



2009 CHEP Recommendations: An Annual Update

On behalf of the Canadian Hypertension Education Program (CHEP)

Hypertension is one of the major health issues facing our country. In 2005, 5.7 million Canadians had been diagnosed with hypertension and just > 5 million were on pharmacotherapy. For the last decade, hypertension has been the leading diagnosis for adult visits to physicians and the proportion of total visits to a physician for hypertension is increasing.¹ The World Health Organization has indicated that increased BP is the leading risk for death, predicting an epidemic of hypertension and is advocating for prevention and treatment programs as a priority.² Worldwide, > 7 million deaths in the year 2000 were attributed to suboptimum BP.³

The year 2009 marks the 10th consecutive year that the CHEP has updated recommendations for the management of hypertension. CHEP was developed to enhance clinical management of hypertension and hence reduce the burden of CVD in Canada.⁴ Recent data have suggested Canada is likely the world's leading country in the prevention and control of hypertension with a five-fold increase in treatment and control of hypertension in Ontario between 1992 and 2006⁵ and a large increase in treatment of hypertension and reduction in CVD rates that occurred at the time CHEP was initiated.⁶

The CHEP program has continued to evolve over the last decade and in many cases can now identify specific clinical scenarios that require improvement in clinical care.⁷⁻⁹ This year CHEP focuses on reducing death and CVD in people with diabetes by encouraging healthcare professionals to ensure their

patients' BP is maintained < 130/80 mmHg. New Canadian data indicate a minority of people with diabetes and hypertension are achieving adequate control of their BP and thus continue to incur avoidable deaths and disability.¹⁰

*The 2009 CHEP theme is:
hypertension in the patient with
diabetes*

Up to 80% of people with diabetes die of CVD and many diabetic complications are attributable to elevated BP.¹¹ Although elevated blood glucose levels is a cause of kidney and eye disease, elevated BP in people with diabetes is also a major cause of kidney failure and eye disease.^{12,13} Most people with diabetes have hypertension and almost one in five people with hypertension have diabetes.¹⁰

Treating hypertension in people with diabetes is one of the most cost-effective medical interventions available to reduce death and disability.¹⁴ Reduction in death and major CV event rates of > 50% can occur in people with diabetes and hypertension whose BP is treated.^{15,16} Even more intensive hypertension treatment reduces death and CV events by 25% compared to conventional treatment levels.¹⁷ Hypertension treatment also reduces the progression of diabetic retinopathy and kidney disease.^{12,13,18-21}

The recently completed Heart and Stroke Foundation survey of BP awareness treatment and

Table 1

Considerations in the individualization of antihypertensive therapy*

Hypertension without other compelling indications		Target < 140/90 mmHg	
	Initial therapy	Second-line therapy	Notes and/or cautions
Diastolic with/without systolic hypertension	Thiazide diuretics, β -blockers, ACE inhibitors, ARBs, or long-acting calcium channel blockers (CCBs) (consider ASA and statins in selected people). Consider initiating therapy with a combination of 2 first-line drugs if the BP is ≥ 20 mmHg systolic or ≥ 10 mmHg diastolic above target	Combinations of first-line drugs	β -blockers are not recommended as initial therapy in those aged > 60 years. Hypokalemia should be avoided by using potassium-sparing agents in those prescribed diuretics as monotherapy. ACE inhibitors are not recommended in blacks. ACE inhibitors, ARBs and direct renin inhibitors are potential teratogens and caution is required if prescribing to women of child-bearing potential. Combination 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 CCBs	Combinations of first-line drugs	Same as diastolic with/without systolic hypertension
Diabetes mellitus		Target < 130/80 mmHg	
	Initial therapy	Second-line therapy	Notes and/or cautions
Diabetes mellitus with nephropathy	ACE inhibitors or ARBs	Addition of thiazide diuretics, cardioselective β -blockers, long-acting CCBs	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 β -blockers and/or long-acting non dihydropyridine CCBs	Normal albumin to creatinine ratio < 2.0 mg/mmol in men and < 2.8 mg/mmol in women. Combination of an ACE inhibitor with an ARB is specifically not recommended
Non diabetic chronic kidney disease		Target < 130/80 mmHg	
	Initial therapy	Second-line therapy	Notes and/or cautions
Non diabetic chronic kidney disease	ACE inhibitors (or ARBs if ACE inhibitor-intolerant) if there is proteinuria. Diuretics as additive therapy	Combinations of additional agents	Avoid ACE inhibitors or ARBs 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 are specifically not recommended in people with chronic kidney disease without proteinuria

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Table 1 (continued)

Considerations in the individualization of antihypertensive therapy*

CV disease		Target < 140/90 mmHg	
	Initial therapy	Second-line therapy	Notes and/or cautions
Angina	β -blockers; ACE inhibitors except in low-risk patients	Long-acting CCBs	Avoid short-acting nifedipine. Combinations of an ACE inhibitor with an ARB are specifically not recommended
Prior MI	β -blockers and ACE inhibitors (ARBs if ACE inhibitor-intolerant)	Long-acting CCBs	Combination of an ACE inhibitor with an ARB are specifically not recommended
Heart failure	ACE inhibitors (ARBs if ACE inhibitor-intolerant) and β -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 ACE inhibitors and ARBs to those used in clinical trials. Avoid nondihydropyridine CCBs (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. BP reduction reduces recurrent cerebrovascular events in stable patients. Combination of an ACE inhibitor with ARB is specifically not recommended
Renovascular disease	Does not affect initial treatment recommendations	Combinations of additional agents	Avoid ACE inhibitors or ARBs if bilateral renal artery stenosis or unilateral disease with solitary kidney
Other conditions		Target < 140/90 mmHg	
	Initial therapy	Second-line therapy	Notes and/or cautions
Peripheral arterial disease	Does not affect initial treatment recommendations	Combinations of additional agents	Avoid β -blockers with severe disease
Dyslipidemia	Does not affect initial treatment recommendations	Combinations of additional agents	—
Overall vascular protection	Statin therapy for patients with ≥ 3 CV risk factors or with atherosclerotic disease. Low dose ASA in people with controlled BP	—	Caution should be exercised with the ASA recommendation if BP is not controlled

NYHA: New York Heart Association

TIA: Transient ischemic attack

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control from the Province of Ontario found unprecedented levels of BP control with two out of three people with hypertension under control. However, for people with diabetes, rates of control were only one in three, with two-thirds above the target of < 130/80 mmHg.¹⁰ This lack of BP control in people with diabetes may be in large part due to the relatively low use of diuretic therapy—the cornerstone of treatment for resistant hypertension in this population.²²⁻²⁴

Combinations of lifestyle modification and three to four or more drugs may be required for BP control in persons with diabetes.²⁵ The prescription of an ACE inhibitor or ARB is recommended in all people with diabetes who are hypertensive (Table 1). Alternative first-line treatments include long-acting calcium channel blockers and low dose diuretics in people without proteinuria. If the BP is $\geq 150/90$ mmHg consideration should be given to initiating therapy with a combination of two drugs. Diuretic therapy is generally necessary for BP control when three or more drugs are used and reduces major CV events in people with diabetes to the same extent as other drug classes.²⁶ Maintaining normal serum potassium levels is important to lessen the impact of diuretics on blood glucose and maximize CV event reductions.^{27,28} If BP control is not achieved with sequential addition of antihypertensive drugs, consider referral to an expert in hypertension. Of note, quality of life improved in the people treated to lower BP levels in the largest trial examining intensive vs. less intensive BP lowering.²⁹

What's new?

In 2008, there were several new clinical trials of interest to clinicians. The Ongoing Telmisartan Alone and in Combination with Ramipril Global Endpoint Trial (ONTARGET) found that an ACE

Table 2 Patient instructions to prepare for home BP measurement	
Purchasing equipment	
<ul style="list-style-type: none"> Buy an approved machine marked by the  logo Make sure the device has a cuff size that is correct for you. Ask for help if you are unsure 	
To measure BP	
<ul style="list-style-type: none"> Follow the directions that come with the device Only measure and record BP if you have time to do it correctly Do not measure BP when you are uncomfortable, cold, anxious, stressed or in pain Wait for at least 2 hours after heavy physical activity (e.g., long run) and at least half an hour after light physical activity (e.g., short walk), drinking coffee or smoking Empty your bladder or bowels if uncomfortable before taking a reading It is very important to rest and relax for 5 minutes in a quiet, comfortable place with no distractions (e.g., TV or talking) before measuring your BP Put the cuff on a bare arm or one that has a thin sleeve Sit in a chair that supports your back and beside a table that can support your arm. If required, put a pillow or towel under your arm so that it rests at heart level. Do not cross your legs Measure BP in the morning before medications and eating and in the evening before going to bed, bathing or taking medications Take at least 2 readings and record them with the date and time 	

inhibitor or an ARB had similar CV outcomes when prescribed to people with CVD or Type 2 diabetes.^{30,31} The ONTARGET trial also found that while the combination of an ACE inhibitor with an ARB had some extra BP lowering, it had more side-effects such as hyperkalemia, hypotension and renal impairment and did not improve patient outcomes compared to the ACE inhibitor alone. In people with stage 3 chronic kidney disease (glomerular filtration rate > 30 ml/min) the combination of an ACE inhibitor with an ARB reduced urine protein levels but did not reduce



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Table 3
Target values for BP*

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

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

CV outcomes and did increase adverse renal outcomes including the need for acute dialysis compared to the ACE inhibitor alone.³¹

The only data to support improved patient outcomes from the combination of an ACE inhibitor with an ARB is in people with heart failure where the combination reduces recurrent hospitalization. There are ongoing trials of the combination of an ACE inhibitor with an ARB in people with chronic kidney disease and diabetes. Hence, the use of combination of ACE inhibitor and ARB therapy should only be considered in selected and closely monitored people with advanced heart failure or proteinuric nephropathy (Table 1). For people already on the combination and stable, clinicians need to consider that prescribing just one of the two classes reduces CV events to the same extent and that other therapeutic regimes have the potential to reduce CV events and BP to a greater degree.

In 2008, the Hypertension in the Very Elderly Trial (HYVET) found large reductions in CV events and mortality in the treatment of hypertension in quite healthy but very elderly people (> 80-years-old).³² Hence, CHEP now specifically recommends

Table 4
Lifestyle therapy to reduce the possibility of becoming hypertensive and to reduce BP and to reduce the risk of BP-related CV 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, low in saturated fat, cholesterol and salt in accordance with Canada's Guide to Healthy Eating
- **Regular physical activity:**
Accumulation of 30-60 minutes of moderate intensity dynamic exercise 4-7 days per week in addition to daily activities
- **Low risk alcohol consumption:**
≤ 2 standard drinks/day and < 14/week for men and < 9/week for women
- **Attaining and maintaining ideal body weight:**
BMI 18.5-24.9 kg/m²
- **Waist circumference:**
 - European < 94 cm for men
< 80 cm for women
 - South Asian, Japanese < 90 cm for men
 - Chinese < 80 cm for women
- **Reduction in sodium intake:**
< 2300 mg/day
- **A smoke-free environment**

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that age not be used as a factor in prescribing pharmacotherapy for hypertension. Nevertheless CHEP continues to recommend caution in treating hypertension in frail elderly people where the risks of therapy and hypotension are likely to be higher. People where the risk may outweigh the benefit could include those with postural hypotension, postprandial hypotension and people who have a poor short-term prognosis due to competing comorbidity.

Other major clinical trials with ARB-based therapy to lower BP were considered (Prevention Regimen for Effectively Avoiding Second Strokes



Table 5

Advice for people to assist them to reduce dietary sodium*

DO

- Buy and eat more fresh foods, especially fruits and vegetables
- Choose processed foods with low salt labels or brands with the lowest percentage of sodium on the food label
- Wash canned foods or other salty foods in water before eating or cooking
- If desired, use unsalted spices to make foods taste better
- Eat less food at restaurants and fast food outlets and ask for less salt to be added in your food orders
- Use less sauces on your food
- Eat foods with < 200 mg of sodium or < 10% of the daily value per serving

DON'T

- Buy or eat heavily salted foods (e.g., pickled foods, salted crackers or chips, processed meats, etc.)
- Add salt in cooking and at the table
- Eat foods with > 400 mg of sodium or > 20% of the daily value per serving

*With permission from Blood Pressure Canada.

[PROFESS]³³ and Telmisartan Randomized Assessment Study in ACE-intolerant Subjects With Cardiovascular Disease [TRANSCEND]³⁴) but did not result in changes to the CHEP recommendations.

Home measurement of BP

CHEP continues to encourage home measurement of BP as a step towards greater patient self-efficacy. Home BP readings have a stronger association with CV outcomes than readings taken in a healthcare professional's office. Home readings can be used to confirm the diagnosis of hypertension, improve BP control, reduce the need for medications in those with white coat effect, identify

those with white coat and masked hypertension and improve medication adherence.³⁵ Patient instructions for purchasing and using home BP measurement can be found at www.hypertension.ca and www.heartandstroke.ca/BP. In 2009, a home measurement instructional DVD will be available for download from the hypertension.ca site. General sources for patient information on home measurement of BP can be found in Table 2.

Other important recommendations for the management of hypertension

Assess BP at all appropriate visits

BP increases with age such that 50% of Canadians > 65-years-old have hypertension. For those with normal BP at 55- to 65-years-old, > 90% will develop hypertension within an average lifespan. To identify those with hypertension, all adults require ongoing assessment of BP throughout their lives and those with high normal BP require annual assessment.

Assess and manage overall CV risk in all people with hypertension including: smoking, dyslipidemia and dysglycemia (e.g., glucose intolerance, diabetes), abdominal obesity, unhealthy eating and physical inactivity

The vast majority of Canadians with hypertension have other CV risks. Identifying and managing risk factors in addition to hypertension can double the risk reduction in CVD, can alter the BP target (Table 3) and specific classes of medications recommended (Table 1). Currently, only one-half of younger people diagnosed with hypertension are treated even if they have multiple CV risks and those who smoke are less, rather than more, likely to be treated.⁹ Younger people with hypertension and multiple CV risks (male, sedentary behaviour, poor dietary habits, obesity, smoking, etc.) are recommended to be considered for pharmacotherapy. In general, people with hypertension who smoke and cannot quit are recommended to be prescribed antihypertensive



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Table 6

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
On-line, personalized BP plan	Create a personalized action plan for healthy living	www.heartandstroke.ca/bp
DASH diet	The DASH diet and healthy eating to improve BP 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
On-line 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 can be downloaded and printed or hard copies ordered for people who do not use the internet. With permission of Blood Pressure Canada.

therapy, although a β -blocker should be avoided as first-line therapy in these people.

Sustained lifestyle modification is the cornerstone for the prevention and management of hypertension and CVD

Hypertension can be prevented and treated and other CV risks reduced, through healthy eating, regular physical activity, low risk alcohol consumption, reductions in dietary sodium and in some, stress reduction (Table 4). Unfortunately after a diagnosis of hypertension, few Canadians improve their lifestyle.⁸ However, simple, brief healthcare professional interventions increase the probability of a patient making lifestyle changes.³⁶ Table 5 provides tips that can be used to advise people on how to reduce dietary sodium. Table 6 outlines internet resources that can assist

people in self-managing their care. A new section of the Heart and Stroke Foundation website (www.heartandstroke.ca/BP) has recently been designed to assess hypertensive patients' lifestyles and provides individualized approaches and monitoring to assist lifestyle changes. Several patient handouts on hypertension can also be ordered from www.hypertension.ca/bpc.

Treat to target (< 140/90 mmHg; < 130/80 mmHg in people with diabetes or chronic kidney disease)

Greater reduction in CVD is achieved by lowering the BP to the stated targets (Table 3). In people with diabetes and hypertension, lowering BP to < 130/80 mmHg markedly decreases CV death and hospitalization.

Combinations of therapies (both drug and lifestyle) are generally necessary to achieve target



Table 7 Strategies to improve patient adherence*
<ol style="list-style-type: none"> 1. Assist your patient to adhere <ul style="list-style-type: none"> • Tailoring pill-taking to fit patients' daily habits • Simplifying medication regimens to once-daily dosing • Replacing 2 antihypertensive agents with a fixed dose combination (where available and appropriate), provided it is the same combination the patient is already taking • Utilizing unit-of-use packaging (of several medications to be taken together) • Identify potential barriers to adherence 2. Assist your patient in getting more involved in their treatment <ul style="list-style-type: none"> • Encouraging greater patient responsibility/ autonomy in monitoring their BP and adjusting their prescriptions • Educating patients and patients' families about their disease/treatment regimens 3. Improve your management in the office and beyond <ul style="list-style-type: none"> • Assessing adherence to pharmacological and non-pharmacological therapy at every visit • Encouraging adherence with therapy by out of office contact (either by phone or mail), particularly over the first 3 months of therapy • Coordinating with work-site healthcare givers to improve monitoring of adherence with pharmacological and lifestyle modification prescriptions • Utilizing electronic medication compliance aids • Adherence to an antihypertensive prescription can be improved by a multidisciplinary team approach
<p>*With permission from the CHEP.</p>

Table 8 The CHEP
<p>Steering committee</p> <ul style="list-style-type: none"> • Blood Pressure Canada • Canadian Council of Cardiovascular Nurses • Canadian Hypertension Society • Canadian Pharmacists Association • College of Family Physicians of Canada • Heart and Stroke Foundation of Canada • Public Health Agency of Canada
<p>Volunteers</p> <ul style="list-style-type: none"> • Over 100 volunteers from clinical practice, academia and government
<p>Evidence based</p> <ul style="list-style-type: none"> • Recommendations Task Force with over 50 clinical and academic volunteers • Centered around a core group of evidence based medicine experts who do not have potential commercial conflicts of interest
<p>Knowledge translation</p> <ul style="list-style-type: none"> • Implementation Task Force with over 25 volunteers from nursing, pharmacy, family medicine and health education to translate the recommendations to meet discipline specific needs and to facilitate inter disciplinary care
<p>Outcomes evaluation</p> <ul style="list-style-type: none"> • Outcomes Research Task Force with over 40 volunteers from academia and government to assess the impact of the program on an ongoing basis
<p>Administrative support</p> <ul style="list-style-type: none"> • Susan Carter at Debut Medical Education
<p>Patient oriented</p> <ul style="list-style-type: none"> • Close association with Blood Pressure Canada to develop patient resources for self efficacy and knowledge translation

BPs. Most people require multiple antihypertensive drugs as well as lifestyle changes. When using two drugs to lower BP, combinations of a β -blocker, ACE inhibitor or ARB produce less than additive hypotensive effect and should be avoided unless there is a specific indication. If BP is $> 20/10$ mmHg above target, initiating therapy with a combination of two “first-line” antihypertensive drugs is a first-line option.

Monitor people whose BP is above target at least every two months. To achieve BP control, follow-up at short intervals improves patient adherence and is required to increase the intensity of treatment.

Focus on adherence. Adherence to pharmacotherapy and lifestyle change should be routinely assessed at each visit. Healthcare professional interventions can both prevent non adherence and



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improve adherence in those who are having problems (Table 7).

Comments from the CHEP executive

CHEP works closely with the College of Family Physicians of Canada, Canadian Council of Cardiovascular Nurses, Canadian Pharmacists Association, Heart and Stroke Foundation, Public Health Agency of Canada, Statistics Canada and other organizations to improve hypertension prevention and control. In particular, CHEP is working closely with Blood Pressure Canada to develop and disseminate patient information on hypertension to improve patient self-efficacy in managing hypertension. A major recent activity has been to develop a joint committee with Blood Pressure Canada to produce patient and healthcare professional aids for reducing dietary sodium. The effort to prevent hypertension by a reduction in dietary sodium could reduce CV events by 13%³⁷ and could save over a billion dollars in health spending a year.

In 2009, a national strategy for prevention and control of CVD in Canada will be released. The strategy will provide guidance for prevention and control of hypertension in the context of reducing CVD. CHEP anticipates that if implemented, the strategy will lead to greater government involvement and a much greater reduction in CVD in Canada.

The CHEP executive would like to thank the > 100 healthcare professional volunteers, many of

whom spend hundreds of hours each year and have been involved for a decade now in developing, disseminating and evaluating the annual Canadian recommendations for the management of hypertension (Table 8). The collaborative approach of volunteers from clinic practice, academia and governments with the support of the primary care professional associations, the pharmaceutical health-care industry, governments, charities and scientific organizations has been associated with marked improvements in the management and outcomes of hypertensive Canadians.⁶ 

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