOUT OTHER COMPELLING INDICATIONS			
		TARGET < 140/90 mmHg	
Diastolic+/- Systolic Hypertension	Thiazide diuretics, beta blockers, ACE-inhibitors, ARBs, or long-acting calcium channel blockers (consider ASA and statins in selected people). Consider initiating therapy with a combination of two first line drugs if the blood pressure is ≥ 20 mmHg systolic or ≥ 10 mmHg diastolic above target.	Combinations of first-line drugs	Beta-blockers are not recommended as initial therapy in those over 60 years of age. Hypokalemia should be avoided by using potassium-sparing agents in those who are prescribed diuretics as monotherapy. ACE inhibitors are not recommended as monotherapy in blacks. ACE inhibitors, ARBs and direct rennin inhibitors are potential teratogens and caution is required if prescribing to women of child bearing potential. Combinations of an ACE-inhibitor with an ARB is specifically not recommended.
Isolated systolic hypertension without other compelling indications	Thiazide diuretics, ARBs or long-acting dihydropyridine calcium channel blockers.	Combinations of first-line drugs	Same as diastolic+/- systolic Hypertension
DIABETES MELLITUS			
		TARGET < 130/80 mmHg	
Diabetes mellitus with nephropathy	ACE inhibitors or ARBs	Addition of thiazide diuretics, cardioselective beta-blockers, long-acting calcium channel blockers	If the serum creatinine level is >150 $\mu\text{mol/L}$, a loop diuretic should be used as a replacement for low-dose thiazide diuretics if volume control is required
Diabetes mellitus without nephropathy	ACE inhibitors, ARBs, dihydropyridine CCBs or thiazide diuretics	Combination of first-line drugs or if first line agents are not tolerated addition of cardioselective beta-blockers and/or long-acting non dihydropyridine calcium channel blockers	Normal albumin to creatinine ratio [ACR] < 2.0 mg/mmol in men and < 2.8 mg/mmol in women Combinations of an ACE-inhibitor with an ARB is specifically not recommended.
CARDIOVASCULAR AND CEREBROVASCULAR DISEASE			
		TARGET < 140/90 mmHg	
Angina	Beta-blockers; ACE inhibitors except in low risk patients	Long-acting calcium channel blockers	Avoid short-acting nifedipine. Combinations of an ACE-inhibitor with an ARB is specifically not recommended.
Prior myocardial infarction	Beta-blockers and ACE inhibitors (ARBs if ACEI- intolerant)	Long-acting calcium channel blockers	Combinations of an ACE-inhibitor with an ARB is specifically not recommended.
Heart failure	ACE inhibitors (ARBs if ACEI-intolerant) and beta-blockers. Spironolactone in patients with NYHA class III or IV symptoms.	ARB in addition to ACE inhibitor. Hydralazine/isosorbide dinitrate combination Thiazide or loop diuretics, are recommended as additive therapy	Titrate doses of ACEI and ARB to those used in clinical trials. Avoid nondihydropyridine calcium channel blockers (diltiazem, verapamil). Monitor potassium and renal function if combining an ACE inhibitor with ARB.
Left ventricular hypertrophy	Does not affect initial treatment recommendations	Combinations of additional agents	Hydralazine and minoxidil can increase left ventricular hypertrophy.
Past cerebrovascular accident or TIA	ACE inhibitor/diuretic combinations	Combinations of additional agents	This does not apply to acute stroke. Blood pressure reduction reduces recurrent cerebrovascular events in stable patients. Combinations of an ACE-inhibitor with ARB is specifically not recommended.
NON DIABETIC CHRONIC KIDNEY DISEASE			
		TARGET < 130/80 mmHg	
Non diabetic chronic kidney disease	ACE inhibitors (or ARBs if ACEI-intolerant) if there is proteinuria Diuretics as additive therapy	Combinations of additional agents	Avoid ACE inhibitors or ARB if bilateral renal artery stenosis or unilateral disease with solitary kidney. Patients placed on an ACE inhibitor or an ARB should have their serum creatinine and potassium carefully monitored. Combinations of an ACE-inhibitor and ARB is specifically not recommended in people with chronic kidney disease without proteinuria
Renovascular disease	Does not affect initial treatment recommendations	Combinations of additional agents	Avoid ACE inhibitors or ARB if bilateral renal artery stenosis or unilateral disease with solitary kidney.
OTHER CONDITIONS			
		TARGET < 140/90 mmHg	
Peripheral arterial disease	Does not affect initial treatment recommendations	Combinations of additional agents	Avoid beta-blockers with severe disease
Dyslipidemia	Does not affect initial treatment recommendations	Combinations of additional agents	
Overall vascular protection	Statin therapy for people with 3 or more cardiovascular risk factors or with atherosclerotic disease Low dose ASA in people with controlled blood pressure		Caution should be exercised with the ASA recommendation if blood pressure is not controlled.

Table 2: Target Values for Blood Pressure

Setting	Target (SBP/DBP mmHg)
Home:	
Home blood pressure and daytime ABPM*	<135/85
Office:	
Diastolic ± systolic hypertension	<140/90
Isolated systolic hypertension	<140
Diabetes	<130/80
Chronic kidney disease	<130/80

* The target value readings taken by home measurement and ABPM in those with diabetes or chronic kidney disease have not been established.

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Table 3: Lifestyle therapy to reduce the possibility of becoming hypertensive and to reduce blood pressure and to reduce the risk of blood pressure-related cardiovascular complications in people with hypertension.

1. Healthy diet: high in fresh fruits and vegetables, low fat dairy products, dietary and soluble fibre, whole grains and protein from plant sources, low in saturated fat, cholesterol and salt in accordance with Canada's Guide to Healthy Eating
2. Regular physical activity: accumulation of 30-60 minutes of moderate intensity dynamic exercise 4-7 days per week in addition to daily activities.
3. Low risk alcohol consumption (≤ 2 standard drinks/day and less than 14/week for men and less than 9/week for women)
4. Attaining and maintaining ideal body weight (BMI 18.5-24.9 kg/m²)
5. A waist circumference

Europid	< 94 cm for men
	< 80 cm for women
South Asian, Japanese,	< 90 cm for men
Chinese	< 80 cm for women
6. Reduction in sodium intake to less than 2300 mg/day
7. A smoke free environment

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Table 4: CHEP reduces the impact of bias by the following methods

- 1) A history of requiring a high level of evidence with patient relevant outcomes for pharmacotherapy recommendations
- 2) A centralized systematic literature review by a Cochrane group librarian
- 3) Multiple clinical experts in subgroups to represent different perspectives
- 4) A Central Review Committee (CRC) that is 'free of commercial conflicts of interest' to oversee the evaluation of evidence, development of recommendations and to present the evidence/ recommendations
- 5) A consensus conference chaired by the CRC and with the evidence primarily presented by the CRC
- 6) Overt written disclosure of potential conflicts of interest at the time of the consensus conference when the recommendations are discussed
- 7) Voting on recommendations with the removal of recommendations voted against by 30% or more of members
- 8) Annual hypertension management themes, key messages and major implementation tools are developed through a consensus of the full CHEP executive. Other internal implementation tools require the consensus of two members of the executive.

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Table 5: Internet Resources for Patient Information*

Resource	Description	Source
2008 Patient Hypertension Recommendations	<ul style="list-style-type: none"> • General information on prevention and treatment of hypertension 	<u>www.hypertension.ca/bpc</u>
2009 Patient Hypertension Recommendations	<ul style="list-style-type: none"> • Specific information on the management of hypertension in the diabetic patient 	<u>www.hypertension.ca/bpc</u>
Diabetes & Hypertension	<ul style="list-style-type: none"> • Information on hypertension for people with diabetes 	<u>www.diabetes.ca</u>
On-line, personalized blood pressure plan DASH diet	<ul style="list-style-type: none"> • Create a personalized action plan for healthy living • The DASH diet and healthy eating to improve blood pressure control 	<u>www.heartandstroke.ca/bp</u> <u>www.nhlbi.nih.gov/hbp/prevent/h_eating/h_eating.htm</u>
Canada's Food Guide	<ul style="list-style-type: none"> • Canada's official guide to healthy eating and lifestyle choices. Personalize your own food guide! 	<u>www.hc-sc.gc.ca/fn-an/food-guide-aliment/index_e.html</u>
Dietitians of Canada	<ul style="list-style-type: none"> • Tips for eating well and living well 	<u>www.dietitians.ca</u>
On-line health and fitness calculators	<ul style="list-style-type: none"> • Learn about your risk factors using different tools to calculate your personal factors 	<u>www.healthtoolsonline.com/health-fit.html</u>

Many of the resources can be downloaded and printed or hard copies ordered for people who do not use the internet. With permission of Blood Pressure Canada

Reference List

- (1) Mohan S, Campbell NR. Hypertension management in Canada: good news, but important challenges remain. *CMAJ* 2008;178:1458-1460.
- (2) Leenen FH, Dumais J, McInnis NH et al. Results of the Ontario survey on the prevalence and control of hypertension. *CMAJ* 2008;178:1441-1449.
- (3) Campbell NR, So L, Amankwah E, Quan H, Maxwell C. Characteristics of hypertensive Canadians not receiving drug therapy. *Can J Cardiol* 2008;24:485-490.
- (4) Neutel CI, Campbell NR. Changes in lifestyle after hypertension diagnosis in Canada. *Can J Cardiol* 2008;24:199-204.
- (5) Patel A, MacMahon S, Chalmers J et al. Intensive blood glucose control and vascular outcomes in patients with type 2 diabetes. *N Engl J Med* 2008;358:2560-2572.
- (6) Patel A, MacMahon S, Chalmers J et al. Effects of a fixed combination of perindopril and indapamide on macrovascular and microvascular outcomes in patients with type 2 diabetes mellitus (the ADVANCE trial): a randomised controlled trial. *Lancet* 2007;370:829-840.
- (7) Sowers JR, Epstein M, Frohlich ED. Diabetes, hypertension, and cardiovascular disease: an update. *Hypertension* 2001;37:1053-1059.
- (8) Schrier RW, Estacio RO, Esler A, Mehler P. Effects of aggressive blood pressure control in normotensive type 2 diabetic patients on albuminuria, retinopathy and strokes. *Kidney Int* 2002;61:1086-1097.
- (9) Gerstein HC, Yusuf S, Mann JFE et al. Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: results of the HOPE study and MICRO-HOPE substudy. *Lancet* 2000;355:253-259.
- (10) Lewis EJ, Hunsicker LG, Clarke WR et al. Renoprotective effect of the angiotensin-receptor antagonist irbesartan in patients with nephropathy due to type 2 diabetes. *N Engl J Med* 2001;345:851-860.
- (11) Brenner BM, Cooper ME, de Zeeuw D et al. Effects of losartan on renal and cardiovascular outcomes in patients with type 2 diabetes and nephropathy. *N Engl J Med* 2001;345:861-869.
- (12) UK Prospective Diabetes Study Group. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38. *BMJ* 1998;317:703-713.
- (13) Tuomilehto J, Rastenyte D, Birkenhager WH et al. Effects of calcium-channel blockade in older patients with diabetes and systolic hypertension. Systolic Hypertension in Europe Trial Investigators. *N Engl J Med* 1999;340:677-684.
- (14) Hansson L, Zanchetti A, Carson DS et al. Effects of intensive blood-pressure lowering and low-dose aspirin in patients with hypertension: principal results of the Hypertension Optimal Treatment (HOT) randomised trial. *Lancet* 1998;351:1755-1762.

- (15) Anderson C, Arima H, Belmans A et al. Effects of Different Blood Pressure-Lowering Regimens on Major Cardiovascular Events in Individuals With and Without Diabetes Mellitus. *Arch Intern Med* 2005;165:1410-1419.
- (16) CDC Diabetes Cost-effectiveness Group. Cost-effectiveness of Intensive Glycemic Control, Intensified Hypertension Control, and Serum Cholesterol Level Reduction for Type 2 Diabetes. *JAMA* 2002;287:2542-2551.
- (17) Yusuf S, Teo KK, Pogue J et al. Telmisartan, ramipril, or both in patients at high risk for vascular events. *N Engl J Med* 2008;358:1547-1559.
- (18) Mann JF, Schmieder RE, McQueen M et al. Renal outcomes with telmisartan, ramipril, or both, in people at high vascular risk (the ONTARGET study): a multicentre, randomised, double-blind, controlled trial. *Lancet* 2008;372:547-553.
- (19) Chalmers J. Enhancing risk stratification in hypertensive subjects: how far should we go in routine screening for target organ damage? *J Hypertens* 2002;20:1255-1257.
- (20) Kunz R, Wolbers M, Glass T, Mann JF. The COOPERATE trial: a letter of concern. *Lancet* 2008;371:1575-1576.
- (21) Arnold JMO, Liu P, Demers C et al. Canadian Cardiovascular Society consensus conference recommendations on heart failure 2006: Diagnosis and management. *Can J Cardiol* 2006;22:23-45.
- (22) McMurray JJV, Ostergren J, Swedberg K et al. Effects of candesartan in patients with chronic heart failure and reduced left-ventricular systolic function taking angiotensin converting-enzyme inhibitors: the CHARM-Added trial. *Lancet* 2003;362:767-771.
- (23) Yusuf S, Diener HC, Sacco RL et al. Telmisartan to Prevent Recurrent Stroke and Cardiovascular Events. *N Engl J Med* 2008.
- (24) MacMahon S, Neal B, Tzourio C et al. Randomised trial of a perindopril-based blood-pressure-lowering regimen among 6105 individuals with previous stroke or transient ischaemic attack. *Lancet* 2001;358:1033-1041.
- (25) Rashid P, Leonardi-Bee J, Bath P. Blood pressure reduction and secondary prevention of stroke and other vascular events: a systematic review. *Stroke* 2003;34:2741-2748.
- (26) Yusuf S, Teo K, Anderson C et al. Effects of the angiotensin-receptor blocker telmisartan on cardiovascular events in high-risk patients intolerant to angiotensin-converting enzyme inhibitors: a randomised controlled trial. *Lancet* 2008;372:1174-1183.
- (27) The Heart Outcomes Prevention Evaluation Study Investigators. Effects of an Angiotensin-Converting - Enzyme Inhibitor, Ramipril, on Cardiovascular Events in High-Risk Patients. *New Engl J Med* 2000;342:145-153.
- (28) The EUROpean trial On reduction of cardiac events with Perindopril in stable coronary Artery disease investigators. Efficacy of perindopril in reduction of cardiovascular events among patients with stable coronary artery disease: randomised, double-blind, placebo-controlled, multicentre trial (the EUROPA study). *Lancet* 2003;362:782-788.

- (29) Braunwald E, Domanski MJ, Fowler SE et al. Angiotensin-Converting-Enzyme Inhibition in Stable Coronary Artery Disease. *N Engl J Med* 2004;351:2058-2068.
- (30) He FJ, MacGregor GA. Effect of longer-term modest salt reduction on blood pressure. *The Cochrane Database of Systematic Reviews* 2004;1-64.
- (31) Joffres M, Campbell NRC, Manns B, Tu K. Estimate of the benefits of a population-based reduction in dietary sodium additives on hypertension and its related health care costs in Canada. *Can J Cardiol* 2007;23:437-443.
- (32) Penz ED, Joffres MR, Campbell NR. Reducing dietary sodium and decreases in cardiovascular disease in Canada. *Can J Cardiol* 2008;24:497-1.
- (33) Appel LJ, Moore TJ, Obarzanek E et al. A clinical trial of the effects of dietary patterns on blood pressure. *N Engl J Med* 1997;336:1117-1124.
- (34) Whelton SP, Chin A, Xin X, He J. Effect of Aerobic Exercise on Blood Pressure: A Meta-Analysis of Randomized, Controlled Trials. *Ann Intern Med* 2002;136:493-503.
- (35) The Trials of Hypertension Prevention Collaborative Research Group. Effects of weight loss and sodium reduction intervention on blood pressure and hypertension incidence in overweight people with high-normal blood pressure. The Trials of Hypertension Phase II. *Arch Intern Med* 1997;157:657-667.
- (36) Cromwell J, Bartosch WJ, Fiore MC, Hasselblad V, Baker T. Cost-effectiveness of the clinical practice recommendations in the AHCPR guideline for smoking cessation. *JAMA* 1997;278:1759-1766.
- (37) Fleming MF, Barry KL, Manwell LB, Johnson K, London R. Brief physician advice for problem alcohol drinkers. A randomized controlled trial in community-based primary care practices. *JAMA* 1997;277:1039-1045.
- (38) Family Heart Study Group. Randomised controlled trial evaluating cardiovascular screening and intervention in general practice: principal results of British Family Heart Study. *BMJ* 1994;308:313-320.
- (39) Elmer PJ, Obarzanek E, Vollmer WM et al. Effects of Comprehensive Lifestyle Modification on Diet, Weight, Physical Fitness, and Blood Pressure Control: 18-Month Results of a Randomized Trial. *Ann Intern Med* 2006;144:485-495.
- (40) Appel LJ, Champagne CM, Harsha DW et al. Effects of Comprehensive Lifestyle Modification on Blood Pressure Control. Main Results of the PREMIER Clinical Trial. *JAMA* 2003;289:2083-2093.
- (41) Wister A, Loewen N, Kennedy-Symonds H, McGowan B, McCoy B, Singer J. One-year follow-up of a therapeutic lifestyle intervention targeting cardiovascular disease risk. *CMAJ* 2007;177:859-865.
- (42) Campbell NR, Brant R, Johansen H et al. Increases in antihypertensive prescriptions and reductions in cardiovascular events in Canada. *Hypertension* 2008;In Press.