2009 Canadian Hypertension Education Program recommendations: The scientific summary – an annual update

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NRC Campbell, NA Khan, MD Hill, et al; on behalf of the Canadian Hypertension Education Program. 2009 Canadian Hypertension Education Program recommendations: The scientific summary – an annual update. *Can J Cardiol* 2009;25(5):271-277.

The present report highlights the key messages of the 2009 Canadian Hypertension Education Program (CHEP) recommendations for the management of hypertension and the supporting clinical evidence. In 2009, the CHEP emphasizes the need to improve the control of hypertension in people with diabetes. Intensive reduction in blood pressure (to less than 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 of patient self-efficacy by promoting lifestyle changes to prevent and control hypertension, and 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 individuals with multiple cardiovascular risks and hypertension should be strongly considered for antihypertensive drug therapy regardless of age. In 2009, the CHEP specifically recommends not to combine an angiotensin-converting enzyme inhibitor with an angiotensin receptor blocker in people with uncomplicated hypertension, diabetes (without micro- or macroalbuminuria), chronic kidney disease (without nephropathy [micro- or overt proteinuria]) or ischemic heart disease (without heart failure).

Key Words: *Clinical practice guidelines; High blood pressure; Hypertension; Knowledge translation*

2009 marks the 10th consecutive year that the Canadian Hypertension Education Program (CHEP) has updated recommendations for the management of hypertension. The 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. The CHEP makes substantive efforts to harmonize recommendations for the management of hypertension with other organizations that produce guidelines on blood pressure-lowering therapy. In

Les recommandations de 2009 du Programme éducatif canadien sur l'hypertension : Le résumé scientifique – une mise à jour annuelle

Le présent article met en lumière les principaux messages des recommandations de 2009 du Programme éducatif canadien sur l'hypertension (PÉCH) pour la prise en charge de l'hypertension ainsi que les données cliniques à l'appui. Les recommandations du PÉCH de 2009 soulignent la nécessité d'améliorer le contrôle de l'hypertension chez les personnes diabétiques. Une réduction intensive de la tension artérielle (à moins de 130/80 mmHg) chez les personnes diabétiques s'associe à une réduction importante du taux de mortalité, du taux d'invalidité et des coûts globaux pour le système de santé, tout en ayant le potentiel d'améliorer la qualité de vie. Les recommandations du PÉCH continuent de souligner l'importance de l'auto-efficacité du patient par la promotion des modifications au mode de vie afin de prévenir et de contrôler l'hypertension et de favoriser les mesures de la tension artérielle à domicile. Malheureusement, la plupart des Canadiens n'adoptent que des modifications superficielles à leur mode de vie après un diagnostic d'hypertension. La mesure systématique de la tension artérielle à toutes les visites pertinentes de même que le dépistage et la prise en charge de tous les facteurs de risque cardiovasculaires sont la pierre angulaire de la prise en charge de la tension artérielle. De nombreux jeunes hypertendus canadiens ayant de multiples risques cardiovasculaires ne reçoivent pas de traitement aux antihypertenseurs, même si les données probantes préconisent vigoureusement d'en prescrire aux personnes hypertendues ayant de multiples risques cardiovasculaires, quel que soit leur âge. En 2009, le PÉCH recommande plus particulièrement de ne pas associer un inhibiteur de l'enzyme de conversion de l'angiotensine à un antagoniste des récepteurs de l'angiotensine chez les personnes atteintes d'hypertension non compliquée, de diabète (sans microalbuminurie ou macroalbuminurie), d'insuffisance rénale chronique (sans néphropathie [microprotéinurie ou macroprotéinurie]) ou de maladie cardiaque ischémique (sans insuffisance cardiaque).

particular, the 2009 CHEP recommendations are harmonized with those of the Canadian Diabetes Association, the Canadian Society of Nephrology and the Canadian Stroke Network.

The CHEP's leadership in the guidelines process 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, the CHEP was aided by data that allowed identification of successes that could be attributed to the program and important clinical care gaps that continue to exist. The Ontario Survey on the Prevalence and Control of Hypertension [ON-BP] (1,2), conducted by the Heart

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Received for publication February 25, 2009. Accepted March 19, 2009

and Stroke Foundation of Ontario, found that while Ontario had a low prevalence of hypertension (21%) relative to other developed countries, it had the world's highest published rates of awareness, treatment and control of hypertension. Nevertheless, the survey found that two-thirds of Ontarians with hypertension and diabetes have uncontrolled blood pressure (one-half the control rate of those without diabetes). A national survey (3) also demonstrated a care gap that revealed only one-half of younger people with hypertension were treated with medications and the rate of treatment did not increase with the increasing number of concomitant cardiovascular risk factors. 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 (4), there was little indication that a diagnosis of hypertension triggered overall healthy lifestyle changes in most people. After being diagnosed with hypertension, there was a slight increase in smoking cessation and an increase in physical activity; however, body mass index increased and there was no change in excess alcohol consumption. Patients who were not prescribed medications were not more likely to make lifestyle changes. The CHEP will make an effort to develop resources and tools to improve results 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, specifically to not combine an angiotensin-converting enzyme (ACE) inhibitor with an angiotensin receptor blocker (ARB) in people with uncomplicated hypertension, ischemic heart disease in the absence of heart failure, previous stroke, nonproteinuric chronic kidney disease or diabetes without nephropathy (albuminuria; see Table 1). The Hypertension in the Very Elderly Trial (HYVET) (5) supported a previous CHEP recommendation to treat hypertension in patients older than 80 years of age. The same cautions indicated in the past need to be exercised when prescribing antihypertensive therapy to those who are at risk for the adverse effects of blood pressure lowering (eg, frail elderly patients). Recent publication of the Action in Diabetes and Vascular disease: preterAx and diamiconN-MR Controlled Evaluation (ADVANCE) trial (6,7) has resulted in the CHEP recommending consideration of initial therapy with two antihypertensive drugs for people with diabetes and blood pressures of greater than 150/90 mmHg.

The present article 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 have been published in this issue of *The Canadian Journal of Cardiology* (Padwal et al, pages 279-286, and Khan et al, pages 287-298) and are also available at <www.hypertension.ca>. The target values for treating hypertension and recommended lifestyle are provided in Tables 2 and 3, respectively. In this issue, the formal recommendations are found in the articles on diagnosis (Padwal et al) and treatment (Khan et al). Other articles in this issue address a more in-depth approach for the management of hypertension in patients with diabetes and individuals receiving dialysis or following transplantation, and provide an approach for the management of those with resistant hypertension.

NEW EVIDENCE HAS ALLOWED THE 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 blood pressure of less than 130/80 mmHg?

In 2008, the ON-BP survey found that two-thirds of people with diabetes and hypertension had a blood pressure of 130/80 mmHg or

greater. 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 (8). In people with diabetes and hypertension, reducing blood pressure results in a large reduction in death and disability (7,9-13). In the Systolic Hypertension in Europe (Syst-Eur) trial (14) 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%. In the Hypertension Optimal Treatment (HOT) trial (15), 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. In a meta-analysis of randomized controlled trials (16), more intensive lowering of blood pressure reduced total mortality by 24% and major cardiovascular events by 25%. The use of an ACE inhibitor or ARB-based therapeutic regimen to lower blood pressure has additional advantages in people with proteinuric chronic kidney disease. The CHEP recommends treating systolic blood pressure to a target of less than 130 mmHg and diastolic pressure to less than 80 mmHg. Economic analysis indicates that a more intensive reduction in blood pressure in people with diabetes is one of the few medical interventions that may reduce overall health care costs (17).

WHAT ARE THE IMPLICATIONS OF NEW CLINICAL TRIALS FOR TREATING PEOPLE WITH HYPERTENSION?

Should I prescribe the combination of an ACE inhibitor with an ARB to my patients?

The ONgoing Telmisartan Alone and in combination with Ramipril Global Endpoint Trial (ONTARGET) (18,19) was a large, randomized double-blind trial designed to determine whether telmisartan was noninferior to ramipril at full doses and whether the combination of telmisartan and ramipril was superior to ramipril alone. Subjects were enrolled in the study if they were 55 years of age or older and had evidence of vascular disease or diabetes with target organ damage. A total of 25,620 people were randomly assigned to receive 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 period of 56 months, the telmisartan and combination therapy groups had significantly lower blood pressures ($-0.9/-0.6$ mmHg and $-2.4/-1.4$ mmHg, respectively) compared with the ramipril monotherapy group. There was no significant difference in the primary outcome (cardiovascular death, myocardial infarction [MI], stroke or hospitalization for congestive heart failure) between the ramipril and telmisartan monotherapy groups or between the combination therapy group and 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 level compared with ramipril monotherapy (hazard ratio [HR] 1.09, 95% CI 1.01 to 1.18; $P=0.037$). The findings of this study provided evidence that telmisartan is equally effective as ramipril for people with cardiovascular disease or diabetes with target organ damage. The findings also demonstrate that combining telmisartan with ramipril does not provide additional cardiovascular benefits above and beyond either therapy alone, but does increase the adverse event rate in the ONTARGET population. The combination treatment of angiotensin-II receptor blocker and angiotensin-converting enzyme inhibitor in nondiabetic renal disease (COOPERATE) trial has been used as evidence in favour of prescribing the combination of an ACE inhibitor with an ARB (20). In 2008, serious concerns were raised regarding several data inconsistencies in the study (21). To date, the only data supporting improved patient-related

TABLE 1
Considerations in the individualization of antihypertensive therapy

	Initial therapy	Second-line therapy	Notes and/or cautions
Hypertension without other compelling indications (target blood pressure <140/90 mmHg)			
Diastolic ± systolic hypertension	Thiazide diuretics, beta-blockers, ACEIs, ARBs or long-acting CCBs (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 older than 60 years of age. Hypokalemia should be avoided by using potassium-sparing agents in those who are prescribed diuretics as monotherapy. ACEIs are not recommended as monotherapy in black patients. ACEIs, ARBs and direct renin inhibitors are potential teratogens, and caution is required if prescribing to women of child-bearing potential. Combination of an ACEI with an ARB is specifically not recommended
Isolated systolic hypertension without other compelling indications	Thiazide diuretics, ARBs or long-acting dihydropyridine CCBs	Combinations of first-line drugs	Same as diastolic ± systolic hypertension
Diabetes mellitus (target blood pressure <130/80 mmHg)			
Diabetes mellitus with nephropathy	ACEIs or ARBs	Addition of thiazide diuretics, cardioselective beta-blockers or long-acting CCBs	If the serum creatinine level is >150 µmol/L, a loop diuretic should be used as a replacement for low-dose thiazide diuretics if volume control is required
Diabetes mellitus without nephropathy	ACEIs, 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 nondihydropyridine CCBs	Normal albumin to creatinine ratio <2.0 mg/mmol in men and <2.8 mg/mmol in women. Combination of an ACEI with an ARB is specifically not recommended
Cardiovascular and cerebrovascular disease (target blood pressure <140/90 mmHg)			
Angina	Beta-blockers and ACEIs, except in low-risk patients	Long-acting CCBs	Avoid short-acting nifedipine. Combination of an ACEI with an ARB is specifically not recommended
Prior myocardial infarction	Beta-blockers and ACEIs (ARBs if ACEI-intolerant)	Long-acting CCBs	Combination of an ACEI with an ARB is specifically not recommended
Heart failure	ACEIs (ARBs if ACEI-intolerant) and beta-blockers. Spironolactone in patients with NYHA class III or IV symptoms	ARB in addition to ACEI. Hydralazine/ isosorbide dinitrate combination. Thiazide or loop diuretics are recommended as additive therapy	Titrate doses of ACEIs and ARBs to those used in clinical trials. Avoid nondihydropyridine CCBs (diltiazem, verapamil). Monitor potassium and renal function if combining an ACEI with an ARB
Left ventricular hypertrophy	Does not affect initial treatment recommendations	Combinations of additional agents	Hydralazine and minoxidil can increase left ventricular hypertrophy
Previous cerebrovascular accident or TIA	ACEI/diuretic combinations	Combinations of additional agents	This does not apply to acute stroke. Blood pressure reduction reduces recurrent cerebrovascular events in stable patients. Combination of an ACEI with an ARB is specifically not recommended
Nondiabetic chronic kidney disease (target blood pressure <130/80 mmHg)			
Nondiabetic chronic kidney disease	ACEIs (or ARBs if ACEI-intolerant) if there is proteinuria. Diuretics as additive therapy	Combinations of additional agents	Avoid ACEIs or ARBs if bilateral renal artery stenosis or unilateral disease with solitary kidney. Patients placed on an ACEI or an ARB should have their serum creatinine and potassium carefully monitored. Combination of an ACEI 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 ACEIs or ARBs if bilateral renal artery stenosis or unilateral disease with solitary kidney
Other conditions (target blood pressure <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 three 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

ACEI Angiotensin-converting enzyme inhibitor; ARB Angiotensin II receptor blocker; ASA Acetylsalicylic acid; CCB Calcium channel blocker; NYHA New York Heart Association; TIA Transient ischemic attack. Reprinted with permission from the Canadian Hypertension Education Program

TABLE 2
Target values for blood pressure

Setting	Target (mmHg)
Home	
Home blood pressure and daytime ambulatory blood pressure measurement*	<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 ambulatory blood pressure monitoring in those with diabetes or chronic kidney disease have not been established. Reprinted with permission from the Canadian Hypertension Education Program

outcomes by prescribing the combination of an ACE inhibitor with an ARB have been from secondary outcome analyses of heart failure trials (22,23). There are ongoing trials in proteinuric patients with substantive chronic kidney disease. In the absence of evidence, there is no recommendation to use the combination aside from in individuals with heart failure. The CHEP specifically recommends not prescribing the combination of an ACE inhibitor with an ARB in people with uncomplicated hypertension, ischemic heart disease in the absence of heart failure, past stroke, nonproteinuric chronic kidney disease or diabetes without albuminuria.

Should I prescribe an ARB to people who have had a stroke?

The Prevention Regimen for Effectively Avoiding Second Strokes (PROFESS) trial (24) was a large randomized 2×2 factorial trial of ARB-based blood pressure-lowering and antiplatelet therapy to prevent recurrent strokes. More than 20,000 patients 50 years of age or older with a previous ischemic stroke were randomly assigned to receive telmisartan versus placebo regardless of their pretreatment 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 with a placebo, with a mean follow-up period of 2.5 years. The ARB therapy did not reduce the primary end point of recurrent stroke (HR 0.95, 95% CI 0.86 to 1.04; P=0.23) or the secondary outcome of major cardiovascular events (stroke, MI, vascular death or worsening congestive heart failure [HR 0.94, 95% CI 0.87 to 1.01; P=0.11]). Exploratory analyses suggested that a difference in outcome in favour of telmisartan began to emerge after the first six months of therapy. Although the absolute risk increase was small (approximately 3%), adverse events – principally hypotensive symptoms, syncope and atrial fibrillation – were more common in the telmisartan group than in the placebo group. It is possible that the modest reduction in blood pressure in the PROFESS study population and the relatively low baseline blood pressure (144/84 mmHg) may have been the reason for the negative results. The CHEP recommendations currently support a target blood pressure of less than 140/90 mmHg in poststroke 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 (Perindopril Protection Against Recurrent Stroke Study [PROGRESS]) with the combination of a diuretic (indapamide) and ACE inhibitor (perindopril) and meta-analyses of blood pressure-lowering trials showing a reduction in recurrent stroke (25,26), the PROFESS trial has not impacted the CHEP recommendations. The PROGRESS trial included people with an average blood pressure of 147/86 mmHg. In PROGRESS, the reduction in stroke was not significant (post hoc analysis) in people who received only ACE inhibitor therapy, but a large reduction in stroke was seen in the trial overall, particularly in those who received an ACE inhibitor with the diuretic indapamide. The

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

Healthy diet: high in fresh fruits and vegetables, low-fat dairy products, dietary and soluble fibre, whole grains and protein from plant sources, and low in saturated fat, cholesterol and salt, in accordance with Canada's Guide to Healthy Eating	
Regular physical activity: accumulation of 30 min to 60 min of moderate intensity dynamic exercise 4 to 7 days per week in addition to routine daily activities	
Low-risk alcohol consumption (≤ 2 standard drinks/day, and less than 14 drinks/week for men and less than 9 drinks/week for women)	
Attaining and maintaining ideal body weight (body mass index 18.5 kg/m ² to 24.9 kg/m ²)	
Waist circumference	
Europid	<94 cm for men and <80 cm for women
South Asian, Japanese, Chinese	<90 cm for men and <80 cm for women
Reduction in sodium intake to less than 2300 mg/day	
A smoke-free environment	

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CHEP recommends that 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.

Should I prescribe an ARB to people who are intolerant to an ACE inhibitor and who have cardiovascular disease or diabetes?

The Telmisartan Randomized Assessment Study in ACE-Intolerant Subjects With Cardiovascular Disease (TRANSCEND) (27) randomly assigned 5926 patients with coronary artery disease (mean blood pressure of 141/69 mmHg at baseline), previous stroke or diabetes mellitus with end-organ damage who were intolerant to ACE inhibitors to receive telmisartan or placebo. The mean blood pressure difference at study end was 3.2/1.3 mmHg lower in the telmisartan group. Over a median follow-up period of slightly more than 2.5 years, telmisartan therapy did not reduce the primary outcome (composite of cardiovascular death, MI, stroke or hospitalization for heart failure [HR 0.92, 95% CI 0.81 to 1.05; P=0.216]). The study did not exclude a small therapeutic benefit and a secondary end point of cardiovascular death, MI or stroke was close to the conventional significance level (HR 0.87, 95% CI 0.76 to 1.00; P=0.068). Syncopal spells were more common in the telmisartan group, but the absolute risk difference was small (0.44%) and the overall rate of adverse events were not different between the two groups. The TRANSCEND trial has not changed the CHEP recommendation to prescribe an ACE inhibitor to most people with hypertension and documented coronary artery disease based on the Heart Outcomes Prevention Evaluation (HOPE) trial (28), the EUROpean trial On reduction of cardiac events with Perindopril in stable coronary Artery disease (EUROPA) (29) and the Prevention of Events with Angiotensin Converting Enzyme Inhibition (PEACE) trial (30).

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

The ADVANCE trial (7) was a randomized controlled trial that included 11,140 people with type 2 diabetes and at least one other cardiovascular risk factor. The ADVANCE trial used a factorial design to assess both the effects of an intensive glucose-lowering regimen and antihypertensive treatment. In the hypertension arm of the trial, people were randomly assigned to receive a fixed-dose combination tablet consisting of perindopril (an ACE inhibitor) and indapamide (a diuretic) or a placebo. The treatment reduced both cardiovascular death (HR 0.82, 95% CI 0.68 to 0.98) and total mortality (HR 0.86, 95% CI 0.75 to 0.98) compared with the placebo. In 2008, it was

TABLE 4
Ways in which the Canadian Hypertension Education Program (CHEP) reduces the impact of bias

A history of requiring a high level of evidence with patient-relevant outcomes for pharmacotherapy recommendations
A centralized systematic literature review by a Cochrane Group librarian
Multiple clinical experts in subgroups to represent different perspectives
A Central Review Committee (CRC) that is 'free of commercial conflicts of interest' to oversee the evaluation of evidence and development of recommendations, and to present the evidence and recommendations
A consensus conference chaired by the CRC and with the evidence primarily presented by the CRC
Overt written disclosure of potential conflicts of interest at the time of the consensus conference, when the recommendations are discussed
Voting on recommendations with the removal of recommendations voted against by 30% or more of members
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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established that there was no interaction between the glucose-lowering and blood pressure-lowering therapies; hence, the CHEP recommends consideration of initial therapy with a combination of first-line drugs in people with diabetes if their blood pressure is 150/90 mmHg or higher (6,7). Caution is required in people in whom a substantial fall in blood pressure is more likely or would be poorly tolerated (eg, patients with postural hypotension).

How do I optimally reduce cardiovascular risk in my patients?

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

Because most Canadians will develop hypertension during their lifetime, routine assessment of blood pressure is recommended in all people at all appropriate visits. Most people with high normal blood pressure (130 mmHg to 139 mmHg systolic or 85 mmHg to 89 mmHg diastolic) will develop hypertension within two to four years and require annual assessment of blood pressure. To encourage self-efficacy, people with hypertension are advised to measure their blood pressure at home.

Nine in 10 Canadians with hypertension will have other risk factors for cardiovascular disease. Hence, optimum management of hypertension requires assessment of overall cardiovascular risk. This includes identifying and managing these other risk factors (eg, smoking, dyslipidemia and dysglycemia [impaired fasting glucose and diabetes]), abdominal obesity, unhealthy diet and physical inactivity. A comprehensive approach to cardiovascular risk reduction can more than double cardiovascular risk reduction compared with blood pressure management alone.

To optimally reduce cardiovascular risk, blood pressure should be lowered to less than 140/90 mmHg in the majority of people. In those with diabetes or chronic kidney disease, blood pressure should be lowered 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 as, 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 two 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 the clinical routine.

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

High blood pressure and 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 cornerstones of prevention and management of hypertension. In selected people, stress reduction including behaviour modification is helpful.

A recent meta-analysis (31) found that decreasing dietary sodium intake by 1860 mg/day reduced blood pressure by 5.1/2.7 mmHg. In Canada, it has been estimated that a 1860 mg/day decrease in dietary sodium will result in a substantive reduction in the prevalence of hypertension, health care costs and cardiovascular complications (32,33). In the Dietary Approaches to Stop Hypertension (DASH) trial (34), a diet rich in fruits, vegetables and low-fat dairy products with reduced saturated and total fat decreased blood pressure by 5.5/3.0 mmHg overall and by 11.4/5.5 mmHg in those with hypertension. A meta-analysis (35) on the effects of regular aerobic exercise showed that physical activity reduced blood pressure by 3.8/2.6 mmHg in people who were previously inactive. The Trials of Hypertension Prevention (TOHP) study (36) found that a decrease in weight of 4.4 kg led to a blood pressure reduction of 4.0/2.8 mmHg.

Brief clinical interventions increase the probability of a patient adhering to lifestyle changes, even for addictive behaviours such as smoking and problem alcohol consumption (37,38), and more comprehensive interdisciplinary care approaches are more effective (34,39-42). Because few Canadians change their lifestyle after a diagnosis of hypertension, it is important that health care professionals assist people in implementing lifestyle interventions (4). For this reason, Blood Pressure Canada, the Heart and Stroke Foundation of Canada and the CHEP have developed a variety of patient resources including paper copies, videos and Web-based interactive monitoring systems to assist people with 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 has taken a number of steps to reduce personal and commercial bias (Table 4). The CHEP also supports regular evaluation of the impact of its program to identify ongoing clinical issues in which care needs to improve. Furthermore, the CHEP monitors ongoing changes in the health care system that will change the way hypertension is managed in the future, and is actively developing new partnerships, educational resources and dissemination strategies. Active involvement of the patient is important in the prevention and control of hypertension. The 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 in becoming more informed about hypertension and more engaged in their care (Table 5). Recently, the increase in treatment of hypertension was found to be strongly associated with reductions in death and hospitalization due to major cardiovascular events in Canada (43).

TABLE 5
Internet resources for patient information

Resource	Description	Source
2008 patient hypertension recommendations	General information on prevention and treatment of hypertension	www.hypertension.ca/bpc
2009 patient hypertension recommendations	Specific information on the management of hypertension in the diabetic patient	www.hypertension.ca/bpc
Diabetes and hypertension	Information on hypertension for people with diabetes	www.diabetes.ca
Online, personalized blood pressure plan	Create a personalized action plan for healthy living	www.heartandstroke.ca/bp
Dietary Approaches to Stop Hypertension (DASH) diet	The DASH diet and healthy eating to improve blood pressure control	www.nhlbi.nih.gov/hbp/prevent/h_eating/h_eating.htm
Canada's Food Guide	Canada's official guide to healthy eating and lifestyle choices. Personalize your own food guide!	www.hc-sc.gc.ca/fn-an/food-guide-aliment/index_e.html
Dietitians of Canada	Tips for eating well and living well	www.dietitians.ca
Online health and fitness calculators	Learn about your risk factors using different tools to calculate your personal factors	www.healthtoolsonline.com/health-fit.html

Many of the resources may be downloaded and printed, or hard copies ordered for people who do not use the internet. Reprinted with permission from Blood Pressure Canada

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 the CHEP to more carefully assess the hypertension care gaps that remain. Furthermore, the results of another survey that assesses patient knowledge, attitudes and barriers to care will be released in 2010,

which 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 of cardiovascular disease.

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