National High Blood Pressure Prevention and Control Strategy

Report of the Expert Working Group

Health Canada
&
The Canadian Coalition for High Blood Pressure Prevention and Control

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ACKNOWLEDGEMENTS

Despite the establishment of the Canadian Coalition for High Blood Pressure Prevention and Control (Coalition) by Health Canada, in 1984, by the participation of all stakeholders concerned with hypertension (or high blood pressure), the control of this silent killer is very small. The situation analysis, in 1996, warranted a critical appraisal.

This led to the development of a national high blood pressure prevention and control strategy, which was readily embraced by the Coalition. An Expert Working Group was established in Fall 1996, and its members took on the challenge of compiling this strategy. Every one of the members listed in the Expert Working Group worked very hard to shape the strategy, based on scientific evidence, through substantial contributions to its content and through participation in numerous revisions.

We are very grateful to the Dr. Paula Stewart for synthesizing the information from the Expert Working Group's deliberations to formulate the final strategy paper. We appreciate her patience and continuous interaction with members of the Working Group to capture the ideas and nuances to make this as a workable strategy. The support of Ms. Jackie Kierulf by providing background research is gratefully acknowledged.

The development of this strategy was a partnership between Health Canada (through Adult Health Division, Health Promotion and Programs Branch and Laboratory Centre for Disease Control, Health Protection Branch) and the Coalition. The financial support provided by the Population Health Fund from the Health Promotion and Programs Branch, Health Canada was a significant contribution to develop and complete this strategy on time.

The Strategy has been reviewed by the Coalition's 34 member organizations. The Strategy is currently under review by the Council of Chief Medical Officers of Health (CCMOH).

While the Strategy is now ready, its full potential will be realized only if we can implement the steps outlined. The work has just begun and it requires the input of every one concerned.

Overall, though a challenging mission, the production of this Strategy was a most satisfying and pleasant experience. On a personal note, I appreciate the opportunity to Chair the Working Group. I thank each and every member of the Working Group, Dr. Paula Stewart and Ms. Jackie Kierulf for their contribution to the completion of this Strategy.

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NATIONAL HIGH BLOOD PRESSURE PREVENTION AND CONTROL

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INTRODUCTION

High blood pressure is one of the most common and important health problems facing Canadians. It is one of the main risk factors for heart disease, stroke, and kidney failure. Heart disease and stroke account for 37% of all deaths[1]. The mortality rates of heart disease and stroke have decreased in the past several years. This appears to be a result of a combination of factors, including a decrease in smoking and salt consumption, and improved treatment. Nonetheless, as the Canadian population ages, deaths due to these two diseases will increase unless further prevention efforts are undertaken now.

The prevention and control of high blood pressure would have a major impact on health, quality of life, disability, and death among Canadians. It would also reduce the need for health care expenditures for these diseases.

This report will review the scientific evidence that addresses high blood pressure prevention and control, summarize what is being done at the present time, and recommend a strategic plan to improve the Canadian situation. The plan will outline goals for blood pressure prevention and control for Canada, changes that are needed to achieve these goals, and strategies for bringing about the needed changes. While the focus is on the prevention and control of high blood pressure, it is important to place this initiative within a broader strategy for the prevention of stroke and heart disease.

The strategy that is outlined is based on a population health approach, whose goal is to ensure that the allocation of resources has the greatest impact on the reduction of morbidity and morality due to high blood pressure among the population as a whole[2],[3]. A population health approach assists in identifying what needs to be done to promote health, directing how this should be done, and determining whether the desired results were achieved.

Within a population health approach some interventions are directed at individuals, others at the environment in which they live, and others at the health system with the aim of making it work effectively and efficiently. Some of the interventions for individuals will be done within a clinical setting while others will be done in the workplace, school, or general community setting. An analysis of the needs of various sub-groups in the population ensures that programs will be responsive to varying characteristics such as age, income, education, language, and culture.

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[1] Heart and Stroke Foundation of Canada. *Heart Disease and Stroke in Canada*. Ottawa, Canada. 1997.
[2] Health Canada. *Federal/Provincial/Territorial Committee on Population Health - Final Report*. 1994.
[3] Rose G. *Strategy of prevention: lessons from cardiovascular disease*. BMJ 1981;282:1847-51.

Past Initiatives

In 1986, the report of a federal/provincial working group[4] recommended four basic strategies for the prevention and control of high blood pressure in Canada:

- Educate the public at large, professionals, and patients.
- Develop a system for detecting and bringing person with high blood pressure into care.
- Implement a multifaceted approach to population surveillance.
- Develop a system that will ensure that those diagnosed with high blood pressure are maintained under care though the necessary follow-up, recall, and other assistance with compliance.

The working group recommended the development of a mix of strategies and a variety of unique programs responsive to the needs of specific communities across the country but within a common framework. To facilitate the development of cooperation among the various parts of the health service system, two supporting strategies were recommended:

- Provide a mechanism for coordination and information exchange
- Develop the information and database required for planning, program development, and evaluation.

Since that report there have been several initiatives to address the challenge of high blood pressure prevention and control.

- Formation of the Canadian Coalition of High Blood Pressure Prevention and Control with membership including professional organizations, government, industry, and voluntary organizations.[5]
- Workshop on the "Epidemiology of High Blood Pressure in Canada" in Montreal, 1989.[6]
- "Heart Health Surveys" in every province from 1989 to 1992 to determine the prevalence of high blood pressure, individual awareness, and control.[7]
- "Heart Health Demonstration Projects" in most provinces.
- Consensus statements on recommendations for pharmacological and lifestyle treatment of high blood pressure to guide clinical decision-making.[8]
- Publication of guidelines on screening and treatment of high blood pressure among adults and seniors by the Canadian Task Force on the Periodic Health Examination.[9]

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[4] Canada. Health and Welfare Canada. Federal/Provincial Working Group on the Prevention and Control of High Blood Pressure in Canada. *The Prevention and Control of High Blood Pressure in Canada*, 1986.

[5] *Progress in Hypertension Control. Proceedings of the 9th Annual Scientific Meeting of the Canadian Coalition of High Blood Pressure Prevention and Control*. Suppl. 2. 1994; Can J Public Health, 1994; S1 p.

[6] *Proceedings of the Workshop on the Epidemiology of High Blood Pressure in Canada*, Montreal March 1 and 2, 1989.

[7] Joffres MR, Ghadirian P, Fodor JG, Petrasovits A, Chockalingam A, Hamet P. *Awareness, treatment, and control of hypertension in Canada*. Amer J Hypertens 1997;10:1097-102

[8] Ogilvie RI, Burgess ED, Cusson JR, Feldman RD, Leiter LA, Myers MG. Report of the Canadian Hypertension Society Consensus Conference: 3. *Pharmacologic treatment of essential hypertension*. Can Med Assoc J 1993;149(5):575-84.

In spite of all these initiatives high blood pressure continues to be one of the most important health problems in Canada.

Other countries have also identified high blood pressure as one of the critical health issues to be addressed. The World Health Organization convened an Expert Committee on High blood pressure Control in 1994[10]. This committee recommended "that a major long-term goal for all countries should be to eliminate preventable cardiovascular diseases in the young and middle-aged and to reduce them markedly in the elderly. To achieve this the Expert Committee recommends that control programs for high blood pressure be set up as part of a comprehensive strategy for the reduction of total cardiovascular risk. This strategy should include the prevention of high blood pressure by measures aimed at the reducing the blood pressure levels in the population as a whole, and the early identification and effective management of individuals with high blood pressure".

[9] The Canadian Task Force on the Periodic Health Examination. *The Canadian Guide to Clinical Preventive Health Care*. Canada Communication Group, Ottawa, Canada 1994;636-649, 944-953.

[10] World Health Organization (WHO) Expert Committee on High Blood Pressure Control. *Hypertension Control: Report of a WHO Expert Committee*. WHO, 1996:69, 72.

BACKGROUND

Definition

Blood pressure is distributed normally in the population with no real definition between people who are normotensive and those who are hypertensive.[11] In general, the higher the blood pressure the greater the risk of health problems. It is difficult to identify an absolute value over which risk increases because the risk is continuous. At lower levels of blood pressure, the presence of other risk factors for heart disease, such as smoking, increase the risk of disease.

In general, high blood pressure is defined as resting diastolic pressure persistently at or above 90 mm Hg after repeated measurements, or systolic blood pressure values of 140 mm Hg or greater[12]. Epidemiological studies have found an association between these levels and an increased risk of cardiovascular disease, and lowering blood pressure below these values is associated with a decreased risk of disease.[13] It is important to take several measurements over a six-month period because blood pressure can be transiently elevated[14].

The broad, normal distribution of blood pressure in the population has major implications for the prevention and control of high blood pressure in the population. First, it is important to reduce the blood pressure of the whole population in addition to the individuals with the highest levels. Although the risk is higher among this latter group, there are many more people in the population in the lower risk categories. Therefore, most of disease associated with high blood pressure occurs among people with borderline or mildly elevated blood pressure[15]. Second, whatever cut-off points are used to diagnose high blood pressure, there will be some people with levels below this that are at increased risk for heart disease. If the whole population is targeted to reduce the risk factors for elevated blood pressure then these people will not be missed.

Scope of High Blood Pressure in the Population

Heart Health surveys were conducted among adults 18 to 74 years of age in each province in the late 1980s and early 1990s[16]. They included in-home measurements of blood pressure on two occasions, followed by two clinic readings for those whose home readings indicated that they had high blood

[11] WHO:862.
[12] The Canadian Task Force on the Periodic Health Examination:636 – 647.
[13] Ibid.
[14] Ibid.
[15] Cook N, Cohen J, Hebert P, Taylor J, Henekens C. *Implications of small reductions in diastolic pressure for primary prevention*. Arch Intern Med 1995;155-701-9.
[16] Joffres et al.

pressure. The average of all four readings was used to assign the participant to the category of high or normal blood pressure.

Based on the Heart Health surveys, it is estimated that 22% of adult Canadians – 26% of men and 18% of women - are hypertensive. This may be an overestimate because the readings were not taken over a six-month period, the suggested period for diagnosing high blood pressure.

International estimates of prevalence of high blood pressure usually range from 10 to 20%[17]. Comparison among countries is difficult, however, due to the use of different methodologies and different diagnostic endpoints. Some countries use a systolic of 160 mm Hg to define high blood pressure.

In the Heart Health surveys, 13% of the population had been diagnosed with high blood pressure.[18] Of these, 28% were treated and controlled, 40% were being treated but were not controlled, and 33% were not treated and not controlled.

Nova Scotia is the only province that has repeated the Heart Health survey.[19] Their results showed an improvement, or reduction, in the prevalence of high blood pressure in the population. In 1995, 22% had high blood pressure or were on treatment for high blood pressure compared to 26% in 1986 ($p \leq 0.05$). The rates among women were 25% in 1995 compared to 29% in 1986, and 19% and 23%, respectively, among men.

The National Population Health Surveys (NPHS) conducted in 1994 and 1996 provide additional information about the prevalence of self-reported high blood pressure that was diagnosed by a physician.[20] In 1994 and 1996, 9% and 10% of the population aged 12 and up had been diagnosed with high blood pressure. This is similar to the 13% found in the late 1980s Heart health surveys with a slightly different population age range (18 to 74).

The proportion of the men and women who had been diagnosed with high blood pressure varied markedly by age (Table 1, Figures 1 and 2). In 1996, 28% of the men over age 65 were diagnosed with high blood pressure. This increased to 36% of the women in the same age group. In the mid-adult years (45 to 64) 15% of the men and 18% of the women had been diagnosed with high blood pressure. Part of the increased rate among women compared to men may be explained by the higher rate of screening for high blood pressure among younger women than among men (see Figures 18 and 19, page 42).

Recent American data suggests that the prevalence of hypertension in the native community ranges from 27% to 56%.[21] Hypertension has been linked to the increased incidence of diabetes, obesity

[17] WHO, p. 15.
[18] Joffres et al.
[19] Province of Nova Scotia, Heart Health Nova Scotia. *The Nova Scotia Health Survey 1995*. Nova Scotia, 1996.
[20] United States. Laboratory Centre for Disease Control. *Using National Population Health Surveys 1994-95, 96-97*: Health Share file.
[21] Howard BV. *Blood pressure in 13 American Indian Communities: The Strong Heart Study*. Public Health Reports, 1996,111(Suppl 2):47-48.

and smoking among the native community.[22,23] Any number of factors may be contributing to the high prevalence of hypertension, such as

- current management regimens that may not culturally appropriate,
- additional information and understanding about the condition may be required,
- management negotiations with the individual may be ineffective, or
- since follow-up in the First Nations people is more difficult, it may not be being done.

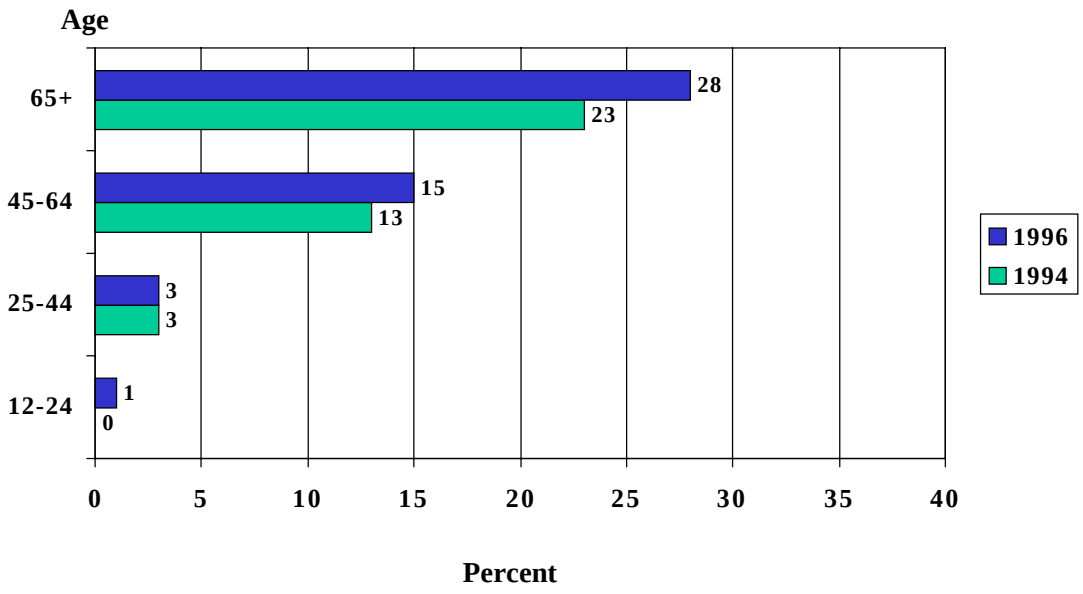
Continued hypertension detection and treatment efforts are needed for aboriginal peoples as for other groups,[24,25] but need to be culturally appropriate.[26,27]

Table 1 Proportion of Men And Women Reporting Diagnosis of High Blood Pressure by Physician, by Age and Sex, National Population Health Survey, 1994 –96.

Age group	1994	1996
Overall	9%	10%
25 – 44 years	3% Men, 3% Women	3% Men, 3% Women
45 – 64 years	13% M, 16% W	15% M, 18% W
65 + years	23% M, 33% W	28% M, 36% W

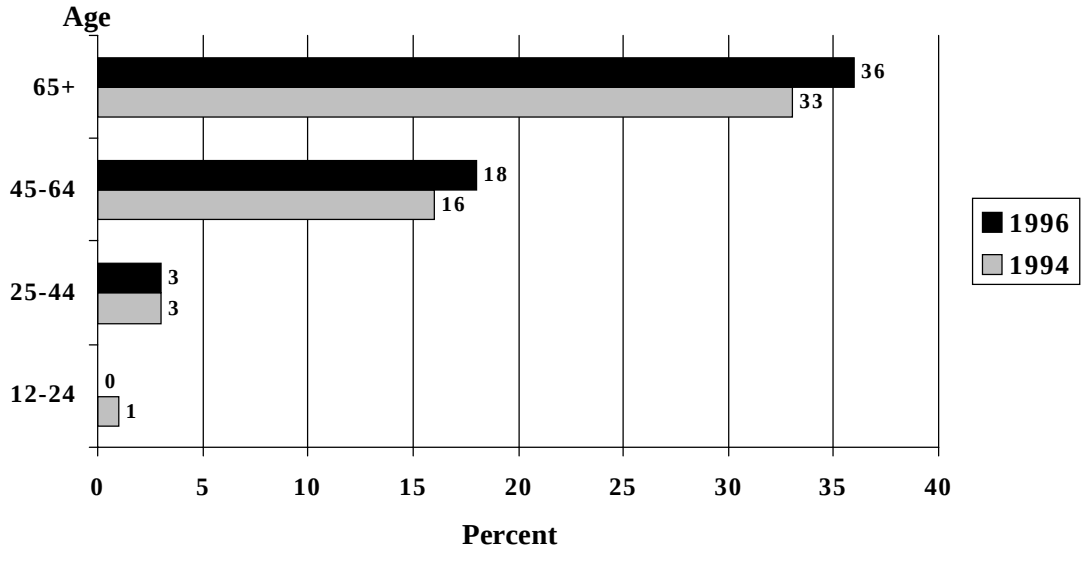
[22] McIntyre L & Shah CP. *Prevalence of hypertension, obesity and smoking in three Indian communities in Northwestern Ontario*. Can Med Assoc J 1986, 134(4), 345-349.
[23] Howard BV.
[24] Gillum RF. *The epidemiology of stroke in Native Americans.* Stroke 1995;26,514-521.
[25] Ellis JL & Campos-Outcalt D. *Cardiovascular disease risk factors in Native Americans: A literature review*. Am J Prev Med 1994;10(5),295-307.
[26] Glassbrenner K. *Seeking `Indian-acceptable' ways to fight hypertension*. JAMA 1995; 254(14), 1877-1878.
[27] MacMillan HL, MacMillan AB, Offord DR, Dingle JL (1996). *Aboriginal Health*. Can Med Assoc J;155(1), 1569-1577.

Figure 1: Proportion of men diagnosed with hypertension by age, Canada, 1994-96



Source: *National Population Health Survey:Health Share File; Statistics Canada, 1994/95, 1996/97.*

Figure 2: Proportion of women diagnosed with hypertension by age, Canada, 1994-96.



Source: *National Population Health Survey:Health Share File; Statistics Canada, 1994/95, 1996/97.*

Association of High Blood Pressure with Health Problems

Impact on Organs

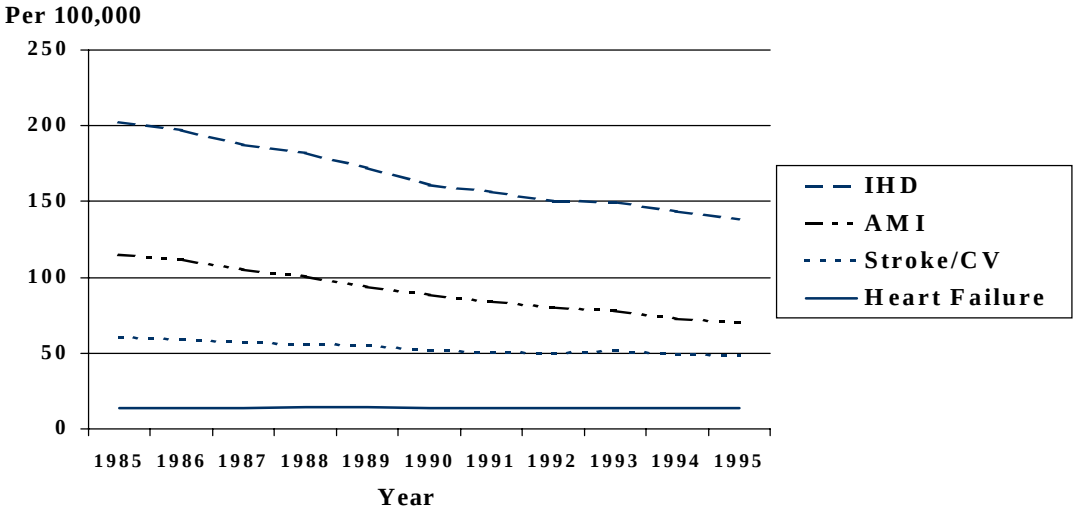
Untreated high blood pressure increases the risk of injury to large arteries, and smaller arteries and arterioles. This in turn results in damage to various organs[28].

- heart - angina, myocardial infarction, congestive heart failure
- brain - stroke, TIA, hypertensive encephalopathy
- eyes - retinal hemmorrhages and exudates with or without papilloedema
- kidney - renal failure
- vessel - aneurysm, arterial occlusive disease

Impact on Mortality

Cardiovascular diseases caused 37% of deaths in 1995[29]. The mortality rates for the four leading causes of cardiovascular death associated with high blood pressure – acute MI, heart failure, ischemic heart disease and stroke/cerebrovascular disease – have been decreasing from 1985 to 1995 (Figure 3). The death rates for men are higher for ischemic heart disease and MI, but are higher for women for stroke (Figure 4). These four diseases are also important causes of early mortality before age 65 (Figure 5).

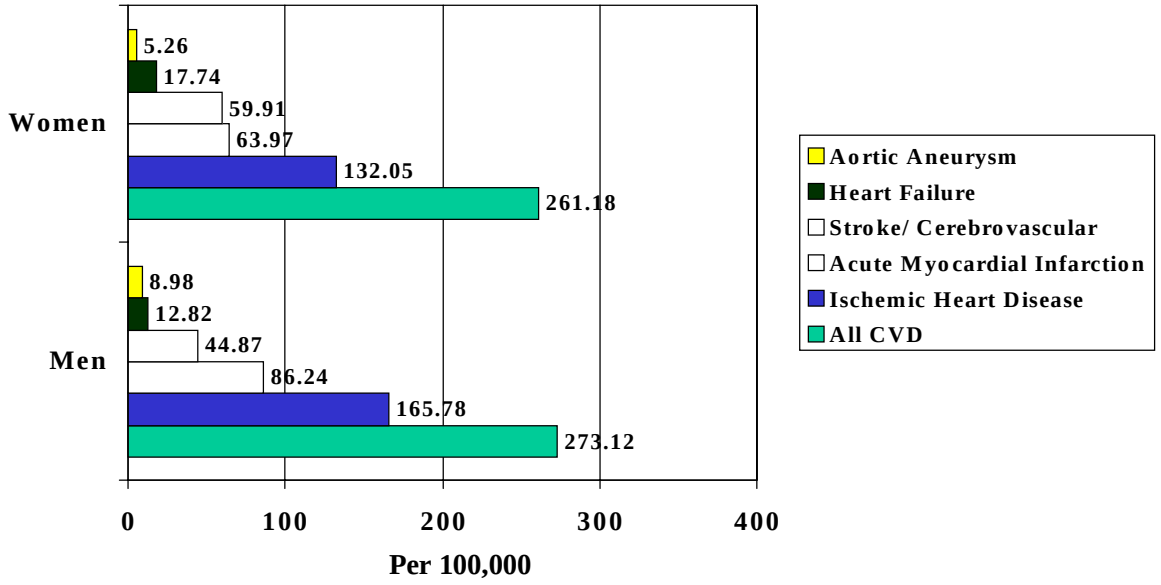
Figure 3: Mortality over time, both sexes combined, all ages, Canada, 1985-1995. (Age-standardized rate per 100,000 to both sexes, Canada, 1991)



Source: *Surveillance On-line, 1998 LCDC, Health Canada; Statistics Canada*

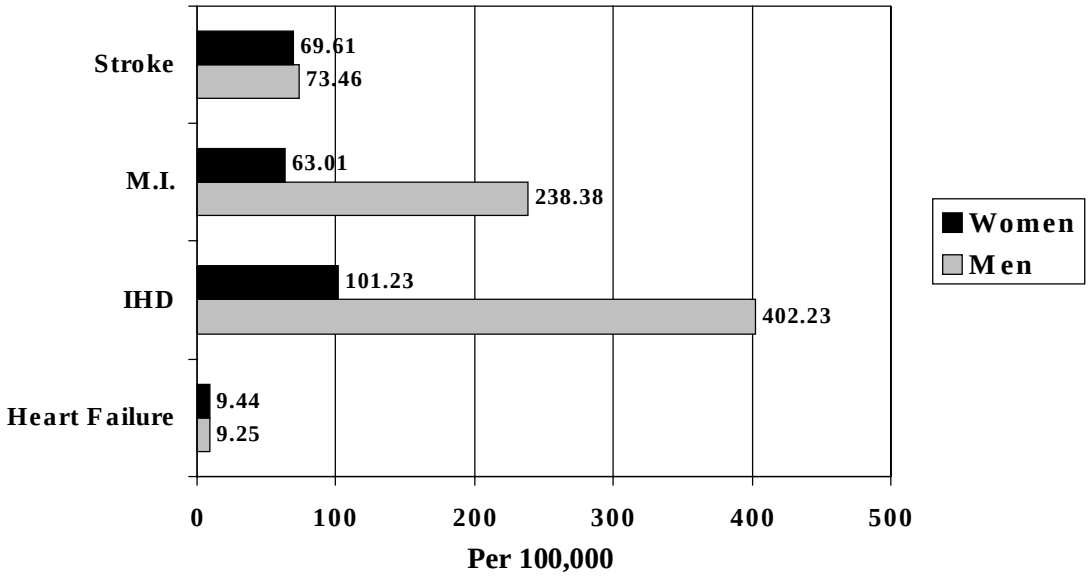
[28] WHO:27.
[29] Heart and Stroke Foundation of Canada. Op cit.

Figure 4: Crude mortality rate by cardiovascular disease by sex, all ages, Canada, 1995.



Source: *Surveillance On-line, 1998, LCDC, Health Canada, Statistics Canada*

Figure 5: Potential years of life lost before age 65 by disease and sex, Canada, 1996.



Source: *Statistics Canada*

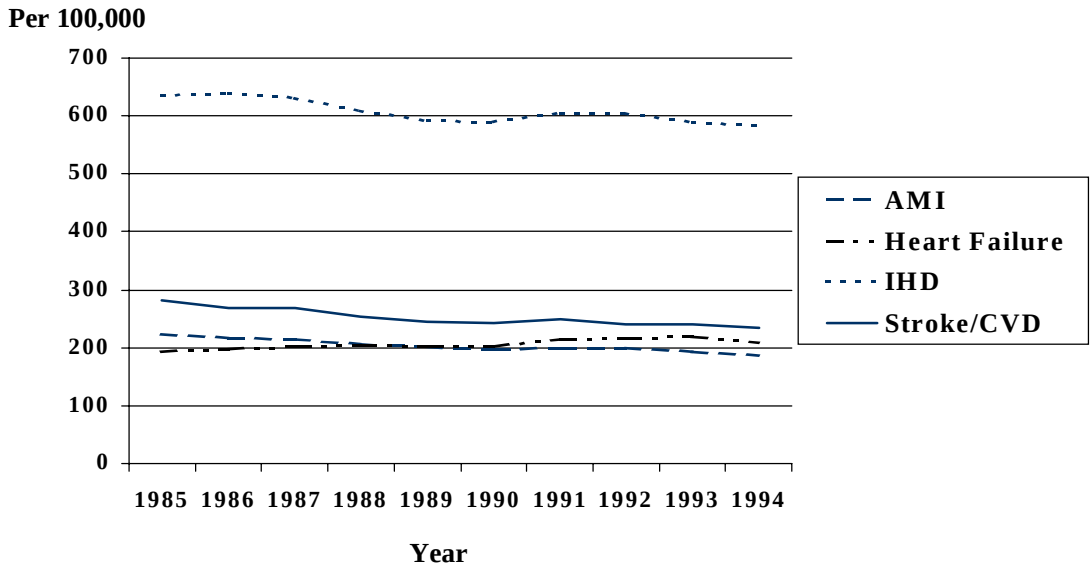
Impact on Health Care

Cardiovascular disease is the leading cause of hospital admissions for men and the second highest for women.[30] Admissions for acute MI, heart failure, ischemic heart disease, and stroke were decreasing in the late 1980s but this decrease appears to have slowed in the 1990s (Figure 6).

Hospitalization rates increase with age for all four diseases (Figures 7 –10). The distribution of acute MI and ischemic heart disease includes much younger people than does the distribution of stroke and congestive heart failure. Younger men are also more likely than women to have been hospitalized for MI and ischemic heart disease.

In 1995, cardiovascular disease accounts for $7.4 billion or 16.7% of direct health care costs[31]. These costs include hospital visits, visits to physicians, research, and drug costs.

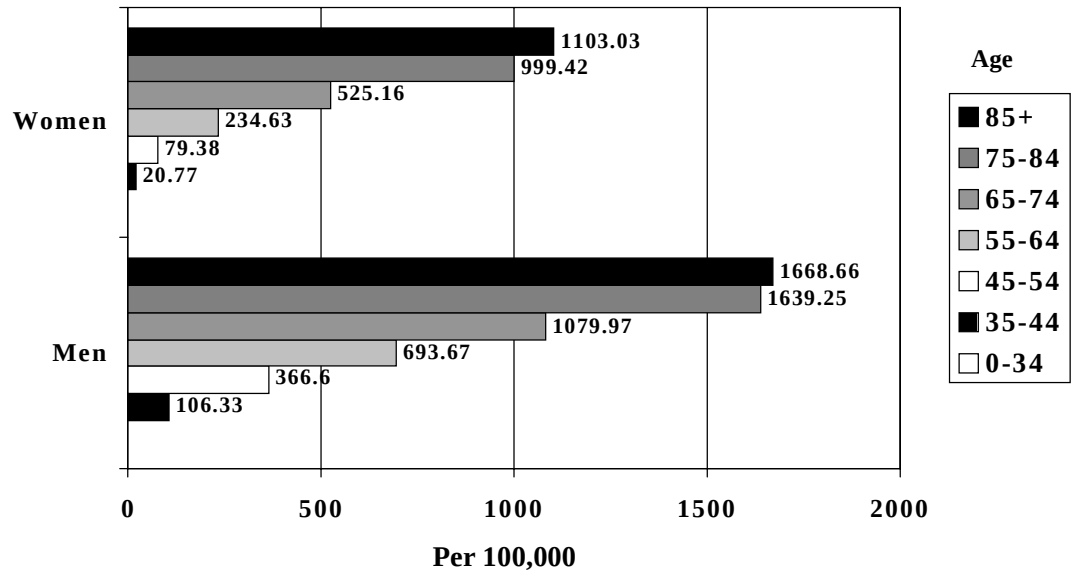
Figure 6: Hospital separations over time, both sexes combined, all ages, Canada, 1985-1994. (Age-standardized to both sexes, Canada, 1991)



Source: *Surveillance On-line, 1998 LCDC, Health Canada; Statistics Canada*

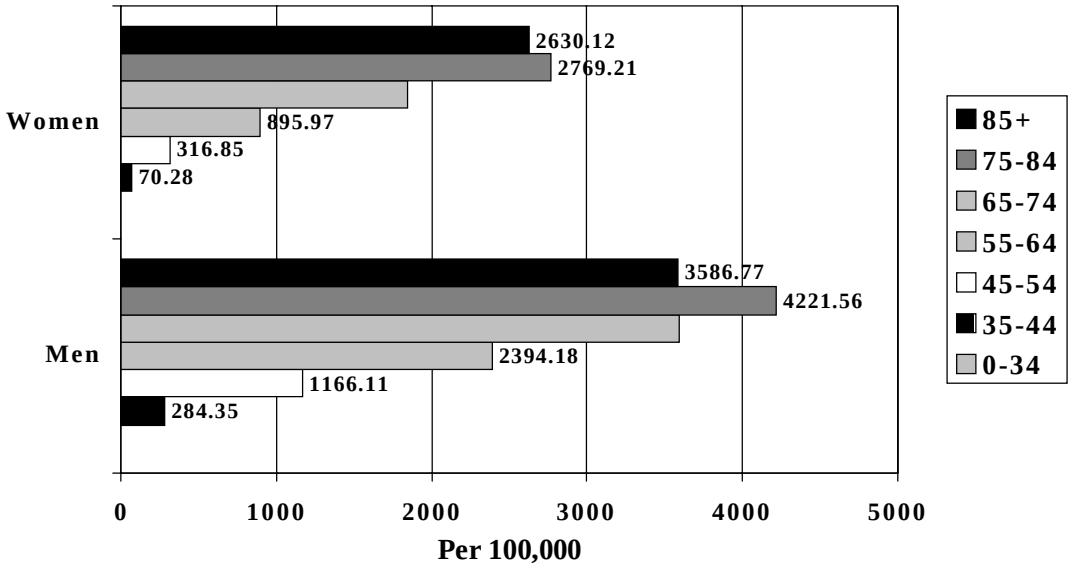
[30] Ibid.:35.
[31] Ibid.

Figure 7: Hospital separation for acute myocardial infarction by age group and sex, Canada, 1994.



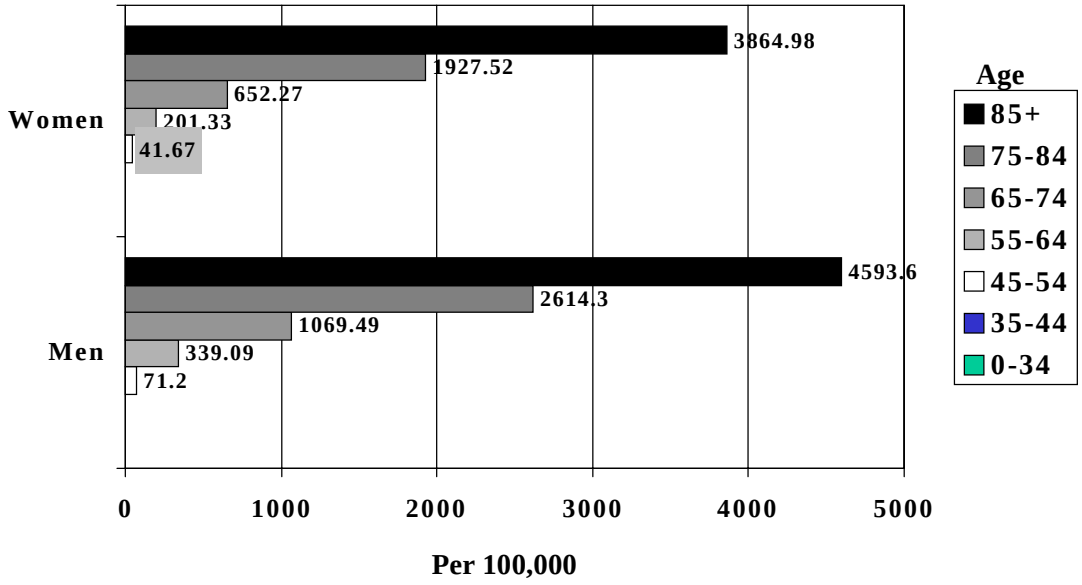
Source: *Surveillance On-line, 1998, LCDC, Health Canada; Statistics Canada*

Figure 8: Hospital separations by age group and sex, ischemic heart disease, Canada, 1994.



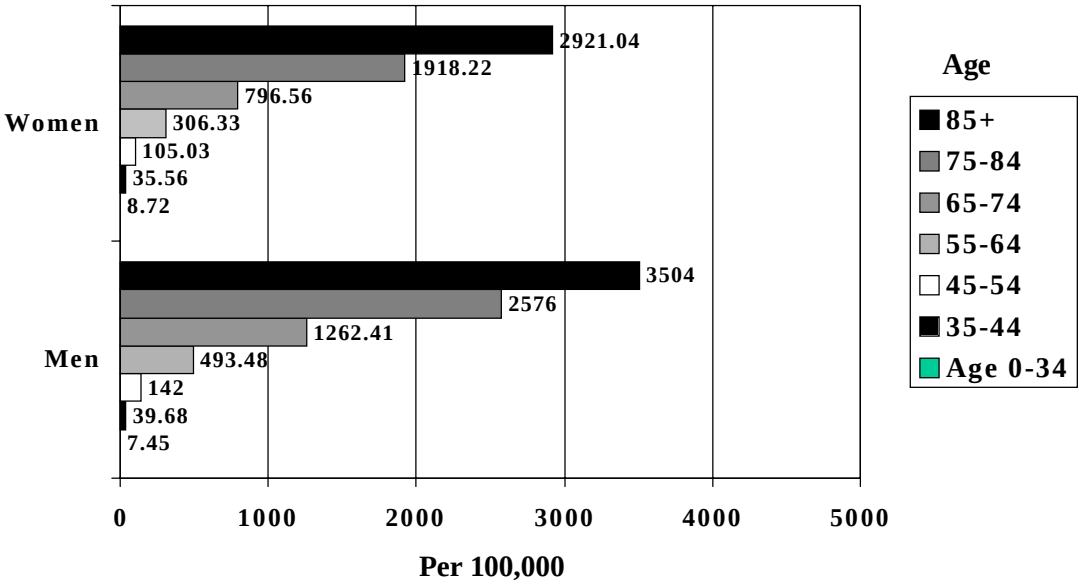
Source: *Surveillance On-line, 1998 LCDC, Health Canada; Statistics Canada*

Figure 9: Hospital separations congestive heart failure, by age group, Canada , 1994.



Source: *Surveillance On-Line, 1998 LCDC, Health Canada, Statistics Canada*

Figure 10: Hospital separations stroke/cerebrovascular disease, by age group, Canada, 1994.



Source: *Surveillance On-Line, 1998 LCDC, Health Canada; Statistics Canada*

Impact on Individuals, Families and the Community

High blood pressure has a major impact on individuals and their families. From a psychological perspective, when individuals who feel well are told that they have a health problem that puts them at increased risk for serious heart, vessel, stroke, and kidney disease, they find it difficult making the necessary lifestyle changes. They may be told to lose weight, exercise, change their diet, or stop smoking for example, and may be required to take medication for the rest of their lives. These medications may be expensive and have side effects.[32] It is not surprising, then, that many individuals find it difficult to make and sustain these changes while feeling well.

Cardiovascular disease, of which high blood pressure is a contributing factor, affects both men and women during their work lives. It is the second most important cause of loss productivity ($12.3 billion).[33] Therefore, high blood pressure has a major impact on loss of productivity due to illness or disability, and the loss of future earnings because of premature death.

[32] Feldman R et al. *Adherance to pharmacologic management of hypertension*. Dept. of Medicine, University of Western Ontario, 1998.
[33] Ibid.

Potential for Prevention of High Blood Pressure

1. Address Underlying Medical Causes of High Blood Pressure

In 1 to 5% of all cases of high blood pressure, the cause is related to an underlying medical problem.[34] Therefore, the diagnosis and treatment of the underlying condition causing high blood pressure is an important element in an overall control strategy. There should be a search for, and treatment of, any of the following potential causes of high blood pressure

- drugs
- renal disease
- endocrine disorders
- coarctation of the aorta and aortitis
- pregnancy
- neurological disorders
- surgery

2. Reduce Risk Factors for High Blood Pressure in the Population

Risk Factors

Given that only a small proportion of high blood pressure is associated with an underlying disease, there is great scope for the prevention of the onset of high blood pressure. Research has identified several factors that are associated with an increased risk of high blood pressure[35],[36]. Cigarette smoking is not specifically associated with high blood pressure but the combination of high blood pressure and smoking puts an individual at high risk for heart disease and stroke.

[34] WHO:p. 22.
[35] Campbell et al. *Lifestyle modifications to prevent and control hypertension: 1. Methods and an overview of the Canadian recommendations.* CMAJ 1999;160 (9 Suppl):S1-S6.
[36] WHO:13-20.

Table 2 Risk Factors for High Blood Pressure

Modifiable factors/conditions	Non-modifiable factors
Excess weight (BMI > 25)	Family history
Central obesity	Age
Lack of regular physical activity	Ethnicity
Heavy alcohol use ($\geq$ 14 drinks per week for men, and $\geq$9 /week for women)	
Excessive salt intake	
Lack of diet with high fibre, fruit, vegetables, and low saturated fat	
Inadequate dietary intake of calcium and potassium	
Stress and coping response	
Low socio-economic status	
Low birthweight	

Excess Weight

Being overweight is defined as having a body mass index of greater than 25 and less than 27 and obesity is a body mass index of 27 or greater.. Excess weight is associated with a two- to six-fold increase in the risk of developing high blood pressure.[37,38] The proportion of high blood pressure attributable to obesity is between 30 to 65% because it is so prevalent in the population.[39]

There is evidence that central obesity, a waist to hip measurement of greater than 1, is associated with a higher risk of high blood pressure[40]. In a sub-set of the population a combination of factors are associated with high blood pressure, including central obesity, insulin resistance, hyperinsulinemia, glucose intolerance, and dyslipidemia. This syndrome is more frequent among individuals from Southeast Asia and aboriginal Canadians and Americans.

[37] Leiter et al. *Lifestyle modifications to prevent and control hypertension. 2. Recommendation on obesity and weight loss.* CMAJ, 1999;160(a Supp):S7-S12.
[38] WHO:17
[39] Ibid.
[40] WHO:18

Healthy Diet

A diet that is high in fibre, fruit, and vegetables and low in saturated fat is associated with a lower blood pressure among individuals with mild or borderline high blood pressure[41]. Therefore it is reasonable to expect that this same diet might be effective in preventing the onset of high blood pressure. Canada's Food guide provides advice on a healthy diet[42].

Physical Inactivity

Individuals with an inactive lifestyle (less than 20 minutes of moderate physical activity at least four times a week) have a 20 to 50% increased risk of developing high blood pressure than their active counterparts[43]. Regular aerobic physical activity that achieves a moderate level of physical fitness lowers blood pressure. In addition, a healthy diet combined with physical activity is the best way to maintain a healthy weight.

Canada's recent "Physical Activity Guide to Healthy Active Living" provides advice on the type and amount of physical activity that is needed.[44] The emphasis in the guide is on the development of a daily active lifestyle rather than a regimen of intense episodic physical activity. This is a more realistic goal because it requires fewer resources and a smaller adjustment in lifestyle. By increasing the fitness level of the whole population, the rate of high blood pressure in the population as a whole will decrease.

Heavy Alcohol Consumption

Heavy alcohol consumption is associated with an increased risk of high blood pressure[45,46,47]. Consuming more than two drinks a day definitely puts an individual at risk. It is estimated that about 5% to 10% of high blood pressure can be attributed to heavy drinking[48].

It is difficult to make recommendations about safe levels of drinking alcohol because there is a curvilinear relationship between the levels of alcohol consumption and the risk of mortality from heart disease[49]. Those who drink even one drink a day may be at higher risk than those who drink once per week.[50] However, individuals who do not drink alcohol are at higher risk for heart disease than are individuals who consume one drink of alcohol a day.

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[41] Appel LJ et al. *A clinical trial of the effects of dietary patterns on blood pressure*. N Engl J Med 1997;336:1117-1124.
[42] Canada. Health Canada. *Canada's Food Guide*.
[43] WHO:19
[44] Canada. Health Canada. *Canada's Physical Activity Guide to Healthy Active Living*. 1998
[45] Stamler R. *Implications of the INTERSALT study*. Hypertension 1991:17:1:1017-1020.
[46] Canadian Coalition for High Blood Pressure Prevention and Control.
[47] Beilin LJ, Puddey IB, Burke V. *Alcohol and hypertension - kill or cure?* J of Human Hypertension 1996;10:2:51-55.
[48] Ibid
[49] Ibid.
[50] WHO:19.

Canadian Low Risk Drinking Guidelines suggest that healthy adults, who chose to drink, should limit alcohol to two or fewer drinks per day with consumption not exceeding 14 standard drinks in men per week and 9 standard drinks per week in women[51].

Stress and Coping Response

Acute mental stress increases blood pressure in the short-term[52]. More research is needed to determine if these transient increases in blood pressure cause long-term changes in blood pressure. Research on the effects of long-term stressors on the development of high blood pressure is also lacking. Stress is a difficult issue to study, however, because its effect on an individual is determined not only by the stressor itself, but also by his/her coping response.

The biologic basis for the role of stressors in the development of high blood pressure is well known. Stress leads to an increase in catecholamine levels. Elevated catecholamine levels are associated with the presence of essential high blood pressure[53].

Stress does have a role to play in the adoption of the other lifestyle factors that are associated with an increased risk of high blood pressure – obesity, heavy alcohol use, and lack of physical activity[54]. It is also a critical factor associated with smoking.[55] Therefore, it is important to identify the underlying causes of stress, remove them where possible, and assist people to develop effective stress management skills.

Excessive Salt Intake

There has been tremendous debate about the role of salt reduction in the preventing the onset of high blood pressure. A recent review of the research evidence by the Canadian Coalition for High Blood Pressure Prevention and Control found that the effect of a salt restricted diet on the reduction of blood pressure is very small, if it exists at all, among healthy adults[56]. However, even a small reduction in blood pressure (1 mm Hg) across the whole population could have a small but important reduction in mortality from stroke (3%) and cardiovascular disease (2%).[57] Therefore, they recommend avoiding excessive intake of salt by choosing foods low in salt, avoiding foods high in salt (such as pre-prepared foods), refraining from adding salt at the table and in cooking, and choosing low sodium foods in restaurants. Another strategy would be to reduce the salt intake of the population as a whole by adopting food industry policies or legislation limiting the salt that can be added to prepared food. About 75% of salt that is

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[51] Campbell NRC et al. *Blood pressure and alcohol: the evidence and recommendations*. For Canadian Coalition for High Blood Pressure Prevention and Control, 1997.
[52] WHO:20
[53] Ibid.
[54] Canada. Statistics Canada, *National Population Health Survey Overview 1994-95*.
[55] WHO:48.
[56] Fodor JG, Whitmore B, Leenen F, Larochelle P. *Lifestyle Modifications to Prevent and Control Hypertension: 5. Recommendations on dietary salt.* CMAJ 1999;160(9 Suppl):S29-S34.
[57] Stamler J et al. *Findings of the International Cooperative INTRERSALT Study*. Hypertension 1994;17(Suppl):I17-20

ingested is attributable to salt that is added to prepared food as both a taste enhancer and a preservative.[58]

Low Socio-economic Status

Lower socio-economic conditions may contribute to an increased risk of high blood pressure through an increased prevalence of the behavioural risk factors, such as excess weight and lack of physical activity, or through the challenges of coping with the stress associated with daily living[59]. It will be important to address these factors in the population to ensure that the gap between individuals in the population does not widen.

Summary of Recommendations for Risk Factors

The Canadian Coalition for High Blood Pressure Prevention and Control has recently made the following recommendations for lifestyle modifications to prevent high blood pressure[60].

- All adults should attain and maintain a healthy body mass index.
- Alcohol consumption should be in accordance with Canadian low-risk drinking guidelines (that is, healthy adults should limit alcohol consumption to 2 drinks or fewer per day, and consumption should not exceed 14 standard drinks per week for men and 9 standard drinks per week for women).
- All adults should be encouraged to participate in regular, moderately intense (40% to 60% of maximal oxygen consumption) physical activity for 50-60 minutes, 3 or 4 times per week.

Intervention Programs

Health promotion research has identified that strategies need to be directed at both individuals and families, and the environments in which they live. For example, the promotion of physical activity will involve education of individuals to increase knowledge about the positive benefits and what is required for moderate physical activity. It will also involve organizations and governments creating a supportive environment for physical activity such as walking trails and bike paths. Another example is the reduction and management of stress. This will involve helping people develop effective coping strategies but also will involve the reduction of stressors such as the lack of adequate affordable housing.

Individuals and organizations within the population will be at different stages of readiness to adopt new health behaviours[61]. Therefore, programs will have to be targeted at the various stages of change among individuals, health service providers, and organizations:

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[58] United States. US Department of Health and Human Services. National Heart, Lung and Blood Institute. *Implementing recommendations for dietary salt reduction.* National High Blood Pressure Prevention Education Program, 1996.

[59] MacDonald S et al. *Multiple cardiovascular disease risk factors in adults.* CMAJ 1992; June 1 Suppl:48-56.

[60] Campbell et al. *Lifestyle modifications to prevent and control hypertension: 1. Methods and an overview of the Canadian recommendations.* CMAJ 1999;160 (9 Suppl):S1-S6.

- pre-contemplation – not aware of the need for change.
- contemplation – considering making a change.
- readiness for action – actively preparing to make the change (preparation).
- behaviour change (action).
- maintenance - continuing the new behaviour.

In order to promote a healthy lifestyle, many intervention strategies will be needed. The Health Promotion Charter outlines five strategies to assist individuals to adopt a healthy behaviours[62]

- Personal skill development to assist individuals to adopt and maintain healthy behaviours.
- Healthy public policy to address the underlying conditions associated with health such as poverty, and to create supportive environments for healthy behaviours.
- Create supportive workplace, school, and community environments to make healthy choices easier.
- Encourage community action to advocate for healthy public policies and to provide opportunities for community members to help each other.
- Re-orient health services to increase preventive health care including education on healthy behaviours and to ensure that programs/services are accessible, effective, and efficient.

It is critical that communities adopt a coordinated approach involving all the possible sectors and community members. For many communities, these interventions are grouped as a Heart Health Program for children, youth and adults[63]. Heart Health programs that take a broad community-wide approach with multiple partners and interventions have been able to reduce risk factors in the population.[64,65]

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[61] Prochaska JO, Di Clemente CC. *Stages and process of self-change of smoking: Toward an integrative model of change*. J Consulting and Clinical Psychology 1983;51:3:390-395.
[62] World Health Organization (WHO). *Ottawa Charter for Health Promotion*. Ottawa, Canada, 1986.
[63] Stachenko, Sylvie. *The Canadian Heart Health Initiative: a countrywide cardiovascular disease prevention strategy*. J Hum Hypertens 1996;10(Suppl.):S5-S8.
[64] Fortmann et al. *Community intervention trials: reflections on the Stanford Five City Project Experience.* Am J Epidemiol 1995;142:6:576-586.
[65] Puska P et al. *The North Karelia Project – 20 Year Results and Experiences.* Helsinki University Printing House, Helsinki, Finland, 1995.

Present Canadian Situation

1. Prevalence of Risk factors

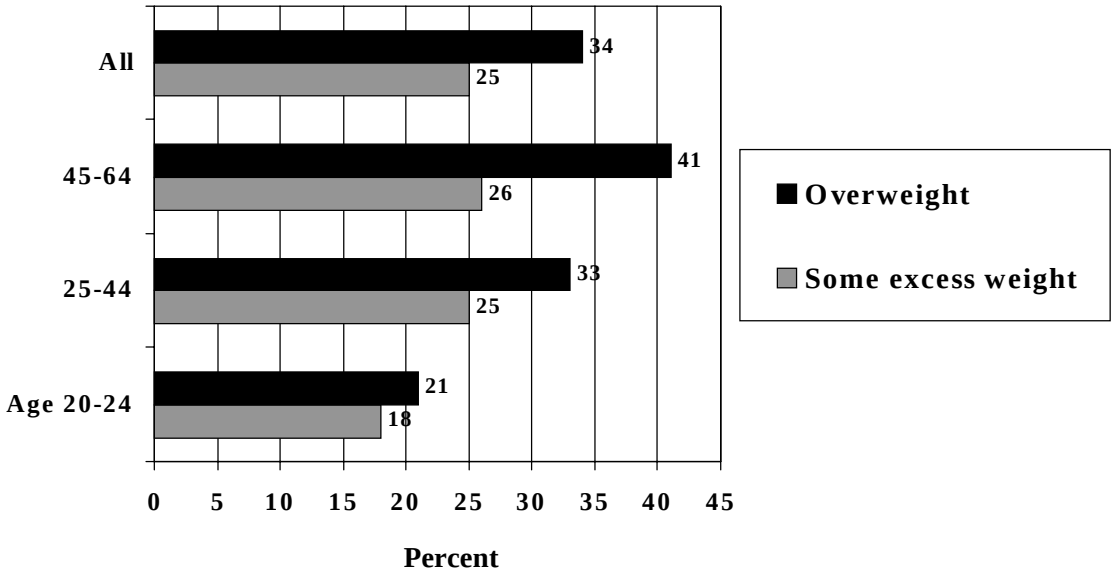
The National Population Health Surveys provide estimates of the prevalence of some of the health behaviours associated with high blood pressure (Table 3). The prevalence of all three lifestyle risk factors increases with age. A greater proportion of men than women are overweight at all ages (Figure 11,12). More than half the population over age 25 are physically inactive[66] (Figure 13, 14). Men and women have similar rates of inactivity until the age of 65 when women become less active than men of the same age group. Daily intake of alcohol is much higher among men than women and is higher among those over age 45 (Figure 15, 16).

Table 3 Prevalence of Risk Factors among Canadians Age 12 and Older, National Population Health Survey, 1994 and 1996.

Risk Factor	**1994** (% of population)	**1996** (% of population)
Some excess weight or overweight - BMI $\geq$25 (aged 20-64, excludes pregnant women)	48%	48%
Heavy alcohol use (men > 14 drinks/wk, women > 9 drinks/wk)	-	5%
Lack of physical activity	58%	57%

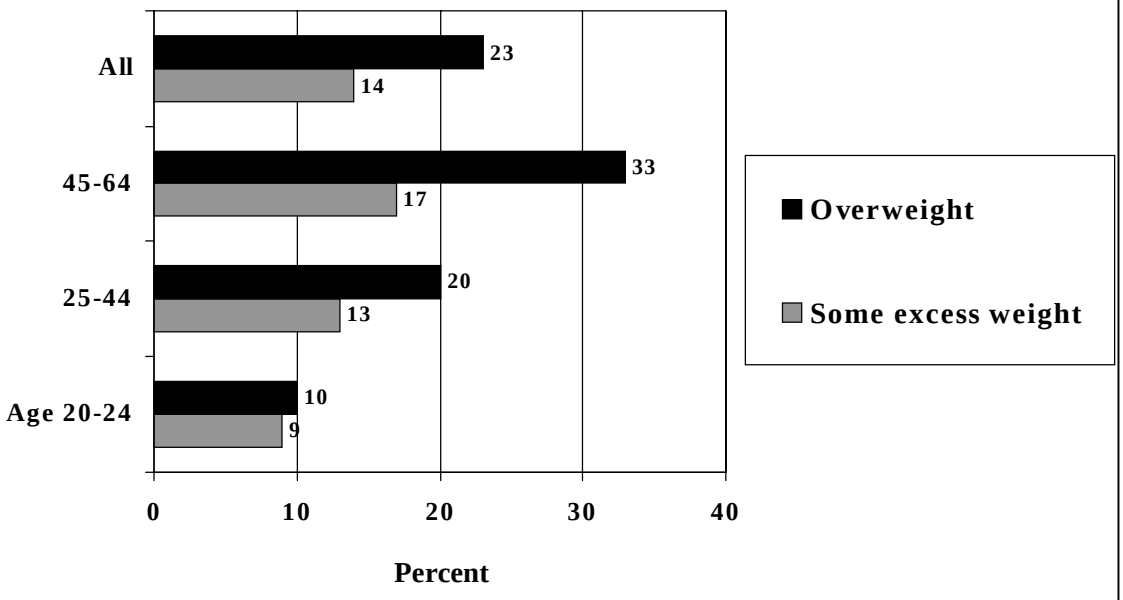
[66] Definition of physical inactivity from NPHS – The Energy expenditure (EE) was calculated for each person based on their reported leisure time activities. An estimated EE below 1.5 kcal/day are considered physical inactive. Statistics Canada. *National Population Health Survey Overview 1994-95*:13.

Figure 11: Proportion of men who have some excess weight (BMI 25-27) or who are overweight (BMI > 27), by age, Canada, 1996.



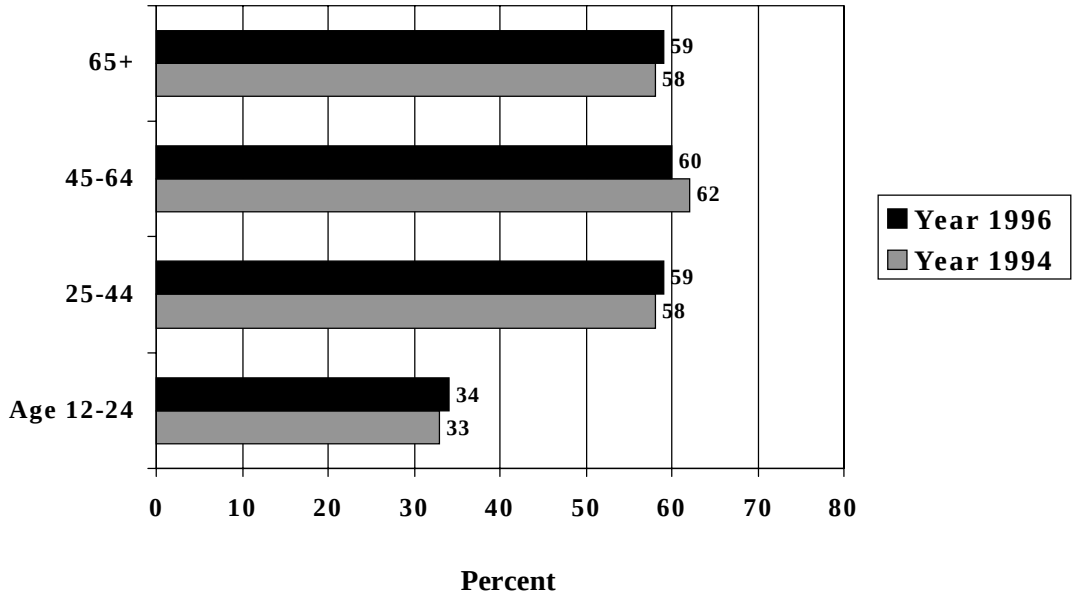
Source: *National Population Health Survey:Health Share File; Statistics Canada, 1994/95, 1996/97.*

Figure 12: Proportion of women who have some excess weight (BMI 25-27), or who are overweight (BMI>27), by age, Canada, 1996.



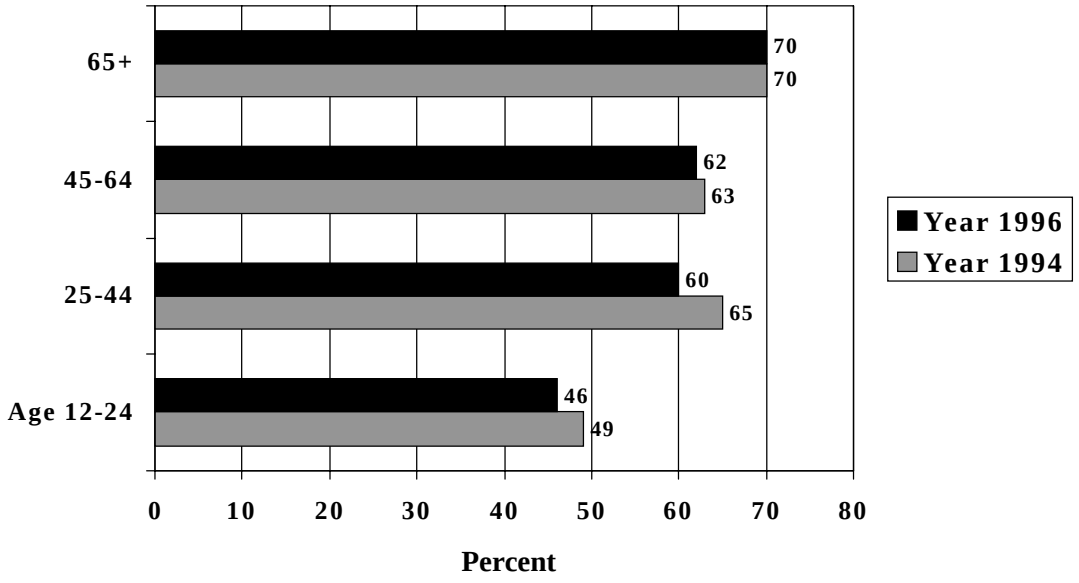
Source: *National Population Health Survey:Health Share File; Statistics Canada, 1994/95, 1996/97.*

Figure 13: Proportion of men physically inactive by level of activity and age, Canada, 1994 and 1996.



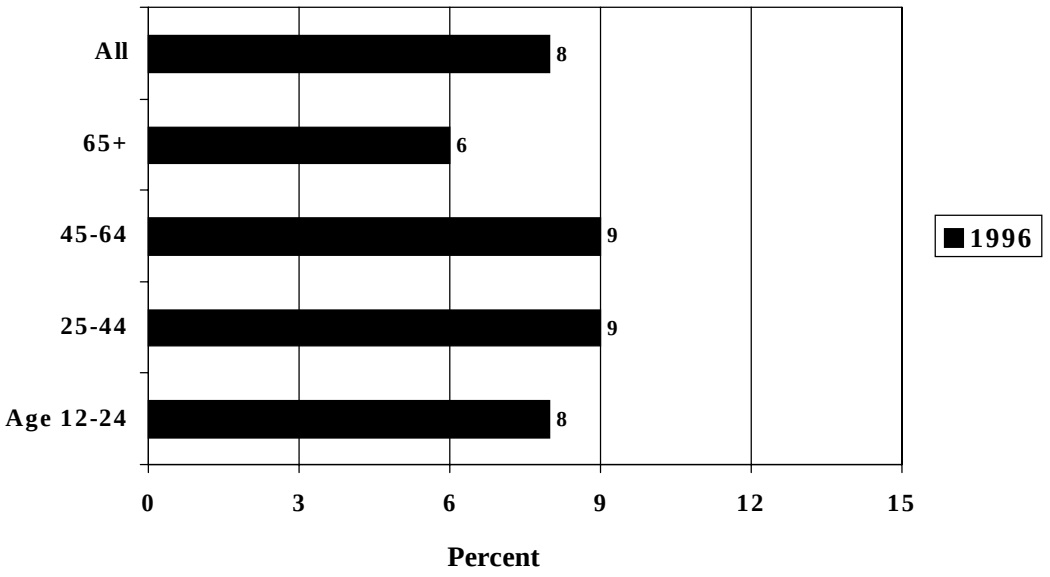
Source: *National Population Health Survey:Health Share File; Statistics Canada, 1994/95, 1996/97.*

Figure 14: Proportion of women physically inactive by level of activity and age, Canada, 1994 and 1996.



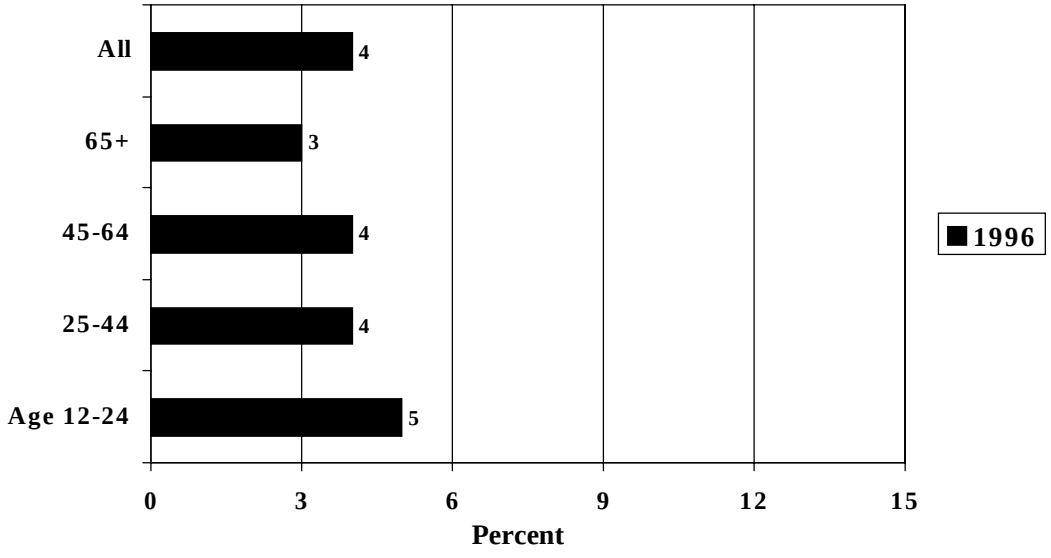
Source: *National Population Health Survey:Health Share File; Statistics Canada, 1994/95, 1996/97.*

Figure 15: Proportion of men drinking 14 or more drinks per week, by age, Canada, 1996.



Source: *National Population Health Survey:Health Share File; Statistics Canada, 1996/97.*

Figure 16: Proportion of women drinking 9 or more drinks per week, by age, Canada, 1996.



Source: *National Population Health Survey:Health Share File; Statistics Canada,1996/97.*

2. Interventions

The public health sector provides health promotion programs in schools, workplaces, and the general community. Some primary health service providers include health education in their practice. The voluntary sector provides research support, fund raising, social marketing, information, and health promotion programs. Governments fund health promotion and prevention services, conduct social marketing campaigns, advocacy, policy development and implementation, and provide support for pilot projects and the development of resources.

There are several Heart Health programs in communities across the country.[67] These focus on smoking, nutrition, physical activity, stress, blood pressure, and determining blood lipid measurements. They are supported by a wide variety of organizations including public health, voluntary organizations, food industry, business, health care providers, schools, and workplaces. They use a variety of approaches including social marketing, advocating for healthy policies, education, community action, and creating supportive workplace, school and community environments.

The Canadian Heart Health Initiative, established in 1986-87, organized a countrywide cardiovascular disease prevention strategy.[68] This initiative is currently studying methods to develop a comprehensive strategy for the reduction of total cardiovascular risk. Demonstration Heart Health programs have been implemented in communities. These include education for the general public and health professionals, worksite programs, school health programs, and the development of healthy public policy. To assist in the planning and implementation of community intervention programs, a national database containing Canadian and provincial risk factor profiles from a cardiovascular risk factor survey was established. Follow-up data evaluating the health impact of these intervention projects, however, has only been reported by the province of Nova Scotia.[69]

There are many education resources to assist individuals in adopting healthy behaviours. For example, Health Canada has published guides to healthy eating and healthy physical activity.[70,71] They have recently collaborated with the College of Family Physicians and the Heart and Stroke Foundation of Canada to produce a guide to promoting heart healthy behaviours in the office setting. The Heart and Stroke Foundation of Canada has been very active in the development and dissemination of programs and resources to promote healthy behaviours among children and the general public.

[67] Stachenko S.
[68] Ibid.
[69] Province of Nova Scotia, Heart Health Nova Scotia.
[70] Canada. Health Canada. *Canada's Food Guide.*
[71] Canada. Health Canada. *Guide to Active Living.*

Gaps in Prevention of Hypertension

There are several important factors that have limited the success of prevention programs to date.

- First, a low proportion of health care resources (1 to 2% of the health care budget) is allocated to the promotion of healthy behaviours among Canadians. This limits the impact programs can have on the population as a whole.
- Second, the most common mode of delivering primary health service is not the optimum one for promoting healthy behaviours among Canadians. Physicians on a fee-for–service model of payment, provide most primary health service in Canada. They express frustration in lifestyle counseling because of the payment schedule, lack of skills and time, and the low yield of behaviour change[72,73]. Psychologists, nutritionists, nurses, and other service providers could assist in promoting healthy behaviours but they are usually not publicly funded. Some provinces have other primary health service models with interdisciplinary teams and physicians on salary. Primary health service reform is being discussed in all provinces at this time. It will be critical that the models proposed facilitate the delivery of individual and family service that support the adoption of healthy behaviours.
- Third, the environment could be more supportive of the adoption of healthy behaviours. For example, opportunities for physical activity vary tremendously from community to community. The provision of walking and bike paths and access to in-door recreation facilities at a reasonable price can facilitate the adoption of regular physical activity. The promotion of thinness among young women distorts a normal body image and contributes to low self-esteem and obesity in later life. Promoting the acceptance of a personally-defined healthy weight and body image would help alleviate this problem.
- Fourth, there is a lack of public policy and legislation to support the adoption of healthy behaviours. For example, there is no limit on the amount of salt that can be added to prepared foods. There is also no requirement that all food be labelled to indicate contents. No universal policy requiring that all students in elementary and high school have regularly scheduled time for physical activity is in place at this time.
- Fifth, there is a lack of attention paid to minimizing the profound impact of poverty and low education (there is a high correlation between the two) on the adoption of a healthy lifestyle. People who have had less education are more likely to have risk factors for high blood pressure and heart disease[74].
- Sixth, there is a lack of information on the effectiveness of prevention programs. There are several reasons for the lack of research evidence. The dominant research methodology to assess clinical interventions – the randomized clinical trial - is very

[72] McAlister EA et al. *Survey of clinician attitudes and management practices in hypertension.* J Hum Hypertension 1997, July;11(7):413-419.
[73] Smith HE, Herber CP. *Preventive practice among primary care physicians; relation to recommendations of the Canadian Task Force on the Periodic Health Examination.* CMAJ 1993; 149(12):1795-1800.
[74] MacDonald S et al.

difficult, expensive, and sometimes impossible to implement in the community setting. Interventions that lend themselves to clinical trials may not be the most effective because they do not build on the energy and support that comes from a more dynamic, less structured approach. Lifestyles are influenced by social factors that are not very amenable to randomized controlled trials. Program evaluation needs to be built into every health promotion and prevention program.

- Seventh, there is a lack of ongoing, timely, population information at the community/regional, provincial/territorial, and national levels to monitor the progress in reducing risk factors associated with high blood pressure. Saskatchewan is the only province with plans to conduct an ongoing survey.[75] The only national survey with risk factor information is the National Population Health Survey. This survey is conducted every two years and it takes about 18 months to two years before the data is available. As well, it is a longitudinal study of a cohort of Canadians and therefore is not designed as a surveillance system. The methodology to collect data on blood pressure is also weak because there are no in–person measurements for high blood pressure, and height and weight..

Summary

A good base for an effective high blood pressure prevention program exists at this time in Canada. Research has identified specific behaviours that could reduce the risk of high blood pressure. There is a good understanding of what influences behaviour change and the need for a supportive environment. There are education resources available to support healthy behaviours. Finally, and most importantly, there are organizations committed to promoting these behaviours in the population. They have been working in a collaborative way in community-based programs for several years.

While the present prevention programs provide a good base, there is a need for expanded activity to have a significant impact on the prevention of high blood pressure.

- Community-based Heart Health programs that encourage healthy diet, healthy weight, regular physical activity, and stress management provided in a collaborative way with public health, community health centers, voluntary organizations, schools, workplaces, food industry, community members, and others, need to be expanded in workplace, school and community settings. A specific link needs to be made between the benefits of adopting these healthy behaviours and the prevention of the onset of high blood pressure.
- All health care providers need to provide education on healthy behaviours as part of regular primary health service. Guidelines for clinical practice and education resources need to be provided to facilitate this practice. The education of health care professionals needs to include prevention knowledge, attitudes, and skills. The newer models of

[75] Butler-Jones D. *Personal Communication*. Department of Health, Saskatchewan, 1999.

primary health service need to consider how to facilitate a more prominent role for a variety of prevention activities in primary health services.

- Additional resources should be allocated to prevention programs at the community level.
- Program evaluation should be included in all health promotion and prevention programs. This will require allocation of funding for this activity and the linkage of evaluators with program planners and managers. University and other researchers need to work in concert with service providers to add to the knowledge base.
- The non-health sector needs to be actively involved in creating supportive environments for physical activity, healthy eating, avoidance of heavy alcohol consumption, avoidance of excessive salt consumption, and stress reduction.
- Ongoing surveillance of the prevalence of risk factors in the whole population and in various sub-groups is needed to monitor progress. The dissemination of this information to policy makers and program managers would encourage its use in policy and program planning.

Potential for Control of High Blood Pressure

Early Detection of High Blood Pressure

The early detection and treatment of high blood pressure is associated with a decreased risk for health problems associated with high blood pressure.[76] However, the symptoms of high blood pressure that would cause an individual to seek care do not appear until the later stages when end-organ damage has already occurred. Therefore, there is a role for screening for high blood pressure

According to Last's Dictionary of Epidemiology "Screening tests sort out apparently well persons who probably have a disease from those who probably do not. A screening test is not intended to be diagnostic. Persons with positive or suspicious findings must be referred to their physician for diagnosis and necessary treatment"[77]. When screening is done by a clinician as part of clinical care the term "casefinding" is often used[78].

A screening test can be correct or it can produce false positives – the test is positive, but the person doesn't really have high blood pressure – or false negatives – the test is negative but the person really does have high blood pressure. For this reason, it is critical to use high quality tests performed by well-trained personnel and to ensure that the screening program is part of a larger program with referral for diagnosis and treatment.

The screening test for high blood pressure is a blood pressure measurement taken on the arm after five minutes of rest with the individual in the sitting position using a blood pressure assessment device that has been carefully calibrated. [79] The mercury sphygmomanometer is the instrument of choice because of its accuracy and dependability. The appropriate cuff size must be used to increase accuracy. The blood pressure can be taken by an individual or by a machine. The person taking the blood pressure must be adequately trained to position the cuff on the arm and to interpret the sounds heard as the cuff is deflated.

There are many possible errors associated with a single blood pressure reading. Such factors as the tool itself, the technique of the person doing the assessment, and the environment in which it is taken can contribute to an inaccurate measure. In addition, an individual's blood pressure fluctuates over time. Therefore, it is critical that a positive screening blood pressure measurement be followed

[76] Heenkins CH. *Lessons from Hypertension Trials*. Amer J of Med 1998;104 (6A):50S-53S.
[77] Last JM. *A Dictionary of Epidemiology*. Oxford University Press, 1995:152-153.
[78] Riegelman RK, Stone AW, Kallenberg GAH. *Screening for Disease Control. In Putting Prevention into Practice.* Ed.: Riegelman and Povar. Little Brown and Company, 1988:29.
[79] The Canadian Task Force on the Periodic Health Examination. *The Canadian Task Force on the Periodic Health Examination: the Canadian Guide to Clinical Preventive Care*. Canada Communication Group, Ottawa, Canada, 1994:637

up with further assessments done with well trained personnel and well calibrated instruments to confirm the presence or absence of high blood pressure.[80]

There are important ethical issues involved in screening programs. When an individual is told of the possibility of a health problem, he/she individual may become anxious and concerned. There is some evidence that this is a problem for individuals labelled as hypertensive[81]. Therefore, it is essential that the screening method minimizes the false positives and that there is prompt follow-up, including counselling, for those who have been labelled from the screen as having possible high blood pressure.

The Canadian Task Force on the Periodic Health Exam recommends that all adults over the age of 20 have regular blood pressure assessments to detect high blood pressure, based on evidence of the efficacy of treatment for high blood pressure in this age group[82]. They state that there is insufficient evidence to recommend case finding in younger individuals.

The World Health Organization recommends that all adults have their blood pressure taken bi-annually[83]. If the blood pressure at the initial screen is between 130-140 systolic or between 85-90 diastolic, then the blood pressure should be rechecked in one year. If the blood pressure is over 140 systolic or 90 diastolic then the individual should be assessed further for high blood pressure.

The ideal place for taking blood pressure is in the primary health service setting where the appropriate follow-up can be instituted[84]. There is general concern among the medical community that physicians are not screening for high blood pressure as often as they could. This concern was supported in a 1994 study of hospital-based family medical centres[85]. These were teaching centres where one might expect a higher level of preventive practice than in the general community. Before the intervention, 60% of individuals had been screened for high blood pressure. After educational sessions with physicians, the screening rates increased to 79%. Another Canadian study found that screening rates increase with the use of a reminder system, incentives, and the use of medical assistants[86].

A recent article entitled "Putting Prevention into Practice" emphasizes that care providers need to know both specific prevention practices, and how to create the office environment that would support them[87]. They suggest that the key components are:

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[80] Haynes RB, Lacourciere Y, Rabkin SW, Leenen FHH, Logan AG, Wright N, Evans E. *Report of the Canadian Hypertension Society Consensus Conference: 2. Diagnosis of hypertension in adults*. Can Med Assoc J 1993;149(4):409-18.

[81] Alderman MH, Lamport B. *Labeling of hypertensives: a review of the data*. J Clin Epidemiol. 1990;43:195-200.

[82] The Canadian Task Force on the Periodic Health Examination:636,944.

[83] WHO:32.

[84] Logan AG. *Screening for High blood pressure in Young and Middle-Aged Adults.* Periodic Task Force

[85] Aubin et al. *Effectiveness of a program to imporve hypertension screening in primary care.* CMAJ 1994;150:4:509-515.

[86] Bass M, McWinney IR, Donner A. *Do family physicians need medical assistats to detect and manage hypertension?* Can Med assoc J 1986;134:1247-1255.

[87] Elford RW et al. *Putting prevention into practice.* Health Reports 1994;6:1:142-153.

- a practice prevention coordinator,
- clear prevention-related job descriptions for all providers,
- an information management system that reinforces prevention, and
- a practice feedback and problem solving strategy.

Other possible sites for high blood pressure screening are in the workplace, shopping centers, pharmacies, and other places that enable access to many people. The advantage of holding screening programs at these sites is in their ability to reach people who do not visit their physician and therefore would not be screened in any other way. There are several challenges associated with screening in these settings, however. These include the need to ensure the quality of assessments with well calibrated instruments, that individuals who screen positive go for further assessment, and that the number of false positives is minimized to decrease unnecessary visits to the physician. These are costly to both the health system and the individual (in terms of lost time at work or home).

Screening in the workplace can indeed reach people. In one Ontario study, 66% of blue collar workers came forward for screening[88]. Of those who were screened, 12.5% screened positive (diastolic blood pressure $\geq$ 90 mm Hg or were on medication for high blood pressure). Of these, one-third were unaware they might have high blood pressure. About half the group (58%) saw their physician for further assessment within 40 days of the screening and most had seen their physician by the end of the first year after screening (87%).

Further analysis of the group found that only 0.9% of the screened workers who had a diastolic blood pressure reading of $\geq$ 90 mm Hg, were unaware of previous high blood pressure, and had not seen a doctor in the previous two years. This suggests that if everyone were to be screened for high blood pressure when they visited a physician's office (for whatever reason), workplace screening programs would be of minimal added value.

The Ontario study and others[89] show that collaboration between the health sector and industry is possible for health promotion and screening programs. The challenge is to identify the most effective way to capitalize on the expertise, access, and resources of each.

Present Canadian Situation

The Canadian Heart Health Surveys in the late 1980s found that 42% of people with high blood pressure (greater than 140 systolic or 90 diastolic averaged on four occasions or on medication for high blood pressure) were unaware that they had high blood pressure[90]. This means that about 9% of the population (42% of the 22% of the population with high blood pressure) have undetected high blood pressure. Of those with undetected high blood pressure, 61% were in the 35 to 64 year old

[88] Ellis E, Koblin W, Irvine MJ, Legare J, Logan AG. *Small, Blue Collar Work Site Hypertension Screening: A cost-effectiveness study*. JOM 1994;36:3:346-355.
[89] Shoveller, JA, langille DB. *Cooperation and Collaboration between a Public Health Unit and Midsized Private Industry in Health Promotion Programming: The Polymer Heart Health Program Experience*. CJPH 1993;84:3:170-173.
[90] Joffres.

age group, 27% were in the 65 to 74 year old age group, and a small proportion (12%) were in the 18 to 34 year old age group.

Table 4 Proportion of Participants with High Blood Pressure Who Were Unaware That They Had High Blood Pressure, Heart Health Surveys, Canada, 1986-90.

	Proportion Unaware of Their High Blood Pressure	
Age Group	**Men**	**Women**
18-34	64%	19%
35-64	43%	36%
65-74	45%	36%
All	47%	35%

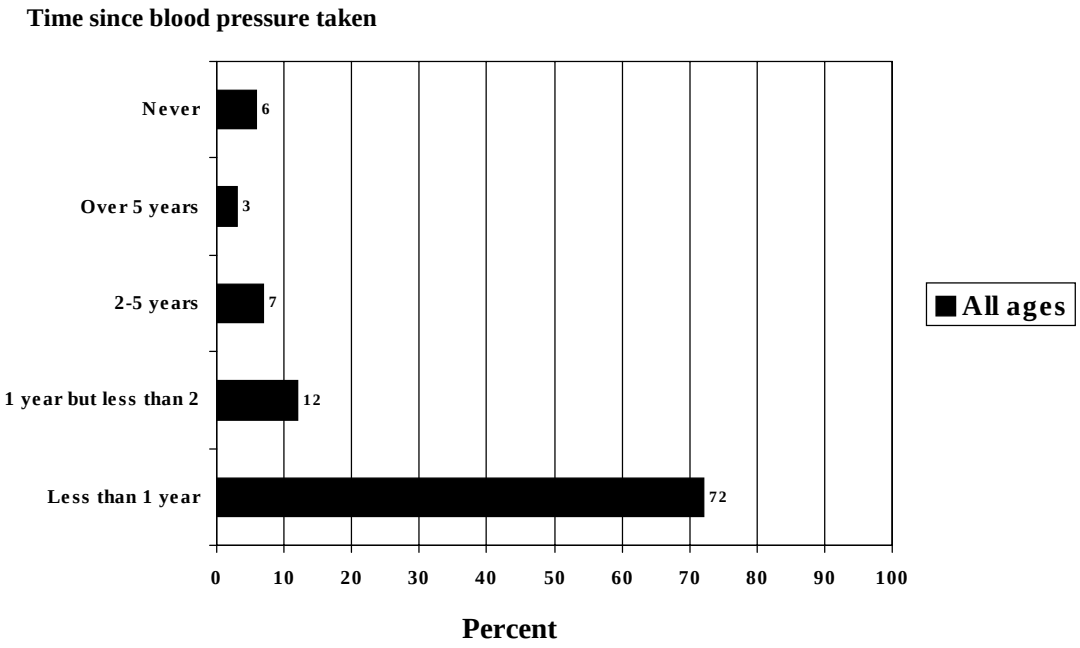
The low rates of awareness high blood pressure could be the result of any of the following reasons:

- Individuals are not going for blood pressure assessment
- Physicians are not interpreting correctly and following-up blood pressure assessments.
- Individuals have been told they have high blood pressure but have forgotten or did not understand the implications. These people were not on medication for their high blood pressure.

The first reason points to a need to improve awareness among both the general public and primary health service providers of the necessity of screening for high blood pressure. The latter two reasons suggest that physicians need to improve their clinical practice and their methods of communicating with individuals.

According to the National Population Health Survey, 1996, a high proportion of adults have had their blood pressure taken in the previous year (72%) or between one to two years previously (12%) (Figure 17). This means that overall about 84% of the population have had their blood pressure assessed in the previous two years – the minimal Canadian guideline.

Figure 17: Proportion of population who have had blood pressure taken, by time since it was taken, Canada 1996.



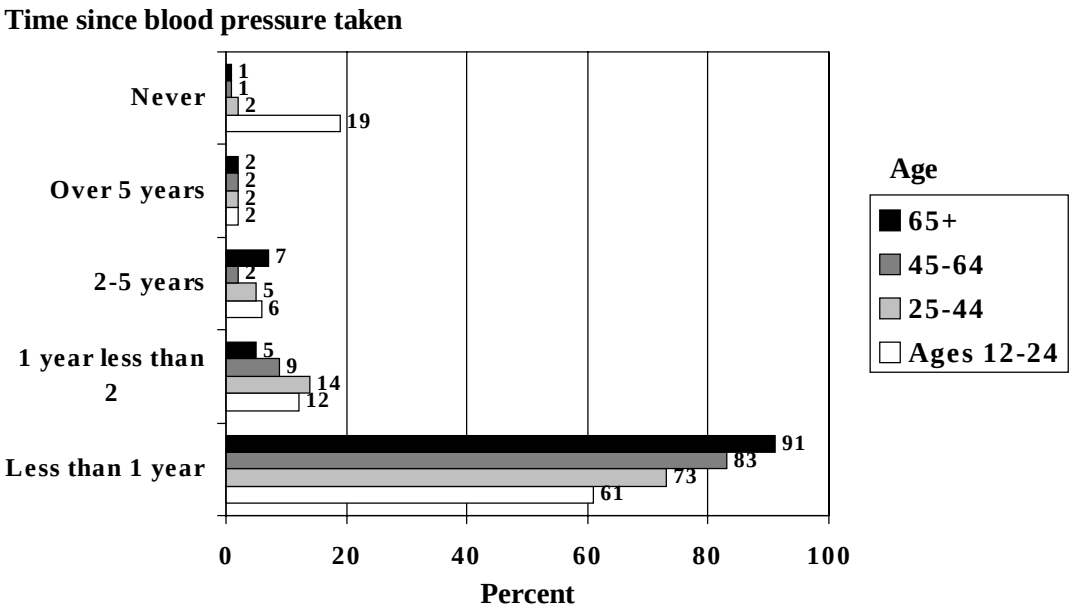
Source: *National Population Health Survey:Health Share File; Statistics Canada, 1994/95, 1996/97.*

There are marked differences by age and sex in the proportion of the population who have had their blood pressure assessed. Young adult men aged 25–44 have the lowest rate of blood pressure assessment (78% met guidelines - 61% in past year and 17% in past one to two years) (Figure 19). This climbed to 88% of men in the 45–64 year old age group, and 95% in the aged 65 and above. Among women, 87% of the 25–44 year old age group, 83% of the 45–64 year old age group and 91% of the 65 and over age group met the minimum guidelines.

The lack of awareness of high blood pressure among younger men may be explained in part because a high proportion had not had their blood pressure assessed. This is not the case for men in the 35 to 64 age group as this group has higher rates of blood pressure assessment. It suggests that there may be a problem with the correct interpretation and follow-up of individuals with high blood pressure, or that these individuals have not yet been told they have high blood pressure.

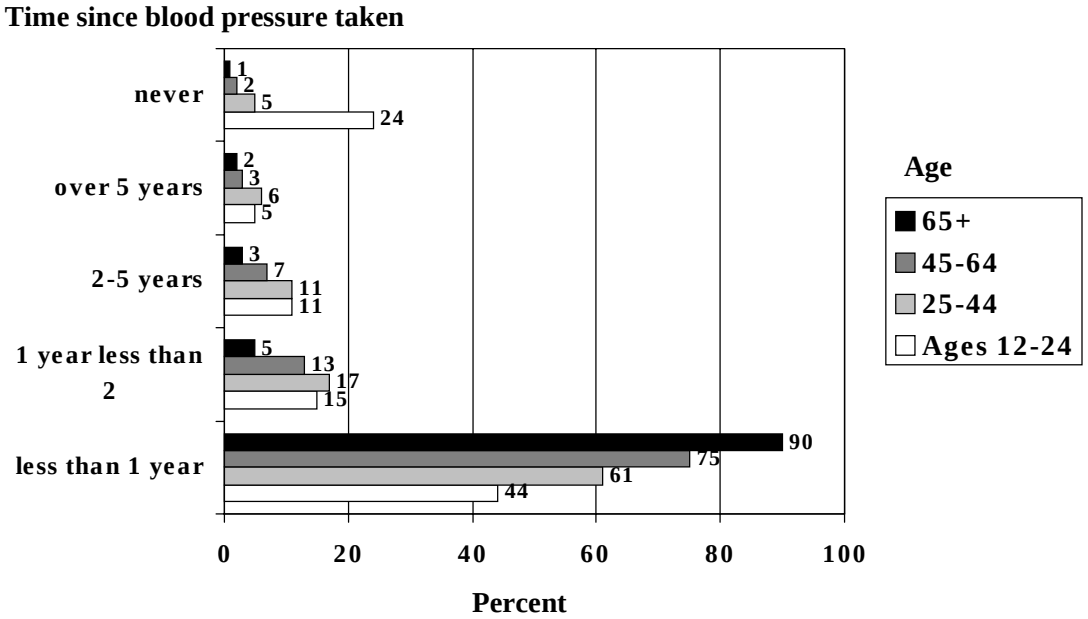
The NPHS did not ask people where they had their blood pressure assessed so it is possible that some people had their blood pressure assessed outside their physicians' office. They may not have known how to interpret the reading or perhaps did not go to a physician for follow-up.

Figure 18: Proportion of women who have had blood pressure taken, by age, Canada, 1996.



Source: *National Population Health Survey:Health Share File; Statistics Canada, 1996/97.*

Figure 19: Proportion of men who have had blood pressure taken, by age, Canada, 1996.



Source: *National Population Health Survey:Health Share File; Statistics Canada, 1996/97.*

Gaps in Early Detection of High Blood Pressure

There is insufficient data to explain why there is such a high proportion of individuals who are unaware that they have high blood pressure, but possibilities include:

- Individuals do not have their blood pressure assessed, particularly younger and middle-aged men.
- Among those who have had their blood pressure assessed in the physician's office, lack of appropriate communication and/or diagnosis of by primary health service providers may exist.
- Among those who have had their blood pressure assessed outside the physician's office, there may be lack of adherence to follow-up recommendations.
- There may also be a lack of awareness among the general public about the need for regular blood pressure assessment.

The lack of blood pressure assessment may be due to the lack of routine screening by primary health service providers during an office visit for other conditions.[91] This may be the only way to reach young and middle-aged men who do not come for a periodic health assessment. Health care providers may not be aware of the guidelines to screen adults every two years for high blood pressure

Summary

Clinical guidelines recommend that all adults should be screened for high blood pressure every two years, or more often if there is a borderline reading on one occasion. This will ensure that high blood pressure is identified early. The effective lowering of high blood pressure results in a decreased risk for heart disease and stroke.

There is a major problem with undetected high blood pressure in the community. Although many individuals have had their blood pressure assessed in the past two years, young and middle-aged men are much less likely to have done so. Even having blood pressure assessed does not necessarily lead to a diagnosis and treatment among those who do have high blood pressure. A physician must follow up those with high measurements at the time of screening with repeated measures with properly calibrated equipment to make a diagnosis. The high rate of undetected high blood pressure in spite of the fact that many people are being screened may be because the physician does not recognize the need for further assessment. In other cases, it may be that the individual has had his/her blood pressure assessed outside the physician's office and does not go for follow-up.

[91] Aubin M et al.

The following strategies would help to decrease the rate of individuals in the community who are unaware that they have high blood pressure:

- An awareness campaign geared to the general public emphasizing the need for and benefits of regular blood pressure assessment
- An education campaign for primary health service providers that outlines screening guidelines and the need for screening to be part of visits for other health problems in addition to periodic health exams
- providing accessible opportunities for blood pressure assessment that ensure linkage to a physician for follow-up

Diagnosis and Treatment of High Blood Pressure

The Canadian Coalition for High Blood Pressure Prevention and Control, the Canadian Hypertension Society[92,93], the Canadian Task Force on the Periodic Health Exam[94], the United States Joint National Committee on Prevention, Detection and Treatment of High Blood Pressure[95] and the World Health Organization[96] have all published detailed guidelines for the diagnosis and treatment of high blood pressure. They are consistent with each other on most points.

Diagnosis

When an initial blood pressure assessment identifies an individual as possibly having elevated blood pressure, it is important to do repeated measurements over time to make a diagnosis of high blood pressure (unless the reading is very high). Blood pressure varies during the day and week so that it is critical not to diagnose high blood pressure on one isolated high reading. It is essential that properly calibrated equipment be used by individuals who are trained in its use in making the diagnosis. A level of 140mm Hg systolic or 90 mmHg diastolic is used as the cut-off for a diagnosis of high blood pressure.

It is important to reassure people who do not have repeated high readings after an initial high reading on screening. However, the situation also presents an opportunity to reinforce the adoption of healthy behaviours toward preventing the development of high blood pressure over time.

Individuals with high blood pressure are classified into groups according to their blood pressure level and the existence of end-organ damage. This classification is used to determine the method of treatment so that the risk of heart disease, stroke, and other diseases associated with high blood pressure can be reduced.

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[92] Haynes RB et al.

[93] Ogilvie RI, Burgess ED, Cusson JR, Feldman RD, Leiter LA, Myers MG. *Report of the Canadian Hypertension Society Consensus Conference: 3. Pharmacologic treatment of essential hypertension*. Can Med Assoc J 1993;149(5):575-84.

[94] Canada. Health and Welfare Canada. Federal/Provincial Working Group on the Prevention and Control of High Blood Pressure in Canada. The Prevention and Control of High Blood Pressure in Canada, 1986.

[95] United States. Department of Health and Human Services. *The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.* 1998.

[96] WHO. *Hypertension Control*.

Treatment

Research evidence strongly supports the benefits of treating high blood pressure to reduce the incidence of stroke, myocardial infraction, coronary artery disease, vascular mortality, and total mortality.[97] The first line of treatment for every individual with high blood pressure is lifestyle modification to achieve[98]

- a healthy weight,
- regular physical activity,
- a low salt diet,
- adequate dietary intake of calcium and magnesium,
- a diet high in fibre, rich in fruits and vegetables, and low-fat dairy products,
- avoidance of a heavy alcohol consumption,
- stress management, and
- smoking cessation. (This will not lead to a decrease in blood pressure but it as so strongly associated with a higher risk of heart disease and stroke that it is an essential part of the overall approach to an individuals with high blood pressure.)

Achieving a healthy body weight is probably the most important lifestyle factor for reducing high blood pressure[99]. A recent review of therapies for treating obesity found that there is no simple way to help people lose weight[100]. Clearly more research is needed with innovative therapies to improve the knowledge base about healthy weight loss and maintenance over the long term. In the meantime, a variety of programs need to be provided to give individuals the opportunity to choose the most suitable method for themselves. This is beyond the scope of services that most individual physicians can provide in a fee-for-service office setting. It suggests the need for a interdisciplinary approach using nutritionists, psychologists, and nurses. Self-help materials and groups should also be part of the program. The promotion of physical activity is an essential part of an overall program because it assists in weight reduction and maintenance[101].

Depending on the blood pressure level, medication may be added to achieve a lower reduction in blood pressure than can be accomplished with lifestyle modifications alone. Diuretics, beta blockers, and ACE inhibitors should be the first line drugs.[102] Other drugs, such as calcium channel blockers, angiotensin II receptor antagonists are second line drugs and are also used for specific indications. There are detailed guidelines from professional organizations that regularly review the literature and make recommendations to physicians regarding appropriate drug use.

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[97] Heenkins CH. *Lessons from Hypertension Trials*. Amer J of Med 1998;104(6A):50S-53S.
[98] Campbell et al. *Lifestyle modifications to prevent and control hypertension: 1. Methods and an overview of the Canadian recommendations*. CMAJ 1999;160 (9 Suppl):S1-S6.
[99] He J, Whelton PK. *Epidemiology and Prevention of Hypertension*. Medical Clinics of North America 1997;81:5:1077-1097.
[100] Douketis JD. Et al. Periodic health examination, 1999 update: 1. Detection, prevention and treatment of obesity. CMAJ 1999;160:4:513-525.
[101] The Canadian Task Force on the Periodic Health Examination:563.
[102] Canadian Hypertension Society. *1999 Recommendations for Treatment of High Blood Pressure*. In press.

The existing medications for lowering blood pressure are powerful agents and can be expected to achieve good control of high blood pressure[103]. However, treatment of high blood pressure with medication is not a simple process. A low dose should be started and then gradually increased to achieve the desired response. It is important to consider the individual's age and the side effects experienced in adjusting the dosage. In general it is better to add a lower dose of another drug rather than give higher levels of one drug. This gives better control and reduces side effects. Therefore, monitoring an individual carefully over time and involving him/her in therapy decisions is critical.

In most cases, primary health service physicians should be able to effectively manage the drug treatment of an individual with high blood pressure. Specialists can provide assistance with more complex drug therapy. It is important that the specialists and primary health service provider continue to work as a team with the individual and his/her family in these situations.

One of the most challenging aspects of high blood pressure control is ensuring that individuals adhere to their medication recommendations. A recent Saskatchewan study found that only 78% of newly diagnosed individuals were still taking drug therapy at the end of the first year[104]. This contrasted with 96% of those with established high blood pressure. At five years, 46% of the newly diagnosed individuals were still taking medication while 82% of those with established high blood pressure were still taking medication. Among those with newly diagnosed high blood pressure, older individuals and women were more likely to persist with medication than younger individuals and men. A review of studies found that initial dropout rates varied from 16 to 50% and two-year rates ranged from 16 to 42%[105].

There are several possible reasons why individuals discontinue taking medication, including[106]

- cost of medication
- side effects
- feeling well and not feeling the need for medication
- denial of the diagnosis of high blood pressure

Improved adherence to medication recommendations has been found to be associated with behavioural determinants, and drug-related determinants[107]. Studies suggest that there is improved adherence to medication use among individuals where there is

- a greater understanding of high blood pressure and the management plan,
- active participation in the management plan including self-monitoring of blood pressure and the selection of high blood pressure medications,
- family involvement,

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[103] Dustan HP et al. *Controlling Hypertension: A Research Success Story*. Arch Intern Med 1996;156:1926-1934.
[104] Caro JJ et al. *Persistence with treatment for hypertension in actual practice.* CMAJ 1999:160:1:31-7.
[105] Feldman R et al. *Adherance to pharmacologic management of hypertension.* Dept. of Medicine, University of Western Ontario, 1998.
[106] Sanson-Fisher RW, Clover K. *Compliance in the Treatment of Hypertension: A Need for Action.* AJH 1995;8:82S-88S.
[107] Feldman R et al.

- education of pharmacists regarding communication with individuals with high blood pressure,
- increased supervision and monitoring,
- a once daily dosage of medication, and
- low frequency of side effects.

Research results suggest that a high blood pressure control program should be multifaceted and include education, tailoring of blood pressure management, self-monitoring of pills and blood pressure, involvement of the family, and a reward system for blood pressure control.[108,109] Work site education and monitoring programs can also enhance adherence.

Present Canadian situation

The Canadian Heart Health Surveys identified a major problem in the control of high blood pressure in Canada[110]. Of those who were diagnosed with high blood pressure, only 28% were treated and controlled. Of the others, 40% were being treated but were not controlled and 33% were not treated and not controlled. There were significant differences by age and sex in the proportion that were treated and controlled (Table 5).

The proportion of men under age 65 who are treated and controlled is much lower the proportion o f women. A major reason for this is the lower proportion of men that are being treated for high blood pressure.

According to the 1996 National Population Health Survey, overall, 84% of people who have been diagnosed with high blood pressure by a physician reported they were on treatment for high blood pressure. This is higher than the 68% reported in the Heart Health surveys conducted 5 to 10 years previously. It is hard to know if this is a true increase in treatment rates because of differences in the survey methodologies.

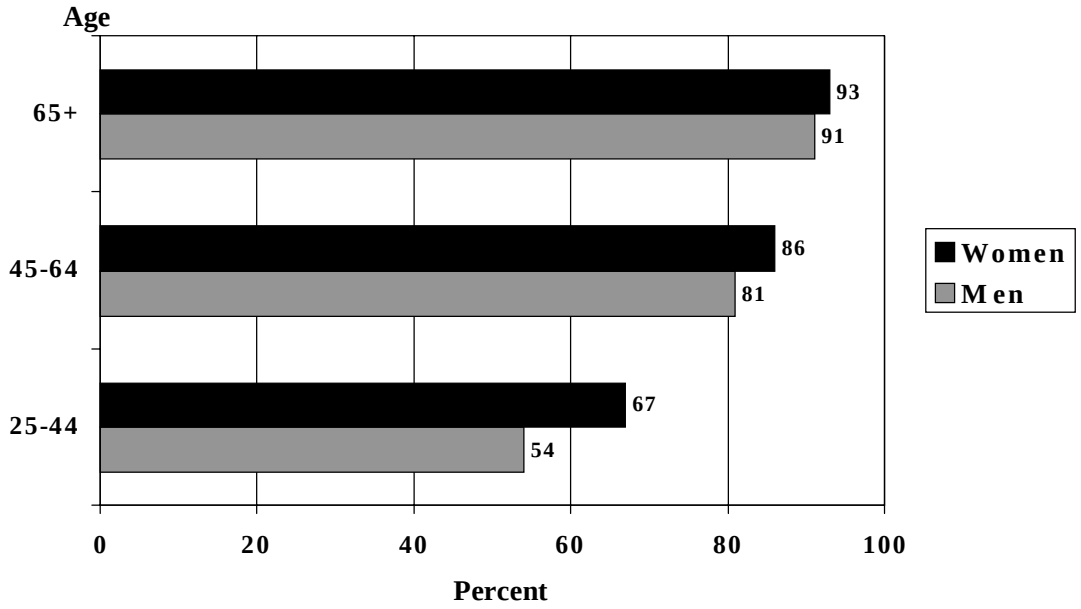
The 1996 National Population Health Survey did find similar differences in treatment rates among men and women as in the Heart Health surveys (Figure 20). Of those who received treatment, 98% were on drugs, only 12% were on a diet, and 1% were receiving some other treatment. (Figures 21 and 22).

[108] Ibid
[109] Fodor et al. *Adherence to Nonpharmacologic Therapy for Hypertension*. Review paper. 1999
[110] Joffre.

Table 5 Prevalence of High Blood Pressure Control among Individuals with Diagnosed High Blood Pressure, Canada, 1985-90.

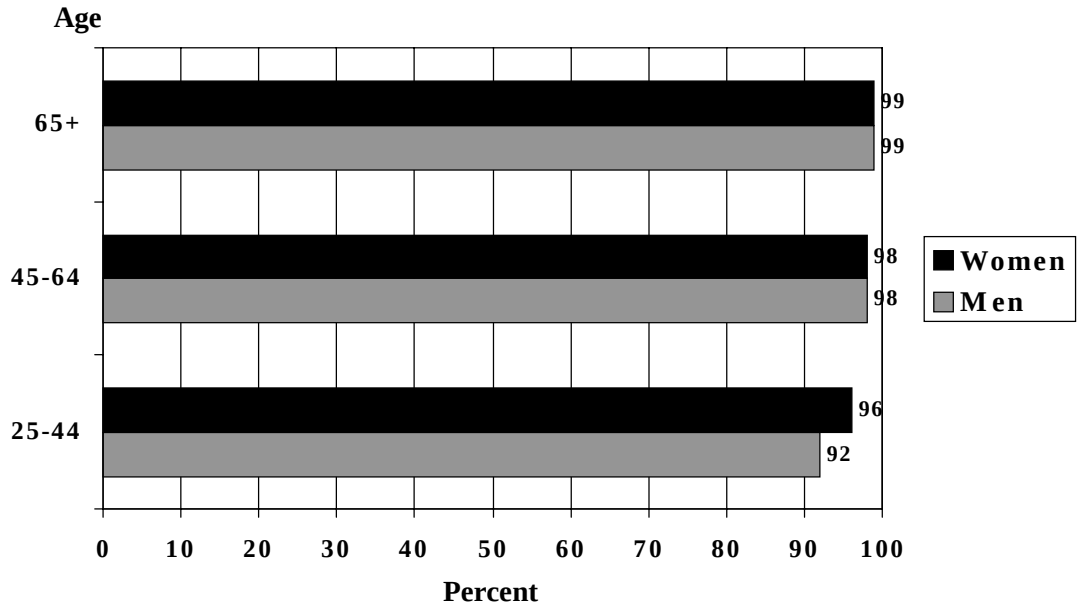
Age Group	Not Treated, Not Controlled		Treated, Not Controlled		Treated and Controlled	
	Male	Female	Male	Female	Male	Female
18 –34	67%	33%	14%	16%	19%	51%
35-64	39%	27%	37%	39%	25%	34%
65-74	27%	17%	49%	59%	24%	25%
Total	40%	23%	36%	45%	25%	31%

Figure 20: Among people diagnosed with hypertension by a professional, proportion who are on treatment for hypertension, by age and sex, Canada, 1996.



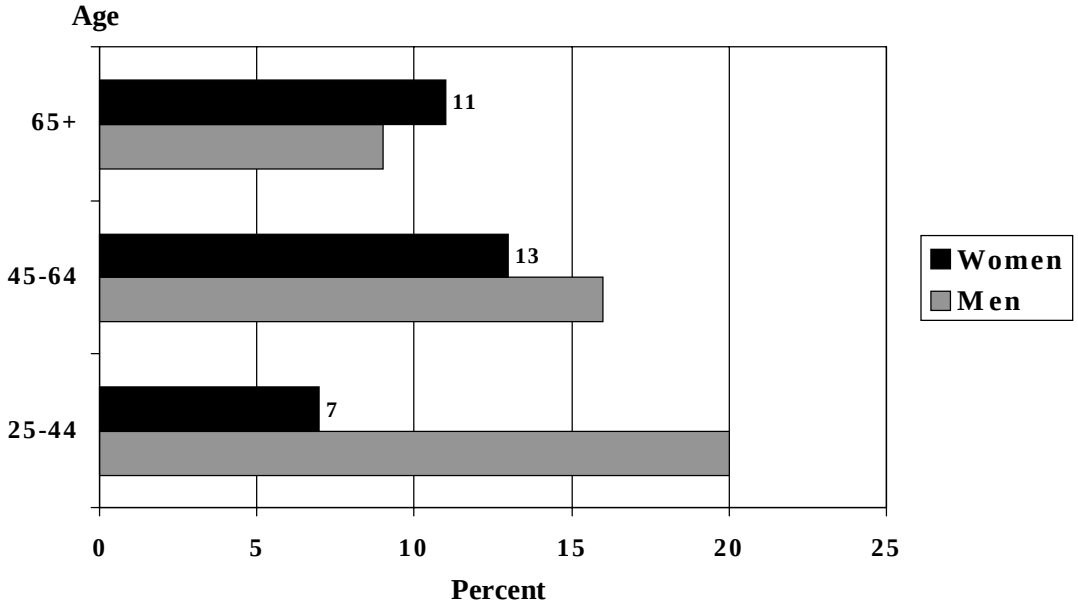
Source: *National Population Health Survey:Health Share File; Statistics Canada, 1996/97.*

Figure 21: Among people treated for hypertension by a professional, proportion who are on drugs for hypertension, by age and sex, Canada, 1996.



Source: *National Population Health Survey:Health Share File; Statistics Canada, 1996/97.*

Figure 22: Among people treated for hypertension by a professional and receiving treatment, proportion who are on a diet for hypertension, by age and sex, Canada, 1996.



Source: *National Population Health Survey:Health Share File; Statistics Canada, 1996/97.*

Primary health service providers, usually family physicians, provide most of the care to individuals with high blood pressure. Most physicians are paid on a fee-for service basis. This limits their ability to provide a interdisciplinary service necessary to effectively assist individuals to both adopt healthy lifestyles and develop joint drug management plans. Several provinces are experimenting with other models of providing primary health service. It will be important to ensure that the needs of individuals with high blood pressure can be met within these new models.

Specialists are involved in the care of more complex cases or where the blood pressure is difficult to control. Several centres in Canada have created High Blood Pressure Clinics to respond to this need. These are interdisciplinary and use a variety of approaches to control blood pressure. They provide diagnostic facilities, expertise for diagnosis and treatment, and additional resources for 24-hour ambulatory blood pressure monitoring and life style counselling. The resource intensity of this approach limits its access to those who cannot be managed in the primary health service setting.

Gaps in Diagnosis and Treatment of High Blood Pressure

There are clearly gaps in the present system of diagnosis and treatment of high blood pressure in Canada.

- According to the 1996 National Population Health survey, many people, young men in particular (46%), are not being treated for high blood pressure once it is diagnosed.
- Many individuals with high blood pressure are being treated with medication alone rather than a combination of medication and lifestyle changes[111].
- The rate of cessation of medication in the first six months to one year is high.[112] For some individuals, the cost of medication is a one of the barriers.
- Current funding arrangements limit the primary health service setting's ability to provide interdisciplinary service (education, self-monitoring of medication and blood pressure) that involves the individual and family in the blood pressure management program. Greater links need to be established among other care providers, such as pharmacists and occupational health nurses. There is a lack of resources for counselling and education.
- Physicians may not be prescribing the medication that could have the maximum impact on lowering blood pressure. Clinical practice guidelines, based on formal review of available research evidence, regarding the diagnosis and lifestyle and pharmacologic management of high blood pressure are published regularly, but are not widely disseminated.
- More supportive workplace and community environments could assist individuals in making healthy lifestyle changes - for example, walking and bike trials, accessible and healthy foods, accessible and affordable weight loss programs. Public policy and legislation could also support healthy lifestyles by such means as lowering the salt content of prepared foods.

[111] Canada. Statistics Canada. *National Population Health Survey 1996*.
[112] Feldman R et al.

- Further research is required on effective medications and programs to increase lifestyle change and adherence to medication, and adherence of physicians and other care providers to clinical practice guidelines.

Summary

The control of high blood pressure is dependent upon two focuses. First is a physician's accurate diagnosis using proper technique and a well-calibrated instrument; and second is the involvement of the individual and his/her family in a treatment or management plan that includes both lifestyle changes and medication. Education, close monitoring, and follow-up, using self-monitoring of both blood pressure medication can improve the chances that the individual will make the necessary lifestyle adjustments and take prescribed medication. Workplace programs that combine education and monitoring with a reward system can improve control.

The following strategies are needed to improve the effective control of high blood pressure among those who have been diagnosed with this health problem.

- Continue to produce clinical practice guidelines on diagnosis and lifestyle and pharmacological management of high blood pressure.
- Develop a formal dissemination process for clinical practice guidelines.
- Create supportive environments to assist individuals in making healthy lifestyle changes - for example, walking and bike trials, accessible, healthy food, accessible and affordable weight loss programs.
- Develop public policy and legislation to support healthy lifestyles by such means as lowering the salt content of prepared foods.
- Develop public policy to ensure that the cost of medication is removed as a barrier to taking blood pressure lowering medication.
- Design primary health services so they are interdisciplinary and can provide a comprehensive high blood pressure control program.
- Involve other members of the health care team, including pharmacists and occupational health nurses, in programs.
- Continue to research effective medications and programs to increase adherence to lifestyle and medication recommendations.

System Support

There are many organizations, health care providers, and community groups in both the health and non-health sector that can be involved in the prevention and control of high blood pressure. It is important to consider the support that is required to enable these groups and individuals to function as effectively as possible as part of an overall system.

An effective system can be supported with

- **collaborative planning, evaluation and communication** to ensure that the system is functioning effectively in the most efficient way;
- **surveillance** of the incidence and prevalence of high blood pressure, prevalence of risk factors, use of prevention and therapeutic interventions and services, and health outcomes including quality of life, disability and mortality followed by the dissemination of this information to decision-makers;
- **research and evaluation** and its dissemination to managers and clinicians to aid evidence-based decision-making;
- ongoing **education of service providers**

Collaborative Planning, Evaluation, and Communication

Coordinating mechanisms are needed at and among all three levels of decision-making – national, provincial/territorial, and local/regional - as vehicles for organizations, health care providers, and groups to plan and work together. These mechanisms would encourage the concentration of resources so that they achieve the greatest impact, avoid duplication, and ensure continuity in service. They would also encourage the involvement of the community itself in identifying its needs and implementing solutions.

As a consortium of professional, voluntary, and government organizations, the Canadian Coalition for High Blood Pressure Prevention and Control could fulfill this function at the national level. The purpose of a national coordinating body would be to:

- review surveillance information on high blood pressure to identify the need for and impact of strategies,
- makr recommendations on national policy,
- coordinate national strategies among national organizations, and
- develop and disseminate clinical practice guidelines

At the present time the coalition does not have dedicated funding, limiting what it can accomplish. It is dependent on the contribution of volunteers from the member organizations, government, and professional societies. The pharmaceutical industry also provides support for many activities.

Similar coalitions of provincial/territorial organizations could fulfil the coordination function at the next level and act as liaisons with the national body. At the community level, several communities have

had a positive experience with Heart Health Coalitions that combine public health, voluntary organizations, community organizations, service provider, food industry, restaurants, media, and others. This model would work well for the prevention and screening components of a high blood pressure program, but would have to be supplemented with another linked body focusing on the treatment of high blood pressure.

Surveillance

"Public health surveillance is the ongoing, systematic collection, analysis and interpretation of health data in the process of describing and monitoring a health event closely integrated with timely dissemination of information to those who need to know. This information is used for planning, implementing, and evaluating public health interventions and programs. Surveillance data are used to determine the need for public health action and to assess the effectiveness of programs".[113]

A surveillance system is critical for monitoring whether the health goals that have been identified for a population have been met or if changes in programs or policies are needed. It is the only way to assess whether policy changes or social marketing programs that are targeted to the population as a whole are effective.

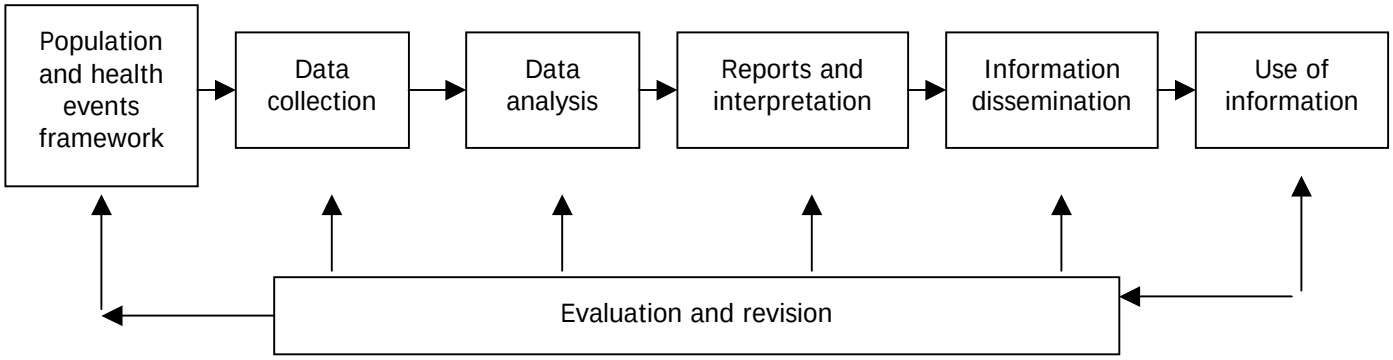
The principles of a good surveillance system are:[114]

- Simplicity in both structure and ease of operation.
- Flexibility to adapt to changing information needs or operating costs in time, personnel, or allocated funds.
- Acceptability to individuals and organizations who participate in the system.
- High sensitivity in the proportion of events detected by the system.
- High positive predictive value (the proportion of the individuals identified as being a case who actually have the condition).
- Representativeness (accurate description of the occurrence of the event over time, and its distribution in the population by place and person).
- Timeliness (minimal delay between steps in the surveillance system).

The key elements of a surveillance system are presented in Figure 1.

[113] United States. Centers for Disease Control and Pevention. *Guidelines for Evaluating Surveillance Systems*. On CDC WONDER. cwus@cdc.gov. Atlanta, USA.
[114] Ibid.

Figure 23 Elements of the Surveillance System



The present surveillance system is very limited. The National Population Health Survey provides information on the prevalence of self-reported risk factors every two years at the national and provincial level. It takes about 18 months to two years before this data is available to planners. While this is useful information, it is not timely and it does not include dietary information. There is no ongoing survey to determine the prevalence of undetected, treated and controlled, or treated and uncontrolled high blood pressure in the population in Canada at the national, provincial, or territorial levels.

The Heart Health Surveys conducted in all provinces in the 1980s developed a methodology that could be used to monitor high blood pressure prevention and control in the population. They developed data collection tools and methods that were acceptable to all the provinces. The investigators were able to analyze the data in a composite way, prepare reports, and disseminate it in a variety of ways to the research community. It is uncertain whether policy makers used the information to shape decision-making about policies and services.

The Hospital Morbidity Database at the Canadian Institute for Health Information and the Mortality Database at Statistics Canada provide useful information but they would be more useful if they were linked through a unique identifier to each other and to other databases such as the physician billing database and home care databases.

Research and Evaluation

Research and program evaluation provides the essential evidence-base to ensure that resources are used effectively and efficiently, and that clinical decisions will help the individual. A strong link, therefore, between researchers and clinicians, managers, and policy makers is an essential part of a national system.

There is considerable ongoing research on the effectiveness of drugs to treat high blood pressure. However, there is a lack of research on the effectiveness of prevention programs and health services. The are fewer sources of funding for these research areas and fewer researchers. The study designs are complex because many interventions are not amenable to randomized controlled trials.

Ongoing Education of Service Providers

The current knowledge base is constantly expanding. A mechanism is needed which would help clinicians keep up to date with the most recent knowledge. Professional societies and the Canadian Coalition for High Blood Pressure Prevention and Control have undertaken the task of reviewing the research literature and developing clinical practice guidelines to assist clinicians in making evidence-based decisions.

Research on the impact of clinical practice guidelines suggests that the simple publication of guidelines is not enough to change physicians' behaviour. Physicians and other heath care providers are in varying stages of readiness to adopt new recommendations for practice[115]. Some of the factors that will influence whether an innovation will be adopted are:

- Evidence from the scientific literature.
- Expert or authority in the field supports change.
- Peer validation from opinion leaders.
- Ease of implementation.
- Presence of enabling factors.
- Reinforcing factors – positive feedback.

Successful interventions are multi-pronged and individually tailored to the stage of readiness of the providers. They also address predisposing, enabling and reinforcing elements, and combine "experts", peers and the literature[116].

At the present time, clinical practice guidelines (CPGs) are published in the research literature but that is the extent of the dissemination process. The Canadian Medical Association has made the following recommendations for the implementation of clinical practice guidelines based on existing research:[117]

- Build a healthy process form the start involving service providers in the development of the guidelines who will be using them.
- Carry out a needs assessment.
- Use multiple interventions at the local level.
- Build on existing structures.
- Build in mutual support mechanisms.
- Include evaluation to guide the process.
- Involve the public.
- Recognize that CPGs are an evolving technology and develop a system to modify them as necessary and build this change into the system.

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[115] Elford RW, JennetT P, Bell N, Szafran O, Meadows L. *Putting prevention into practice*. Health Rep 1994;6:142-153.

[116] Davis DA, Thomson MA, Oxman AD and Haynes RB. *Changing physician performance: a systematic review of the effect of continuing medical education strategies*. JAMA 1995;274:9:700-705.

[117] Canadian Medical Association. *Implementing CPG's: A Handbook for Practitioners*. CMA Website.

The implementation of a successful Hypertension Prevention and Control Strategy is dependent on health care providers educating people about healthy behaviours as well as the importance of screening. Health providers themselves must correctly screen for, diagnose, and treat high blood pressure. Therefore, it is critical that there be an ongoing mechanism to develop clinical practice guidelines and educate health care providers in their use. This includes not only the use of medication but also other topics such as good communication, education on prevention, use of information technology, and involvement of the individual and family in a care plan.

Summary

The prevention and control of high blood pressure is a complex undertaking involving many health care providers, organizations, and groups. In order to function effectively in response to the needs of the population, it is important to consider the support that the prevention and control system needs to be effective and efficient.

- Support existing, or develop new coalitions or networks at the local, provincial/territorial, and national levels to facilitate joint planning and collaboration.
- Continue the current work to develop an ongoing heart disease and stroke surveillance system to assess the prevalence of risk factors, awareness of high blood pressure, and the prevalence of treated and controlled high blood pressure.
- Continue to research all aspects of the prevention and control of high blood pressure with emphasis on the impact on the population and health services research.
- Develop an ongoing process for the continuing education of health care providers starting in professional schools.

OTHER NATIONAL PROGRAMS FOR THE PREVENTION AND CONTROL OF HIGH BLOOD PRESSURE

Several other countries have implemented major campaigns to prevent and control high blood pressure. These provide useful ideas for Canada to consider in developing its own high blood pressure prevention and control program.

The World Health Organization has been involved in high blood pressure prevention and control since 1985[118]. A recent review found that the majority of community control programs have focused on detection and treatment rather than prevention. This has resulted in a decline in the age-adjusted average blood pressures in various populations, but the incidence (new cases) did not follow this trend. The improvement in average blood pressure was because of widespread drug treatment. The article concludes the greater emphasis must be placed on prevention to reduce the prohibitive costs associated with care and drug treatment of high blood pressure.

The German National High Blood Pressure Programme (NBP), established in 1985, focused on four modules implemented in different communities and various sectors of the German community[119].

- A work site screening and follow-up program for high blood pressure was implemented focusing particularly on men under age 50. At the end of two years there was a higher rate of treatment and control of blood pressure.
- More than 200 training courses were organized on blood pressure measurement for nurses and physicians in various parts of the country.
- A large number of blood pressure self-measurement courses were held across the country for individuals with high blood pressure.
- A cardiovascular hotline was developed for the general public offering information on cardiovascular disease, clinical manifestations, treatment and prevention. It was used primarily by individuals with high blood pressure or heart disease.
- Bi-annual conferences on high blood pressure are held to provide a meeting point for various, very different groups involved in the prevention of cardiovascular disease. They also serve as a forum of interest for the media. High blood pressure receives press coverage that would not otherwise occur.

In the United States, a large proportion of daily sodium intake (75%) is derived from consuming processed foods.[120] In order to alter the salt content of processed foods the commitment of food

[118] Gyarfas I. *Lessons form worldwide experience with hypertension control*. Journal of human Hypertension 1996;10:suppl 1:S21-25.
[119] Hense H. *Successful modules of community hypertension control programs - Examples from the German National High Blood Pressure Programme*. J Hum Hypertens 1996;10(Suppl. 1):S13-6.
[120] James WPT, Ralph A, Sanchez-Castillo CP. *The dominance of salt in manufactured food in the sodium intake of affluent societies*. Lancet 1987;1:426-9.

manufacturers, food marketers, and food distributors is required. Currently there exists an unwritten agreement between the American government and the food industry to gradually reduce the addition of sodium to processed foods.

The National High Blood Pressure Education Program (NHBPEP)[121], established in 1972, is a cooperative effort among professional and voluntary health agencies, State health departments, and many community groups. The NHBPEP is administered and coordinated by the National Heart, Lung, and Blood institute (NHLBI), one of the 17 agencies at the National Institutes of Health (NIH).

The goal of the NHBPEP is to reduce death and disability related to high blood pressure through programs of professional, patient, and public education. Strategies to achieve this goal include developing and disseminating educational materials and programs that are grounded in a strong science base, as well as developing partnerships among the program participants.

To assist program participants in carrying out their diverse efforts, the NHBPEP offers resources in five major areas:

- Information collection and dissemination.
- Public, patient, and professional education.
- Community program development.
- Evaluation and data analysis.
- Technology transfer and electronic distribution.

Public knowledge regarding the sequelae of high blood pressure has increased dramatically. Virtually all Americans have had their blood pressure measured at least once, and three-fourths of the population have it measured every 6 months. In the last 2 decades, the number of persons with hypertension who are aware of their condition has increased dramatically. In addition, the percentage of persons with hypertension who are on medication and controlling their condition also has improved substantially. Mean blood pressures compared in four national health surveys conducted between 1960 and 1991 suggest a reduction of 10 mm Hg systolic pressure and 5 mm Hg diastolic pressure during this time period. These remarkable decreases indicate that the U.S. population has heard and acted upon NHBPEP messages. More importantly, this significant reduction in mean blood pressures has had a significant effect on death rates from heart disease and stroke.

In Finland, it was recognized that mildly elevated blood pressure produced many more strokes, heart attacks, and other complications than the more severe high blood pressure in which drug therapy is indicated[122]. This occurred because, although the risk is lower in the mildly elevated group, it is a much larger group. Finland concentrated, therefore, on lifestyle changes in the population as a whole and among all individuals with mild high blood pressure. They adopted a comprehensive program for the whole population aimed at a healthier diet and other health behaviours, and superimposed on that a more intensive counselling program for those with high blood pressure.

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[121] United States. US Department of Health and Human Services. National Heart, Lung and Blood Institute. *Program Description.* National High Blood Pressure Prevention Education Program, 1999. Website: http://www.nlhbi.nih.gov/nhlbi/othcomp/opec/nhbpep/nhbp_pd.htm

[122] Karppanen H, Mervaala E. *Adherence to and population impact of non-pharmacological antihypertensive therapy*. J. of Human Hypertension 1996;10:Supl 1:S57-61.

A critical part of the Finish strategy has been the reduction of the salt content of food through legislation for industry prepared foods and a broad social marketing campaign on the harmful effects of sodium. The use of Pansalt ™ a sodium-reduced, potassium-, magnesium-, and l-lysine rich mineral salt has increased dramatically and has resulted in a dramatic decrease in the previously very high sodium to potassium ratio of many food items. The decline in this ratio and a change in dietary fat is hypothesized to account for the decrease in blood pressure, and a 60% decrease in deaths from stroke and ischemic heart disease from 1972 to 1992 in men and women between 30-59 years.

The Spanish League Against High Blood Pressure was formed in 1978. It has three strategies directed to: 1) physicians and other health care providers; 2) hypertensive individuals; and 3) the general public[123]. The program for health professionals (physicians, nurses, pharmacists, dentists) was designed to increase their awareness about their important role in diagnosis, treatment, and control of high blood pressure, and to improve their knowledge through a continued post-graduate education program. They have also worked at improving the doctor-patient relation to get improved adherence with recommendations for medication and lifestyle changes. A community-based prevention and control program provided information to the general public. The mass media producers and the pharmaceutical companies supported the Spanish program. There was only limited support from the medical societies and government.

According to the WHO technical report on hypertension control, there is a strategic need to evaluate the adequacy of control measures and how they can be improved. This includes a comparison of morbidity and mortality after implementation of hypertension control strategies, blood pressure values, awareness of hypertension, and rates of untreated and treated hypertensive individuals.

Other countries have implemented surveillance systems. The U.S. National Health and Nutrition Examinations Surveys (NHANES) I to III have evaluated population-based programmes by measuring the number of people diagnosed as having hypertension, the number undergoing treatment, and the number whose blood pressure is under control.[124] The WHO MONICA project collected information on coronary heart disease risk factors in 40 populations of men and women aged 35-65.

In the WHO/WHL Hypertension Management Audit Project, five approaches were used to assess the control of hypertension in 17 population groups participating from 10 European countries.[125,126]

- The **population (or epidemiological) approach** consists of surveying a random sample of a population in order to assess awareness of hypertension in the community (i.e. number of undiagnosed and untreated hypertensives) and overdiagnosed and possibly unnecessarily treated patients with high blood pressure.
- The **patient approach** is the clinical analysis of treatment in a sample of patients, assessing retrospectively the quality of care (using medical records) and examination of the patient (using the International Society of Hypertension treatment guidelines).

[123] Arand A. *Arterial hypertension in Spain: the experience of the Spanish League*. J of Human Hypertension 1996;10:suppl 1:S73-75.
[124] WHO. *Hypertension Control*.
[125] Ibid.
[126] Strasser T. *Auditing hypertension control and management: a position paper*. J Hum Hypertens 1996;10(Suppl. 1):S27-8.

- The **consumer approach** evaluated patient satisfaction of care, compliance to treatment, and treatment concerns or complaints.
- The **physician approach** assessed the knowledge and attitudes of physicians who treated hypertension.
- Finally, the **drug utilization approach** assessed the volume of defined daily doses of hypertensive medication based on the number of citizens in a community and the prevalence of hypertension. Primary prevention was not assessed and the audit included only a small number of populations. A more comprehensive method including primary prevention and leadership by national organizations and societies would improve upon the present "audit" model. An audit protocol, as an evolving activity with built in feedback "loops" was proposed.

Lackland built upon the original Hypertension Management Audit Project and identified specific issues essential to developing an evaluation methodology.[127] Accurate estimates of hypertension and its control need to be conducted. Since estimates vary from one population to another[128] (3) and awareness, treatment and control vary over time, an international working party was proposed to establish a detailed system of standard protocols and common methodologies for detection, intervention, follow-up, evaluation, and management of hypertension. This system would be applicable and adaptable to hypertensive populations around the world and would require a cooperative network of clinicians and researchers.

Summary

The World Health Organization has identified the prevention and control of high blood pressure as an important goal for all countries. This includes the diagnosis and effective management of those with high blood pressure but it emphasizes the need to put more emphasis on prevention of high blood pressure and the use of lifestyle changes in the population as a whole. Some other countries have developed a co-ordinated approach to this important health problem through a co-ordinating council using a variety of strategies directed at health professionals, the general public, and individuals with high blood pressure. The use of legislation to control the amount of salt in food combined with a social marketing program on the harmful effects of salt appears to be a promising new strategy.

[127] Lackland DT. *An international working party on assessing hypertension control in populations: a proposal*. J Hum Hypertens 1996;10(Suppl. 1):S29-31.
[128] WHO. *Hypertension Control*.

DESCRIPTION OF A NATIONAL HIGH BLOOD PRESSURE PREVENTION AND CONTROL STRATEGY

Introduction

High blood pressure is a serious, common health problem in Canada. Research evidence suggests that more could be done to prevent and control it and, in turn, decrease the associated heart, stroke, kidney, and vessel health problems. This section of the report will outline a prevention and control strategy that will require a commitment from individuals, health professionals, governments, community organizations, and non-health sectors to work together to address the underlying causes and to respond to the health needs of individuals with high blood pressure.

Principles of Strategy

The National High Blood Pressure Prevention and Control Strategy is based on a population health approach to ensure that resources are allocated most effectively to improve the health of the population. Based on the review of evidence in the preceding section, the following are the implications for the prevention and control of high blood pressure in Canada.

1. Research findings and program evaluations guide decision-making.

- While much research has been done to date, there is a need for ongoing basic, clinical, community, and epidemiological research on the prevention and control of high blood pressure. This includes both qualitative and quantitative research.
- Gaps exist between the action that should be taken, according to the research evidence, and what is actually being done. The mechanism for dissemination of research findings to policy makers must be improved, and policy makers need to incorporate research findings into their decision-making.
- Research findings need to be incorporated into clinical practice guidelines on lifestyle counseling, screening, diagnosis, treatment, and follow-up of high blood pressure.
- Program evaluation needs to be incorporated into all programs, services, and policies. The results should shape changes to increase effectiveness.

2. Strategies are selected based on their potential to have the greatest impact on the population as a whole. Strategies are identified to both

prevent and respond to the needs of individuals with the health problem.

- First, the promotion of healthy lifestyles (healthy diet including the avoidance of excessive salt, maintenance of healthy weight, regular physical activity, and avoidance of heavy alcohol consumption) for the whole population has the greatest potential for the primary prevention of high blood pressure.
- Second, coordinated accessible high blood pressure screening programs with appropriate follow-up investigations are required to diagnose high blood pressure.
- Third, high blood pressure needs to be treated more effectively by encouraging lifestyle changes such as healthy diet (low salt, high fiber, low fat, maintenance of healthy weight), moderate physical activity, avoidance of excessive alcohol, and stress management, and by the addition of appropriate medications according to clinical practice guidelines. Consistent follow-up by the health care provider will assist individuals in making the necessary changes to achieve blood pressure control.

3. The broad determinants of health (biological, psychological, social, and environmental) are addressed recognizing their complexity and interaction. This includes ensuring that programs, policies, and services address inequities in health and access to health services in the population.

- The social values, norms, and roles that influence men and women's body images need to be addressed to assist in the maintenance of healthy weights.
- Social policies need to ensure that all individuals and families have access to reasonable housing, income, food, and medication if needed, and have opportunities to contribute in a meaningful way to society and live without prejudice.
- Health services need to be provided in an accessible way that considers specific needs associated with, for example, culture, age, sex, literacy, income, and education.

4. Multiple strategies are used in multiple settings involving the health sector and other sectors as needed. A collaborative approach is used including health "experts" and professionals, government, community members, and public, non-profit, and private sectors.

- Community prevention programs need to be delivered in collaboration with existing health promotion programs, particularly "Heart Health" programs.
- Mechanisms need to be implemented that involve individuals with high blood pressure in the development and implementation of programs to ensure that their needs will be met.
- Interdisciplinary primary health service teams need to be set up to collaboratively manage high blood pressure.
- The workplace, school, and general community can be used as program and service delivery sites.

- The non-health sector needs to be involved in reducing excessive salt in prepared foods and providing healthy food choices (restaurants, food industry, workplace, and school cafeterias), and in ensuring access to opportunities for physical activity (recreation, roads, workplace, local government). In some cases, legislation may be needed to support these efforts.

Health Goals

The identification of health goals is a critical component of a high blood pressure prevention and control strategy. Goals clearly outline the changes that are needed in the population in order to improve health. The specific targets for the goals are based on the results of the Heart Health surveys in the early 1990s[129].

Table 6 Health Goals

Health Goal	Target
To reduce the prevalence of uncontrolled high blood pressure in Canada.	
Sub-goals	
a) To reduce the incidence of high blood pressure among Canadians.	By 10% by the year 2005 (current estimate is 22% of population aged 18–74)
b) To reduce the proportion of Canadians who are unaware that they have high blood pressure.	By 10% by the year 2005 (current estimate is 9.2% of population, or 42% of people with high blood pressure)
c) To reduce the prevalence of uncontrolled high blood pressure among those who have been diagnosed with high blood pressure.	By 10% by the year 2005 (current estimate is 9.3% of population, or 43% of individuals with diagnosed high blood pressure)

Program Outcomes

The High Blood Pressure Prevention and Control goals will be achieved by programs, policies, and services that are directed at achieving the following changes in the population:

[129] Joffres et al.

Long-Term Program Outcome	***Target Group***
1. Increase in a healthy lifestyle for all Canadians – healthy weight, healthy nutrition, regular physical activity, low risk alcohol use, and stress management - to prevent the onset of high blood pressure.	• Whole population • Public health • Health service providers • Community organizations • Governments • Voluntary sector • Workplace, schools • Non-health sector
2. Increase in Canadians having regular blood pressure measurements taken and interpreted correctly to increase the early detection of high blood pressure.	• All adults • Primary health service providers
3. Increase in high blood pressure investigation, diagnosis, and treatment with lifestyle changes, medication, and follow-up according to evidence-based clinical practice guidelines.	• Primary health service providers • Specialist care providers • Pharmacists • Health professional organizations • Universities • Health service managers
4. Increase in individuals with high blood pressure adopting healthy behaviours and taking prescribed medication appropriately.	• Individuals with diagnosed high blood pressure • Families of individuals with diagnosed high blood pressure • Health service providers • Social service providers • Same organizations as in number 1 above associated with the promotion of a healthy lifestyle

These long-term program outcomes will be achieved through changes outlined in the following short-term program outcomes:

Short-Term Program Outcome	***Target Group***
1. Increase in knowledge, positive attitudes, and skills of the general public about healthy behaviours and the need to have regular blood pressure measurements.	• Whole population
2. Increase in knowledge, positive attitudes, and skills of the individuals with high blood pressure about healthy behaviours and control of blood pressure.	• Individuals with high blood pressure and their family members
3. Increase in knowledge, skills, and positive attitudes of health service providers about healthy behaviours, and high blood pressure detection and treatment.	• Health service providers
4. Increase in supportive community, workplace, and school environments for the adoption and maintenance of healthy behaviours.	• Public health • Health service providers • Community organizations • Governments • Voluntary sector • Workplace, schools • Non-health sector
5. Increase in supportive health care environments for health care providers and individuals with high blood pressure that support high blood pressure control.	• Health planners • Health service managers • Health service providers • Government • Universities • Health professional organizations
6. Decrease in salt added to prepared packaged food and in restaurants.	• Food industry • Restaurants, cafeterias, and fast food outlets • Health Protection Branch, Health Canada
7. Increase in research about the effectiveness of high blood pressure prevention and control interventions.	• Researchers in universities, health service organizations, voluntary organizations, government
8. Increase in research about the prevalence of risk factors, high blood pressure, and the control of high blood pressure in the population.	• Researchers in universities, public health, health service organizations, voluntary organizations, government

Short-Term Program Outcome	***Target Group***
9. Increase in collaboration among organizations and the community in providing interventions for the prevention and control of high blood pressure.	• Consumers • Public health • Health service providers • Health planners • Health service managers • Academics and researchers • Community organizations • Governments • Voluntary sector • Workplace, schools • Non-health sector – restaurants, recreation, food industry etc.

Strategies

The program short- and long-term outcomes will be achieved through the development and implementation of strategies involving both health and other sectors. These strategies will address the factors that influence the behaviours and environment associated with high blood pressure prevention and control.

Community Health Promotion

- Advocating for ***healthy public policy*** in both the health and non-health sectors to support healthy lifestyles.
- Encouraging ***community action*** for the adoption of healthy lifestyles and the regular assessment of blood pressure.
- Creating ***supportive environments*** in schools, the workplace, and the community for the adoption of healthy lifestyles and the regular assessment of blood pressure.
- Providing ***education and information*** about the adoption of healthy lifestyles, the regular assessment of blood pressure, and the taking of prescribed medication appropriately.
- Involve ***the non-health sector*** in creating healthy policies, programs, and services to support healthy lifestyles and high blood pressure detection and control.

Health Services

- Provide ***education about healthy lifestyle and high blood pressure prevention and screening*** using a variety of methods as part of primary health service for all ages.
- ***Screen all adults (over age 20) for high blood pressure*** at least once every two years, or more often if indicated, in the primary health service setting, or in the workplace or community if part of an organized program of follow-up.
- ***Assess individuals with a high blood pressure reading*** at the time of screening on repeated occasions over a three to six month period to make the diagnosis of high blood pressure.
- ***Search for underlying medical causes*** of high blood pressure according to clinical practice guidelines.
- Provide ***intensive lifestyle education for individuals with high blood pressure*** as an essential part of high blood pressure management control.
- Recommend the ***addition of medication*** to control high blood pressure according to clinical practice guidelines.
- Encourage the individual with high blood pressure and his/her family to be ***active participants*** in his/her management plan, and provide ***monitoring and follow-up*** to

support healthy behavioural changes and ensure that medications are taken appropriately.

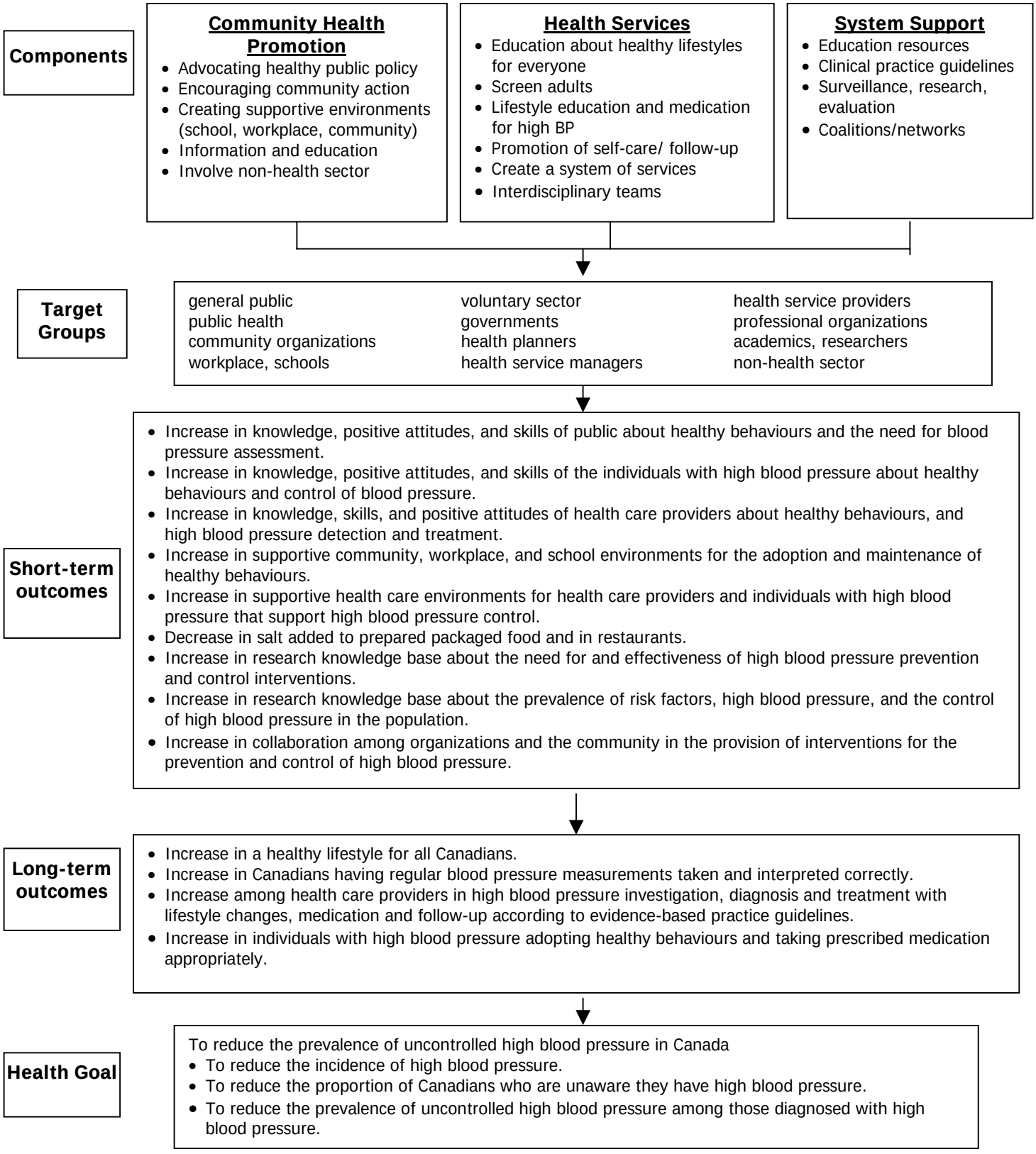
- Organize the ***delivery of health services*** to ensure they are accessible, effective, and efficient including the use of interdisciplinary teams for service delivery, a primary health service team as first response, and specialist assistance as needed. Use information technology to facilitate screening and follow-up.

System Support

- Advocate for ***sufficient resources*** to implement the high blood pressure prevention and control initiative.
- Develop and provide ***education resources*** on healthy behaviours and prevention and treatment of high blood pressure for individuals, families, and health service providers.
- Develop and disseminate ***clinical practice guidelines*** to health care providers, including undergraduate and postgraduate students and practicing professionals. Provide education on effective ways to assist individuals in adopting healthy lifestyles and taking medication as prescribed.
- Conduct ***surveillance, research, and program evaluation*** to provide the evidence base for the high blood pressure prevention and control program.
- Maintain or develop ***coalitions or networks*** at the local/regional, provincial/territorial, and national levels to facilitate effective planning, collaboration, and communication and effective use of resources within the health and non-health sectors.

Appendix A includes a list of possible activities within each of these strategies for each of the goals.

Figure 24 Canadian High Blood Pressure Prevention and Control Program



TOWARD IMPLEMENTATION: RECOMMENDATIONS FOR ACTION

The Canadian Coalition for High Blood Pressure Prevention and Control recommends the following next steps to decrease morbidity and mortality associated with high blood pressure in Canada.

1. Make high blood pressure prevention and control a priority for federal, provincial, and territorial governments.
2. Provide dedicated funding to support a national coalition involving health professionals, government, industry, voluntary organizations, and all stakeholders to coordinate the Canadian Prevention and Control of High Blood Pressure Strategy.
3. Implement a public awareness campaign on the risk factors for, screening of, and benefits of the control of high blood pressure.
4. Develop and implement interdisciplinary models of primary health service that support effective preventive practices including risk factor reduction, screening, and blood pressure control programs using information technology to facilitate evidence-based practice.
5. Provide ongoing education to health service providers through professional associations on clinical practice guidelines for high blood pressure prevention and control.
6. Negotiation by the Health Protection Branch with the food industry to decrease salt in prepared food and to use a salt substitute with a lower sodium concentration.
7. Promote physical activity and healthy nutrition for all age groups in the population to prevent obesity.
8. Continue research on the causes of high blood pressure and effective treatments, and the evaluation of prevention and control programs.
9. Conduct ongoing surveillance of high blood pressure using existing sources of data on health problems and by conducting periodic population surveys using methodology developed in the provincial heart health surveys.

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APPENDIX A

Activities for the Prevention and Control of High Blood Pressure in Canada

Examples of activities to promote a healthy lifestyle to prevent the onset of high blood pressure.

Strategy	Possible Activities	Targeted to:	Responsibility
Community Health Promotion			
Healthy public policy	• Physical activity – bike lanes, walking trails • Adequate affordable housing • Financial support for families • Reduction in sodium added to packaged, prepared food and in restaurants	General public	Local government Food and salt industry Restaurants, cafeterias
Encouraging community action	• Community group to promote physical activities (for example, cycling) • Self-help groups for stress management	General public	Public Health, voluntary organizations, workplace
Creating supportive environments	• Labeling of heart healthy foods in supermarkets • Availability of healthy foods in workplaces and schools	General public	Food industry Workplace, schools
Information and education	• Social marketing campaigns • School health education curriculum • Community workshops • Workplace education	General public	Public health, health care providers, occupational health nurses
Health Services			
Prevention education	• Discussion of healthy lifestyle during physician/nurse visits • Referral to community programs • Provide interdisciplinary primary health care programs for individual counseling	General public	Health care providers (physicians, nurse, nutritionists, etc)
System Support			
Continuing education of health care providers and development of clinical practice guidelines and education resources	• Develop clinical practice guidelines about lifestyle counseling • Conferences, workshops • Provision of resources for use in the office setting • Internet information distribution • Undergraduate and postgraduate education	Health care providers Academics Students	Universities, professional organizations
Surveillance, research and program evaluation	• Monitor prevalence of high blood pressure in community • Program evaluation • Research effective interventions	Health care providers and managers Government	Universities, researchers, service providers
Creating a system	• Heart Health Coalitions	Organizations	e.g Public Health, voluntary, food industry, workplace

Examples of activities to increase the early detection of high blood pressure in the general population.

Strategy	Activity	Targeted to:	Responsibility
Community Health Promotion			
Healthy public policy	• Professional organizations adopt a formal policy about high blood pressure screening and communicate it to their members and the public.	Health care providers General public	Health professional organizations Federal, provincial/territorial government
Encouraging community action	• Seniors organizations encourage their members to have blood pressure screening. • Neighbourhood organizations encourage screening.	General public	Community groups
Creating supportive environments	• Screening for high blood pressure in workplaces with a referral process and follow-up to primary health service providers.	General public	Workplace
Information and Education	• Social marketing campaign on blood pressure awareness and need for screening.	General public	Voluntary organizations, professional organizations, public health, government
Health Services			
Prevention education	• Education on importance of high blood pressure and need for screening using posters, pamphlets, counseling etc.	General public	Primary health service providers, specialists, hospitals
Screening by primary health service providers	• Set up a tracking system for individuals in the practice. • Identify screening as one person's responsibility in the office. • Conduct screening as part of regular office procedures for all visits. • Set up a system to flag high results on screening and have a formal system for education and follow-up.	Individuals in practice	Primary health service providers
System Support			
Continuing education of health care providers and development of clinical practice guidelines and resources	• Disseminate existing guidelines. • Develop and disseminate clinical practice guidelines for implementation of a screening program.	Health care providers	Health professional organizations Coalitions
Surveillance, research, and program evaluation	• Evaluate the effectiveness of awareness raising and screening programs. • Monitor the awareness levels in the population and screening.	Health care providers, manger, government	Researchers
Network /coalitions	• Add the early identification of high blood pressure to the work of community Heart Health coalitions.	All those involved in program	Heart Health Coalitions NCPCHP

Examples of activities to promote the appropriate diagnosis and optimum treatment and follow-up of individuals with high blood pressure

Strategy	Activity	Targeted to:	Responsibility
Community Health Promotion			
Healthy public policy	• Advocate for legislation for reduced salt in prepared foods. • Advocate for public policy for adequate funding for medication for those who need financial support.	Federal government Provincial government	Health professional associations, community groups, public health, heart health coalitions
Encouraging community action	• Self-help weight control programs.	Individuals with high blood pressure who are overweight	Health care providers
Creating supportive environments	• Create bike and walking trails.	Individuals with high blood pressure	Local government
Information and education	• Group education programs on high blood pressure. • Workplace education programs. • Pharmacy education at time of filling prescriptions.	Individuals with high blood pressure	Local health care providers Occupational health nurses Pharmacists
Health Services			
Primary health service	• Interdisciplinary team with nutritionists, psychologists, nurses. • Formal follow-up system with reminders by phone and letter. • Education via video tape, pamphlets, internet, etc.	Individuals with high blood pressure	Primary health service providers Provincial governments
Specialist care	• Interdisciplinary clinics. • Formal follow-up system with reminders by phone and letter. • Education via video tape, pamphlets, internet etc.	Individuals with high blood pressure who cannot be controlled in primary health service	Specialists, hospitals, provincial governments
System Support			
Continuing education of health care providers and development of clinical practice guidelines and resources	• Continue to update clinical practice guidelines. • Local professional groups can meet to discuss the implementation of clinical practice guidelines in their community.	Health care providers	Health professional assoc. Local health care provider group
Surveillance, research and program evaluation	• Ongoing surveys of prevalence of treated and controlled high blood pressure. • Research on effectiveness of interventions.	Managers, voluntary/ Professional associations, government, researchers	Local public health, provincial and federal government.
Network /coalitions	• Local network of all providers meet to ensure continuity between primary health service site, pharmacy, specialist, lifestyle support organizations.	Those involved providing service	Heath care providers, government, voluntary organizations, pharmaceutical industry