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Diagnosis and treatment of high blood pressure

New directions and new approaches: 1999 Canadian recommendations for management of hypertension

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Treatment recommendations for hypertension as outlined by the 1999 Canadian Recommendations for the Management of Hypertension are the product of constantly evolving clinical evidence and the need to refine this new information for care providers and patients. Statistics show that despite remarkable reductions in stroke and coronary heart disease during the 1970s and 1980s, these diseases started to increase in the 1990s. Also, between 1988 and 1991, congestive heart failure had a dramatic resurgence, and between 1982 and 1995, incidence of end-stage renal disease more than doubled. Uncontrolled hypertension is a substantial contributor to these four illnesses.

Recommendations in the new Canadian Consensus guidelines, published in fall 1999, focus on the need to be aware of, adhere to, and monitor antihypertensive therapy for high blood pressure (BP). Blood pressure control is currently poor (**Table 1**¹⁻³). As Americans became more aware of hypertension and treatment increased, more people had their high BP controlled to below 140/90 mm Hg. Since publication of the US Joint National Committee V recommendations in 1993 and the Canadian Guidelines in 1995, however, these impressive improvements have begun to deteriorate. The Canadian Heart Health survey¹ reported that only half the Canadians who have hypertension are aware of it, and only 16% control it adequately; a dismal record, but comparable to the situation in other industrialized countries.

Why is most hypertension not controlled?

Lifestyle factors, including increasing overall body weight, might be to blame. Among Americans, 55% of adults older than 20 are overweight (body mass index [BMI] 25 to 29.9) or obese (BMI >30), up from 40% in the 1970s and 43% in the 1960s. Lifestyle modification is important for lowering cardiovascular risk.

Physicians, patients, and the public are complacent about BP control. In one trial,⁴ more than 95% of patients were receiving treatment at baseline, but only 27% were

Table 1. Trends in awareness, treatment, and control of high blood pressure (BP): Proportion of adults aged 18 to 74 with systolic BP >140 mm Hg and diastolic BP >90 mm Hg receiving antihypertensive medication in the United States (1976-1994) and in Canada (1995).

STUDY	%
UNITED STATES\NHANES* II ²	
• Aware	51
• Treated	31
• Controlled [†]	10
NHANES III-1 ³	
• Aware	73
• Treated	55
• Controlled	29
NHANES III-2 ³	
• Aware	64.4
• Treated	53.6
• Controlled	27.4
CANADA\JOFFRES ET AL ¹	
• Treated, controlled	16
• Treated, uncontrolled	23
• Untreated, uncontrolled	19
• Unaware	42

*NHANES—National Health and Nutrition Examination Survey.

[†]Systolic BP <140 mm Hg; diastolic BP <90 mm Hg.



controlled. Physicians were asked to use an algorithm that stressed lifestyle modification, medication, and aiming for a goal. Within 1 year, average BP control rates had doubled.

Poor compliance with therapy is another important factor. Many manufacturers are producing once-a-day formulations or combination therapies that might help patients comply.

Another problem might be failure to set goals. Results of a recent observation⁵ of 800 hypertensive men in Veterans Affairs Canada over 2 years illustrates this failure. About 40% had BP readings of $\geq 160/90$ mm Hg, despite an average of six or more hypertension-related clinic visits yearly. The researchers concluded that physicians frequently failed to increase doses of antihypertensive medications or to initiate new treatments for patients whose BP was not controlled.

The Canadian Consensus recommendations encourage optimal management of individual patients based on the best available evidence (Table 2). The recommendations do not take patient preferences into account, but do profile patient subgroups with notable special considerations.

Diagnosis

Inaccurate measurement could lead to misclassification of cardiovascular risk and misdiagnosis of hypertension.^{6,7} Accurate BP measurement requires particular attention to patient preparation, standardized measurements, and accurate equipment.

Recommendations

- Blood pressure should be measured at all appropriate visits to help determine cardiovascular risk and monitor antihypertensive treatment (grade C). Measurements should be taken by trained staff (grade B), using standardized techniques (grade D).
- Risk of cardiovascular disease (CVD) increases with hypertension and specific target organ damage. Confirmation of diagnosis is critical. The closer a patient's BP is to normal, the greater the risk of misclassification.^{8,10} Hence, readings should be taken at more frequent intervals to establish diagnosis in those with borderline high BP and those without target organ damage.
- If an initial BP reading is high, another reading should be taken in the same session and patients scheduled for further visits (grade A). The search for target organ damage, associated risk factors, and exogenous causes of elevated BP should begin with questioning patients and reviewing medical records for myocardial infarction, angina pectoris, transient ischemic attacks, cerebrovascular accidents, peripheral arteriovascular insufficiency, or renal insufficiency; and continue at a second visit, if BP is still elevated, with taking further history, another physical examination, and arranging diagnostic tests. If BP at first visit was between 140/90 and 180/105 mm Hg, at least four more visits are required over the next 6 months to diagnose hypertension (grade B). Because BP falls most between the first and second visits,

Table 2. Grades of evidence to support recommendations

GRADE A	Results of a randomized controlled trial (RCT) show a difference in important outcome. If there is no statistical difference, the RCT has adequate power to exclude a 25% difference in relative risk.
GRADE B	Results of an RCT do not meet criteria for grade A evidence.
GRADE C	Results of a non-randomized trial where controls were chosen by a systematic method, or results of a subgroup analysis of an RCT.
GRADE D	Expert opinion; before-after studies or case series with historic controls or controls drawn from other studies; case series without controls; case reports or case series with fewer than 10 patients.

three or more visits are required to confirm or rule out hypertension (grade D).

- If at a previous diagnostic visit BP was lower than 140/90 mm Hg and patients have no evidence of target organ damage or associated risk factors, they should be reassessed yearly (grade D). These low-risk patients (grade A for prognosis) should not be labeled hypertensive (grade D).
- When patients present as a hypertensive emergency, diagnosis of hypertension should be made immediately and appropriate management started right away (grade C).
- Patients should be seen monthly until two BP readings are below target with antihypertensive medication (grade D). Patients with symptoms or severe hypertension, intolerance to antihypertensive drugs, and target organ damage need to be seen more frequently (grade D). Once target BP is achieved, patients should be seen at 3- to 6-month intervals (grade D) and encouraged in lifestyle modification (grade D).

Home BP monitoring

Monitoring BP at home is a relatively recent tool. It can increase compliance among those suspected of being noncompliant¹¹ (grade D) and among diabetic patients (grade D).¹² Currently, there is insufficient evidence to recommend home BP monitoring routinely for all hypertensive patients. Standardization and regulation of devices will help ensure that rigorous standards of accuracy and reliability are maintained.

Recommendations

- Home BP monitoring devices should meet American Academy of Medical Instrumentation standards or British Hypertension Society guidelines (grade D).
- At home, BP of $\geq 135/85$ mm Hg should be considered elevated (grade B).¹³⁻¹⁶ Patients should be taught how to

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use the devices, which should be regularly calibrated (grade D).

Ambulatory blood pressure monitoring

Ambulatory BP monitoring might allow patients to take fewer medications.¹⁷ About 20% to 40% of patients with elevated BP in the office have normal BP on 24-hour ambulatory monitoring.^{7,18,19} Hence, ambulatory BP monitoring might improve long-term management of hypertension and cardiovascular risk.²⁰ The American Hypertension Society has suggested that daytime ambulatory BP of <135/85 mm Hg be considered normal.¹⁹ If BP does not decrease the usual 10% to 20% during sleep, CVD prognosis is poorer.³ Hence, timing of measurement is an important determinant of diagnosis and treatment.

Recommendations

- Ambulatory BP monitoring should be considered for untreated patients whenever “white-coat effect” is suspected, including patients with mild-to-moderate BP elevation and no target organ damage (grade A).
- For treated patients, ambulatory BP monitoring should be considered for white-coat effect, apparent resistance to drug therapy, symptoms suggesting hypotension, or fluctuating office BP readings (grade B). Withholding drug therapy based on ambulatory BP should take into account normal values for 24-hour and awake ambulatory BP (grade B) and changes in nocturnal BP (grade A for prognosis).
- As with home BP monitors, patients should be advised to use only devices that have been validated independently using established protocols (grade A).

When to consider drug therapy

Recommending a target diastolic BP level of ≥ 90 mm Hg for drug therapy is a significant reduction from the previous 100 mm Hg.

Therapy should be tailored to individual patient characteristics (eg, age, sex, racial group, tobacco use, dyslipidemia, diabetes, renal disease) that alter risk for cardiovascular events. Risk of current CVD in people with identical BP readings can vary more than tenfold, depending on other cardiovascular risk factors, hypertension-related complications, CVDs, or other illnesses.^{21,22}

Recommendations

- Drug therapy for hypertension should be considered for all adults <60 years with sustained diastolic pressure ≥ 90 mm Hg (grade A) and prescribed when their diastolic readings average ≥ 100 mm Hg (grade A); when they have target organ damage related to uncontrolled hypertension (grade C); or when they have diabetes mellitus, renal parenchymal disease, or CVD (grade C). Other independent risk factors, such as older age, male sex, being postmenopausal, black race, elevated systolic BP, continued cigarette smoking, glucose intolerance, or abnormal blood lipid profiles, should strongly influence the decision to initiate drug therapy (grade C). Other factors, including a strong family history of hypertension or premature CVD, increased BMI or truncal obesity, and sedentary lifestyle, should also be considered (grade D).
- Drug therapy is indicated for isolated systolic BP ≥ 160 mm Hg in patients >60 years (grade A) and should be considered for patients <60 (grade D). For adults <60 with isolated systolic hypertension, particular consideration should be given to target organ damage, concomitant diseases such as diabetes mellitus, or other independent cardiovascular risk factors (grade D).

What is the goal of therapy?

A recent trial²³ provides new information on specific goals of therapy. No significant differences in cardiovascular



events were seen between groups randomized to one of three BP goals (<90, <85, and <80 mm Hg), but the subgroup with diabetes did benefit from having lower goals. These data support a goal BP of <90 mm Hg for most hypertensive patients, but do not indicate harm in lowering the goal.

Recommendation

- The diastolic BP goal should be <90 mm Hg (grade A). For systolic BP, the goal should be <140 mm Hg (grade D).

What are the therapeutic choices?

Recommendations for treatment of uncomplicated hypertension are based on agents that have been shown to effectively lower BP and reduce cardiovascular events, but do not reflect costs or patient preference. Recommendations reflect both older literature supporting use of β -adrenergic antagonists and a recent study²⁴ supporting use of angiotensin-converting enzyme (ACE) inhibitors as an alternative to traditional therapy, particularly for patients with diabetes. Calcium channel blockers (CCBs) are reserved for alternative therapy for younger patients with elevated diastolic pressures because there are no comparable data for this population.

Recommendations

- Initial therapy should be simple and tailored to individual patients. Monotherapy with a thiazide diuretic, β -adrenergic antagonist, or ACE inhibitor (grade A) should start with the lowest doses.
- If response is inadequate or there are adverse effects, substitute another drug from the initial therapy group (grade D) or combine a thiazide diuretic with a β -adrenergic antagonist or an ACE inhibitor (grade A).
- If BP remains uncontrolled or there are adverse effects, other classes of antihypertensive drugs (ie, CCBs, angiotensin II receptor antagonists, α -adrenergic antagonists, or centrally acting agents), either alone or in combination, can be tried (grade D).
- Poor compliance, dietary habits, or secondary causes of hypertension, including consumption of other drugs, should be considered as confounding factors in optimal control (grade D).

Special considerations

Hyperlipidemia. Many studies have reported the effect of various antihypertensive drugs on serum lipids. Effects have generally been of relatively short duration and have not been shown to change serum lipids or incidence of atherosclerotic complications. One study²⁵ showed no sustained adverse effects on lipids of drugs from five major antihypertensive classes (acebutolol, amlodipine, chlorthalidone, doxazosin, and enalapril). The recommendations reflect the view that choice of antihypertensive therapy for patients with hyperlipidemia should not be inordinately affected by their lipid status.

Recommendation

- For patients with dyslipidemia, therapy for hypertension should follow recommendations for uncomplicated hypertension or for patients with other concurrent risk factors or diseases. Additional considerations are that high-dose thiazides and β -adrenergic antagonists without intrinsic sympathomimetic activity might worsen lipid profiles (grade B) and that α_1 -adrenergic antagonists can improve lipid profiles (grade B).

Diabetes. Lower thresholds for initiating drug therapy for diabetics with hypertension are due to increased risk of microvascular and macrovascular complications. Lower thresholds have been associated with fewer complications and improved cardiovascular outcomes in two trials.^{23,26}

Recommendations for first-line therapy for patients >60 years with diabetes and systolic hypertension follow those for uncomplicated systolic hypertension. Recommendations are based, in part, on two studies^{17,27} where patients with diabetes benefited from therapy similarly to the overall study population.

Recommendations

- Target BP for diabetics with hypertension should be <130/80 mm Hg (grade B). Preferred treatment for patients with diabetes and hypertension but no overt nephropathy and those <60 years is either ACE inhibitors or cardioselective β -adrenergic antagonists (grade A).
- Second-line therapy includes low-dose thiazide diuretics (grade B), long-acting CCBs (grade B), and α -antagonists (grade C). α -Antagonists and centrally acting antihypertensive agents should be used with caution for patients with autonomic neuropathy (grade C).
- Preferred therapy for patients >60 years with diabetes and isolated systolic hypertension is either low-dose thiazide diuretics or long-acting dihydropyridine CCBs (grade C).
- If monotherapy with first-line agents is ineffective, contraindicated, or associated with adverse effects, consider a long-acting CCB combined with an ACE inhibitor (grade B). A low-dose thiazide diuretic may be added to an ACE inhibitor without adversely affecting microalbuminuria (grade B).

Ischemic heart disease. No large, randomized controlled trials have demonstrated statistically significant differences in important outcomes, such as survival, in patients with stable angina and hypertension treated with medications that lower BP. The principal goal has been demonstrating that ischemia has been suppressed.

Recommendations

- For patients with stable angina and hypertension, β -adrenergic antagonists are preferred as initial therapy (grade D); alternative therapy would include long-acting CCBs (grade B).

- Patients with hypertension and a recent myocardial infarction should be treated with either β -adrenergic antagonists or ACE inhibitors, as both protect against reinfarction and death (grade A). Alternative therapies would include verapamil (grade A) and diltiazem when there is normal left ventricular function (grade C).

Cerebrovascular disease. There are no specific treatment recommendations for patients with cerebrovascular disease even though an important goal of treatment of hypertension is prevention of stroke. Whether BP should be lowered as part of management of acute stroke has not been established,²⁸ but hypertensive patients with prior stroke can reduce risk of recurrence with antihypertensive therapy.²⁹

Elderly people. Systolic pressure rises with age; diastolic pressure levels off at age 55 and then declines. Hypertension-related complications correlate more with systolic BP, underscoring the importance of considering systolic hypertension regardless of elevations in diastolic BP.³⁰ The basis of recommendations for therapy for older hypertensive patients comes, in part, from large, well-connected, randomized trials. The studies included relatively healthy elderly people generally between ages 60 and 84. Recommendations cannot, therefore, be generalized to the frail elderly and those >84 years.

Recommendations

- For uncomplicated hypertension without contraindication, preferred initial therapy for hypertensive patients >60 years is low-dose thiazide diuretics (grade A) and long-acting dihydropyridine calcium channel antagonists (grade A).^{17,27,31} The striking difference is that, although β -blockers can be useful adjunctive therapy for elderly patients taking diuretics, they are not recommended as first-line therapy (grade A).
- Risk of cognitive impairment resulting from therapy with methylodopa; postural hypotension from α -adrenergic antagonists; and drowsiness, rebound hypertension, and depression from reserpine might limit use of these otherwise effective antihypertensive agents in older people (grade B).

Conclusion

Lifestyle modification is important in preventing and controlling hypertension.³² It is encouraged for all and might be definitive treatment for some. Embracing healthy heart habits early in life offers Canadians the best chance for cardiovascular health. Proper diagnostic criteria using new technologies will certainly enhance identification of hypertension.

In the limited time available to see patients in the office, physicians should resist the quick fix of prescribing medications first and, instead, develop skills in diagnosis and

targeted antihypertensive therapy and recommending health-promoting lifestyle changes.

Getting patients involved is essential for success in controlling hypertension. The new guidelines describe accurate measurement of BP and the value of repeated self-measurement at home and work. Certainly, high BP is only one of several risk factors for CVD. The risk-based approach to treating high BP with lifestyle interventions complements other health-promoting activities. Effective strategies and behaviour change models to motivate and guide patients to maintain prescribed interventions must be developed.

Family physicians see and treat most of the hypertension in Canada. Hence, our role in reducing the burden of CVD should be seen as a necessary and achievable challenge. ❖

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