

**GUIDELINES FOR
BLOOD PRESSURE MONITORING AND EDUCATION
THROUGH NOVA SCOTIA DIABETES CENTRES**

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TABLE OF CONTENTS

INTRODUCTION	1
LITERATURE REVIEW	2
RECOMMENDATIONS	3
RATIONALE	5
REFERENCES	6
APPENDIX 1: Measuring Blood Pressure	7
APPENDIX 2: Diabetes Centre Action Algorithm	9
APPENDIX 3: Home (Self) Measurement of Blood Pressure	10

INTRODUCTION

This paper discusses the Diabetes Care Program of Nova Scotia (DCPNS) recommendations regarding implementation of standard blood pressure measuring, recording, reporting, and educational initiatives for persons attending Diabetes Centres (DCs) in Nova Scotia (NS). These recommendations support the self-management component of chronic disease management and are consistent with national guidelines.

In persons with diabetes, hypertension represents a significant problem contributing to the development and progression of a number of diabetic complications such as cardiovascular disease, retinopathy, and nephropathy.

For hypertension to be detected, it must be accurately measured. At present, diabetes educators at all DCs funded by NS District Health Authorities (DHAs) measure the blood pressure of persons attending their programs. However, DCPNS survey data taken from 13 NS DCs (reported in 2000/01) showed that only 27.5% of people attending those DCs had blood pressure values within the 1998 recommended target (< 130/85 mm Hg). The current 2003 Canadian Diabetes Association (CDA) Clinical Practice Guideline recommends a blood pressure target of \leq 130/80 mm Hg; this may increase the numbers above target even further. This supports the need for early identification, education, and treatment of hypertension for individuals attending DCs. Diabetes educators should promote aggressive control of blood pressure in persons with diabetes to the same degree as they emphasize glycemic control.

This guideline document makes recommendations for diabetes educators in NS DCs to measure and record blood pressure at each patient visit, report results to physicians, and work with these physicians to develop individualized plans for those whose blood pressure remains above target values. It is also recommended that DCs have a variety of cuff sizes available to accurately measure blood pressure and electronic blood pressure monitors to allow individuals to self-assess/self report their values while attending the DC. Although there are costs involved in purchasing equipment, the potential of intensifying blood pressure management will save the system greatly by decreasing diabetes complications and associated morbidity.

The DCPNS will continue to support and assist DC staff in collecting and analyzing blood pressure data and assist with initiatives aimed at hypertension management. Self-management of hypertension, as part of a chronic disease management approach to diabetes care, is strongly encouraged.

LITERATURE REVIEW

Hypertension is a common but challenging comorbid condition in diabetes, affecting up to 60% of all cases.¹ A 1999 study found that 57% of men and 42% of women in Halifax County diagnosed with hypertension did not have adequately controlled blood pressure.² The Canadian Heart Health Survey reported that only 43% of people (age 18-74 years) had an optimal blood pressure (<120/80 mm Hg); and of those with a diagnosis of hypertension, only 13% were below target (defined as 140/90 mm Hg).³ A DCPNS chart review from 1997-2001 showed that only 27.5% of a random selection of patients attending DCs fell within the recommended 1998 CDA Clinical Practice Guideline target blood pressure value (<130/85 mm Hg).

Hypertension is a significant risk factor for cardiovascular disease and microvascular complications of diabetes.^{1,4} Cardiovascular disease rates are 2 to 4 times higher in persons with diabetes than in matched non-diabetic populations.¹ Up to 80% of people with type 2 diabetes will develop or die of macrovascular disease.⁵ However, clinical trials of blood pressure control in diabetes have shown a dramatic effect in preventing such serious outcomes. The Hypertension Optimal Treatment (HOT) study compared the effects of different blood pressure targets on diabetes outcomes. In those with diabetes, the group randomly assigned to a diastolic blood pressure target of 80 mm Hg had a significantly reduced risk for cardiovascular death and major cardiovascular events compared with the group randomly assigned to a target of 90 mm Hg.⁶

The United Kingdom Prospective Diabetes Study (UKPDS) clearly demonstrated the need for tight control of blood pressure in persons with type 2 diabetes.⁴ In this study, “tight” blood pressure control reduced the risk of multiple diabetes endpoints: 32% decrease in deaths related to diabetes; 44% decreased risk of stroke; and a 34% decrease in risk of all macrovascular diseases, as well as a significant decrease in the development of retinopathy and proteinuria. This landmark study changed the emphasis from that of mainly glycemic control to prevent diabetes complications to that of combined metabolic and cardiovascular risk factor control.

Based on the evidence that hypertension has been inadequately controlled in NS and that lowering blood pressure adequately can significantly reduce diabetes related macro and microvascular complications, NS DCs have an opportunity to improve the health of the population they are serving. This concern becomes even greater as the rates of type 2 diabetes are projected to continue to rise dramatically. The 2003 CDA Clinical Practice Guidelines⁷ and the 2004 Canadian Hypertension Education Program Guidelines⁸ have made clear and consistent evidence-based recommendations. Diabetes educators, working in a patient-centered team, aiming to lower blood pressure values to target should evaluate blood pressure in an accurate and standard way and report the values to physicians. It will be important to track blood pressure values aggregately to determine the need for targeted population interventions.

RECOMMENDATIONS

The following are recommendations to assist with blood pressure monitoring and education through NS DCs.

1. **Diabetes educators should measure the blood pressure of all persons seen in their DC at every visit* following standard technique (*see Appendix 1*).**
2. **Diabetes educators should report blood pressure findings to the referring physician who is responsible for the management of the person's hypertension. Highly elevated values should be reported by phone/fax (*see Appendix 2 for BP action algorithm*).**
3. **Diabetes educators should provide written and verbal blood pressure results to all persons with diabetes attending the DC. These results should be accompanied by recommended target values.**
4. **A variety of cuff sizes should be available in DCs to fit all arm sizes to accurately measure blood pressure in all persons.**
5. **DCs should ideally be provided with electronic blood pressure measuring devices for use in the DC to improve consistency, efficacy, and accuracy in blood pressure measurement, as well as standardize data collection.****
6. **Servicing/calibration of blood pressure machines by biomedical engineers must be done routinely (as per facility/district Quality Assurance standards) to ensure reliability.**
7. **Patient self-monitoring of blood pressure during a DC visit should be encouraged. Space should be allocated and electronic blood pressure measuring devices provided to facilitate self-assessment and self-reporting of blood pressure values.**
8. **All DCs should incorporate a community-based blood pressure education module focused on patient self-care, emphasizing appropriate lifestyle modification and community supports. This can be delivered at both facility and community levels.**
9. **The decision to implement home and/or ambulatory blood pressure monitoring is to be made by the family physician. (Refer to Appendix 3.)**

*As per the CDA 2003 Clinical Practice Guidelines.⁷

**As of October 2004, the approximate cost for an electronic measuring device, stand, and three cuffs of varying sizes was \$1,300 to \$1,500.

- 10. Diabetes educators will review aggregate blood pressure values from the DCPNS Registry data or other audit sources annually/semi-annually and implement additional program interventions as required to improve population values.**
- 11. In patients where blood pressure values remain above target, diabetes educators will communicate with the primary care physician or specialist and other team members to develop an individualized care plan.**
- 12. Diabetes educators should form partnerships with groups or services in the facility or community to introduce blood pressure initiatives. Patients should be provided with information on resources available to assist them with their blood pressure management.**

RATIONALE

The following are rationale for implementing the guidelines for blood pressure monitoring and education in NS DCs:

- These guidelines conform to the CDA Clinical Practice Guidelines⁷, as well as the Canadian Hypertension Education Program Guidelines.⁸
- There are minimal costs for District Health Authorities to implement the outlined recommendations.
- Treatment by non-pharmacologic and pharmacologic means will be started at an appropriate time if hypertension is detected and routinely reported. In the former, diabetes educators can play a major role in educating the person about blood pressure and its management.
- If treatment is effective, there is potential for decreasing the risk of cardiovascular disease and preventing or slowing down the progression of diabetic nephropathy and retinopathy; thus reducing costs to the individual and the health care system.
- By becoming aware of hypertension and the various treatment modalities, the person can be more involved in the management of this modifiable cardiovascular risk factor.
- Blood pressure data can be captured and trends monitored to assess effectiveness and target further initiatives where necessary.

It is noted that there is cost involved in purchasing blood pressure machines and cuffs in various sizes as well as space required for self-assessment of blood pressure. Also, measuring blood pressure requires the diabetes educator's time to assess, report, and follow up. However, once a routine is established, time may be reduced.

REFERENCES

1. American Diabetes Association. Treatment of hypertension in adults with diabetes. *Diabetes Care*. 2003;26(Supp1):S80-S82.
2. Wolf HK, Andreaou P, Bata IR, et al. Trends in the prevalence and treatment of hypertension in Halifax County from 1985-1995. *CMAJ*. 1999;161:699-704.
3. Joffres MR, Hamet P, MacLean DR, L'italien GJ, Fodor G. Distribution of blood pressure and hypertension in Canada and the United States. *AJH*. 2001;14:1099-1105.
4. 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.
5. Snow V, Weiss KB, Mottur-Pilson C, for the Clinical Efficacy Assessment Subcommittee of the American College of Physicians. The evidence base for tight blood pressure control in the management of type 2 diabetes mellitus. *Annals of Internal Medicine*. 2003;138(7):587-592.
6. Hansson L, Zanchetti A, Carruthers SG, et al. Effects of intensive blood-pressure lowering and low-dose aspirin in patients with hypertension: principal results of the Hypertension Optimal Treatment (HOT) randomized trial. *Lancet*. 1998;351:1755-1762.
7. Canadian Diabetes Association Clinical Practice Guidelines Expert Committee. Canadian Diabetes Association 2003 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. *Canadian Journal of Diabetes*. 2003;27(suppl 2):S1-S152.
8. Canadian Hypertension Education Program Task Force. *2004 Canadian Hypertension Education Program Recommendations*. Canadian Hypertension Society website: www.hypertension.ca.

APPENDIX 1

MEASURING BLOOD PRESSURE

The recommended technique for measurement of blood pressure, according to the 2004 Canadian Hypertension Education Program Recommendations is outlined below:

- Have the patient sit calmly for at least 5 minutes, his or her back well supported, and bare arm supported at the level of the heart. Feet should be flat on the floor and legs should not be crossed. The patient should be instructed not to talk prior to and during the procedure.
- Use a mercury manometer or a recently calibrated aneroid or a validated electronic device.
- Select an appropriate cuff size (see Table 1). The inflatable bladder must go around the arm and cover 80% of its circumference. The width of the cuff must be at least 40% of the circumference of the arm. Position the centre of the inflatable bladder directly over the brachial artery 2 to 3 cm above the antecubital fossa.
- *For assessment by auscultation:*
 - Inflate the cuff rapidly to 20 to 30 mmHg over systolic pressure, identified by the disappearance of the radial pulse. Stethoscope is placed over the brachial artery.
 - Deflate cuff 2 to 3 mmHg per second or heartbeat.
 - Note the systolic pressure when a clear sound is repeated (phase 1 of Korotkoff).
 - Note the diastolic value when the repeating sound disappears (phase V of Korotkoff). However, for children, the recommendation is to hold until phase IV when the sounds are muffled. For patients in whom the sound does not disappear, use phase IV as the reference. Record the blood pressure to the nearest 2 mmHg.
 - If inflation is required again, deflate quickly and wait 30 to 60 seconds to eliminate venous congestion as a source of reading errors.
 - If the Korotkoff sounds are weak, ask the patient to raise his or her arm and flex and extend his or her hand five to ten times; a new reading can be taken once the arm has been lowered.
- Take two blood pressure measurements 1 minute apart.

Reference:

Canadian Hypertension Education Program Task Force. 2004 Canadian Hypertension Education Program Recommendations. Canadian Hypertension Society website: www.hypertension.ca.

Table 1: Recommended Cuff Dimensions Based on Arm Circumference

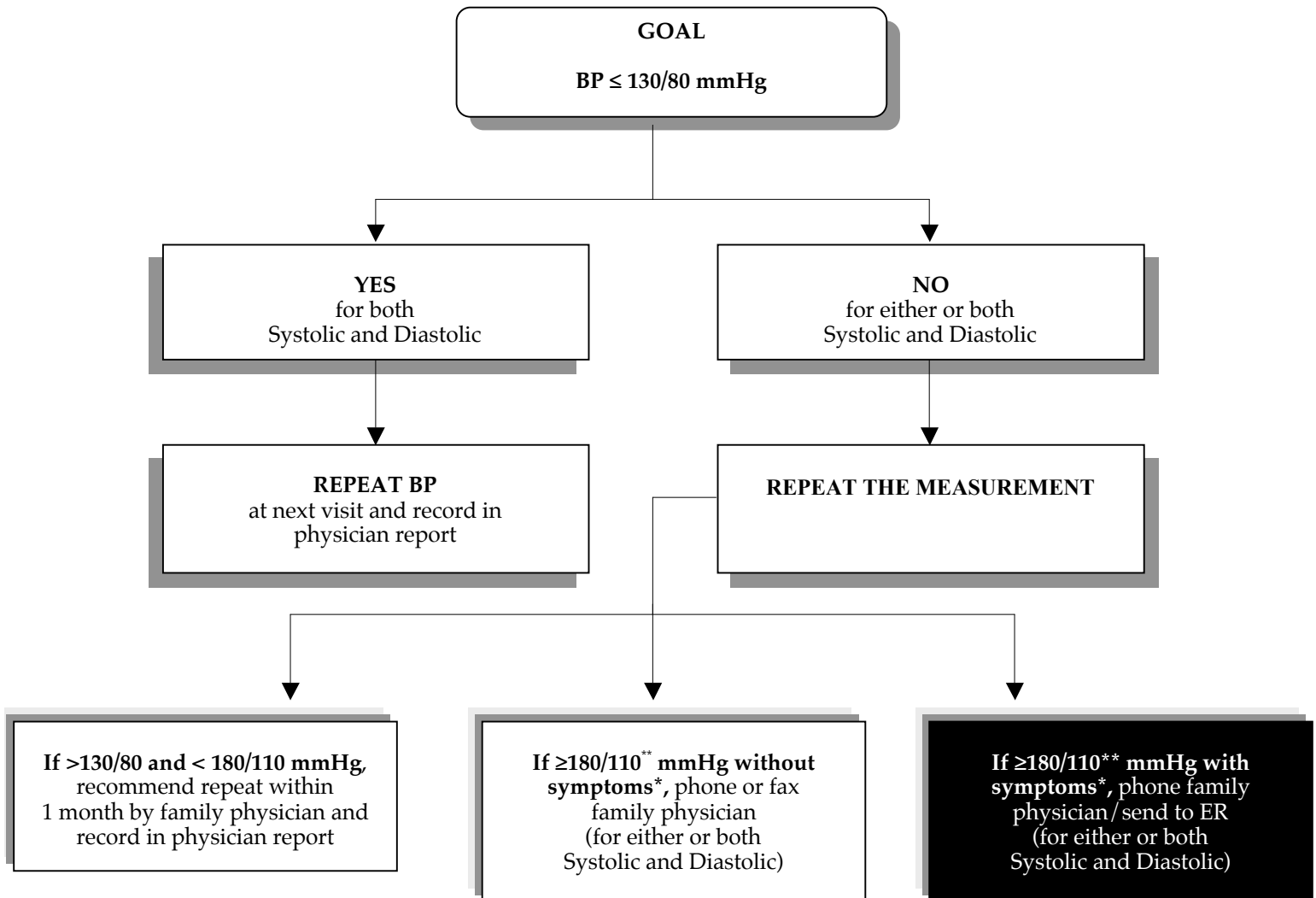
Circumference of Adult Arm (cm)	Size of Cuff (cm)
18 to 26	9 x 18 (standard child's model)
>26 up to 33	12 x 23 (standard adult model)
>33 up to 41	15 x 33 (large, obese)
> 41	18 x 36 (extra large, obese)

Adapted from: Drouin D, Milot A, eds. Hypertension Therapeutic Guide 2002. Quebec City: The Canadian Hypertension Society and The Quebec Hypertension Society; 2002.

The seated blood pressure is used to determine and monitor treatment decisions. The standing blood pressure is used to test for postural hypotension.

APPENDIX 2

DIABETES CENTRE ACTION ALGORITHM



NOTE:

- Encourage follow up with family physician for any elevated BP values.
- Provide reassurance to patient if BP values elevated; avoid alarming patient.
- *Symptoms may include (but are not limited to) headache, blurred vision, confusion, shortness of breath, chest pain, severe anxiety, nausea/vomiting.
- According to the Canadian Hypertension Society, hypertensive crisis is rare and BP values are usually $\geq 210/120$ mmHg.¹

^{**}Value derived from Canadian Hypertension Society classification of "severe hypertension" and the Mayo Clinic definition of extremely high blood pressure.

1. Drouin D, Milot A, eds. *Hypertension Therapeutic Guide 2002*. Quebec City: The Canadian Hypertension Society and The Quebec Hypertension Society; 2002.

*Differing reporting values may be determined at the facility or district level.
These values should be shared with local physicians.*

APPENDIX 3

HOME (SELF) MEASUREMENT OF BLOOD PRESSURE

The following guidelines have been adopted from the 2004 Canadian Hypertension Education Program Recommendations. Use these to reinforce the physician's decision to introduce home blood pressure monitoring.

1. The use of home blood pressure monitoring on a regular basis should be considered for patients with persistent, inadequately controlled blood pressure.
2. When white coat effect is suggested by self/home monitoring, its presence should be confirmed with 24-hour ambulatory blood pressure monitoring before making treatment decisions.
3. Patients should be advised to purchase and use only home blood pressure monitoring devices that are appropriate for the individual and have met the most recent standards of (i) the Association for the Advancement of Medical Instrumentation, (ii) the British Hypertension Society protocol or (iii) the International Protocol for Validation of Automated Blood Pressure Measuring Devices. Patients should be encouraged to use devices with data recording capabilities or automatic data transmission to increase the reliability of reported home blood pressure values.
4. Home systolic and diastolic blood pressure values above 136/or/83 mmHg respectively should be considered elevated and associated with an increased overall mortality risk analogous to clinic readings greater than 140/or/90 mmHg.
5. Health care professionals should ensure that patients who measure their blood pressure at home have adequate training; and if necessary, repeat training in measuring their blood pressure. Patients should be observed to determine that they measure blood pressure correctly and they should be given adequate information about interpreting these readings.
6. The accuracy of all individual patients' validated blood pressure measurement devices must be regularly checked against a device of known calibration.
7. Home blood pressure values for assessing white coat hypertension or sustained hypertension should be based on duplicate measures (morning and evening) for an initial 7-day period. Singular and first day home blood pressure values should not be considered.

Reference:

Canadian Hypertension Education Program Task Force. 2004 Canadian Hypertension Education Program Recommendations. Canadian Hypertension Society website: www.hypertension.ca.