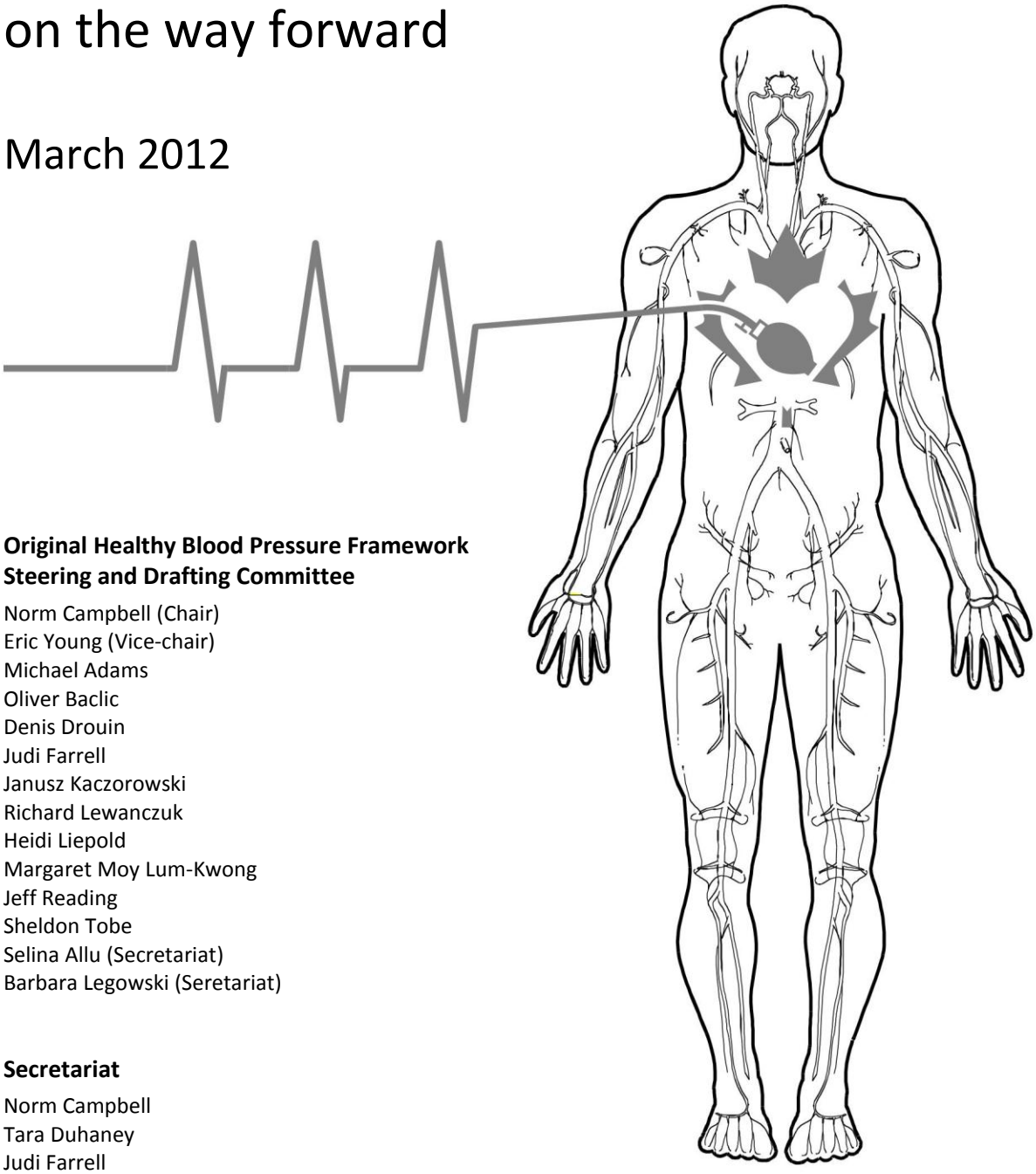
Pan Canadian Framework on the Prevention and Control of Hypertension: a discussion paper on the way forward

March 2012



Original Healthy Blood Pressure Framework Steering and Drafting Committee

Norm Campbell (Chair)
Eric Young (Vice-chair)
Michael Adams
Oliver Baclic
Denis Drouin
Judi Farrell
Janusz Kaczorowski
Richard Lewanczuk
Heidi Liepold
Margaret Moy Lum-Kwong
Jeff Reading
Sheldon Tobe
Selina Allu (Secretariat)
Barbara Legowski (Seretariat)

Secretariat

Norm Campbell
Tara Duhaney
Judi Farrell
Jocelyne Bellerive
Eric Young

This document has been prepared with funds provided by the Public Health Agency of Canada and the HSFC CIHR chair in Hypertension Prevention and Control under the auspices of Hypertension Canada. The information herein reflects the views of the authors and is not officially endorsed by the Government of Canada.

The Healthy Blood Pressure Framework was developed in 2010/2011 with a feedback and consultative phase from March 2011 to December 2011. This framework could not have been completed without the efforts and support of many individuals, national and non-governmental organizations.

Gratefully acknowledged is the Public Health Agency of Canada for funding the French translation of the draft Framework; Denis Drouin and Jocelyne Bellerive for their support with finalizing the French translation of this report; and Tara Duhaney for updating key content pieces based on consultative feedback.

The Framework is expected to receive ongoing comment and input with formal revisions taking place every 2 years.

Use of this Resource

Endorsement

Because this paper represents a long-term plan on the successful prevention, reduction and management of hypertension in Canada, further dissemination of this Framework for endorsement to national policymakers, government decision-makers, leaders in non-governmental organizations is encouraged.

Suggested citation

Healthy Blood Pressure Framework Steering and Drafting Committee (2012) for the Healthy Blood Pressure Framework Steering and Drafting Committee. *Pan Canadian Framework on the Prevention and Control of Hypertension: a discussion paper on the way forward*.

Key messages

Canada had almost 6 million people diagnosed with hypertension in 2006-07. The number is expected to rise as we have been largely ineffective with prevention at the population level, leaving high blood pressure to be almost inevitable with advancing age.

Healthcare systems across Canada are spending billions of dollars treating hypertension and the diseases directly attributed to it – two-thirds of stroke and half of all heart disease – and associated with it – dementia and kidney failure. Almost half of all people in Canada over age 60 are taking medications to control blood pressure. In 2003, antihypertensive drugs alone cost more than $1.7 billion, and each subsequent year medication use has gone up. Approximately one half of all direct medical costs of cardiovascular disease are due to hypertension and its related diseases. Despite the investment, these diseases are the leading causes of premature death. This need not be the case – hypertension is highly preventable.

Healthy lifestyle is at the heart of healthy blood pressure – it can prevent blood pressure from rising and can lower high blood pressure. It amounts to a diet rich in fruits and vegetables, low in sodium and saturated fats, combined with regular physical activity, healthy body weight, no smoking and low intake of alcohol if consumed at all. But achieving and sustaining a healthy lifestyle is a huge challenge to many people. Individuals can have little or no control over certain circumstances in life and in their local built environments that together affect health including blood pressure.

In 2000, the hypertension community in Canada developed a National Strategy for High Blood Pressure Prevention and Control. Ten years later, thanks to strong and steadfast interdisciplinary partnerships among health professionals, scientists and researchers, non-government and government organizations and the private sector, Canada has a rigorous, systematic and transparent process for developing and disseminating hypertension management recommendations and we have the highest reported rates of treating and controlling hypertension in the world.

More needs to be done. There are avenues for population health promotion to improve and maintain vascular health predicted to both save billions of healthcare dollars and improve the health and quality of life of the Canadian population. In addition, Canada's diverse and hard-to-reach communities can benefit from what has been proven effective to manage hypertension.

A team of health and hypertension experts from across Canada has prepared this Healthy Blood Pressure Framework, broad in scope and inclusive of what has been achieved to date. It is offered to members of Canada's healthcare community, from national to local levels, as the basis for discussions on the focus of two tracks for future action: one at the population level to promote vascular health and healthy blood pressure and a second for people with hypertension to further improve management of their blood pressure.

Executive Summary

Almost 6 million people in Canada, about 1 in 5 adults, were living with hypertension in 2006-07 – with blood pressure ≥ 140 systolic or ≥ 90 diastolic mm Hg. Add to this some 15% of young adults under 39 years of age and an estimated 2% of children and youth up to 19 years of age who already have high normal blood pressure – they are at significant risk of becoming hypertensive as they get older.

Rising blood pressure over the long term is associated with the development of atherosclerosis – the main risk for premature death (before the age of 65). It leads to a range of vascular diseases, the most common being hypertension, which itself is a risk factor for stroke, heart and kidney failure and dementia. Healthcare systems across the country are spending billions of dollars treating hypertension. In 2003, hypertension costs the Canadian health care system an estimated $ 2.4 billion ($73 per capita), physician, prescription drug and laboratory investigation costs. It it is the most expensive cardiovascular disease with total direct health expenditures being similar to stroke, heart attack, and other ischemic heart diseases combined. In 2003, antihypertensive medications alone cost over $1.7 billion in Canada, with each subsequent year showing a linear increase in medication use.

Thanks to research, we know that in "westernized" societies such as Canada, hypertension and increased blood pressure are highly preventable. A significant proportion of the current prevalence of hypertension is attributed to modifiable risk factors, in other words, lifestyle. Healthy lifestyle is at the heart of healthy blood pressure – it can prevent blood pressure from rising and can lower high blood pressure. It amounts to a diet rich in fruits and vegetables (high in potassium and fibre), low in sodium and saturated fats, combined with regular physical activity, healthy body weight and avoidance of tobacco use and/or excessive alcohol intake.

Achieving and sustaining a healthy lifestyle is a huge challenge to many people. There are elements in the built environment over which individuals have little or no control that have negative effects on their health including blood pressure. Witness the alarming patterns of poor diet and lack of physical activity contributing to rising blood pressure everywhere, in adults and children. Add to this that almost 1 in 4 young adults in Canada smoke, nearly 30% of adults under 39 years of age have high unhealthy lipid levels and that diabetes is appearing more frequently in younger age groups, in part a function of excess body weight. In some Canadian ethnic and cultural groups, namely Aboriginal peoples and those of Chinese, South Asian, Filipino and black decent prevalence rates are even higher. The incidence and prevalence rates of vascular diseases can be expected to rise if no action is taken to help people maintain healthy blood pressure. *We can do better.*

Action at the population level is imperative. By focusing on poor diet and lack of physical activity, action for healthy blood pressure joins other initiatives underway or being advocated in Canada at federal, provincial and territorial levels – for health

promotion/healthy living, heart health, the prevention of cancer, diabetes and renal disease. All have the same message – intervene upstream and in the environments where people live. A complex mix of socio-economic factors is at play over the life course, influencing the way people live and the choices they make, and these differ widely. In Canada, the extent of our geographic and cultural diversity adds emphasis to factors such as rural and remote location and ethnicity. Among Aboriginal peoples, there are social, economic and cultural factors influencing the health disparities, including prevalence of cardiovascular disease, between Aboriginal and non-Aboriginal Canadians.

At the same time, there are successes worth celebrating. Since 2000, when the last National High Blood Pressure Prevention and Control Strategy was released, Canada has become a leader in the early detection of high blood pressure, its treatment and overall management. Strong partnerships between government, non-government and private sectors have resulted in Canada having the highest reported national rates of treating and controlling hypertension in the world. We can build on the achievements.

At the core of Canada's success is that blood pressure can be objectively measured and elevated blood pressure is highly treatable – facts that the hypertension community in Canada has taken advantage of with its concerted focus on the Canadian Hypertension Education Program (CHEP) – a knowledge translation program targeted originally at primary care practitioners, providing annually updated standardized recommendations and clinical practice guidelines to detect, treat and control hypertension. Now in its 12th year, CHEP has extended its reach to engage and inform various healthcare professionals including pharmacists, nurses and dietitians in clinical and community settings. CHEP and its partners e.g. associations of health professionals, non-government organizations and government agencies, also collaborate to increase public awareness of blood pressure and have been central in stimulating and then contributing to the Sodium Reduction Strategy for Canada.

Still more needs to be done to manage hypertension. Almost 1 in 3 people with hypertension have uncontrolled blood pressure; there is evidence that healthcare professionals are still misdiagnosing hypertension; and almost 1 in 5 people with high blood pressure are not aware of their condition.

What this Framework offers is a basis on which the members of Canada's healthcare community, from national to local levels, can begin discussions for an expanded plan of action for healthy blood pressure. It summarizes why high blood pressure is such an alarming public health concern, describes the achievements to date in hypertension prevention and management in Canada, gives the status of lifestyle factors and determinants relevant to blood pressure and presents future areas of work. It concludes with a vision, 9 objectives for 2020 and 7 sets of recommendations. Among the tasks for those who join the consultative process expected in mid 2011 will be prioritizing the actions proposed in this Framework into an implementation plan.

Vision

The people of Canada have the healthiest blood pressure distribution, lowest prevalence of hypertension and the highest rates of awareness, treatment and control in the world.

Objectives for 2020

1. The prevalence of hypertension* among adults in Canada is reduced to13%.
2. 90% of adults in Canada are aware of the risk of developing hypertension and of the lifestyle factors that influence blood pressure.
3. 85% of adults in Canada are aware that high blood pressure increases the risk of major vascular disease (stroke, heart attack, dementia, kidney failure, heart failure).
4. 95% of people in Canada who have hypertension are aware of their condition.
5. 90% of those with hypertension are attempting to follow appropriate lifestyle recommendations
6. 40% of Canadians initially diagnosed with hypertension will become normotensive through lifestyle therapy
7. 87% of people unable to be successfully treated for hypertension through lifestyle therapy have appropriate drug therapy
8. 78% of people on drug therapy have hypertension under control
9. Aboriginal populations have similar rates for blood pressure health indicators as the general population.
10. Populations at higher risk have similar rates for blood pressure health indicators as the general population.

Overarching Recommendations

Build healthy public policy

Develop one comprehensive multi-sector strategy whose goal **i**s for people in Canada to meet the nationally recommended benchmarks for physical activity and diet (including the recommended dietary reference intakes for nutrients and especially sodium).

Re-orient/redesign the health services delivery system

Use an integrated interdisciplinary primary healthcare team approach focusing on healthy living in chronic disease management. A healthy blood pressure/hypertension management approach in Canada – with its partnership base and continuum of health promotion, disease prevention, early detection, treatment and control – is a best practice model for how to prevent and control other chronic conditions and diseases, such as diabetes.

Build partnerships to create supportive environments and evolve the healthcare system

Expand and maintain the partnerships whose contributions have been integral to the current Canadian successes in lowering and controlling hypertension. Build new partnerships to better integrate disease management with population health promotion, engaging all levels of government, health organizations and healthcare professionals, non-government organizations, academics, relevant institutions and corporations/businesses.

Strengthen community action

Plan, implement and evaluate programs which support community action in setting local priorities and which develop individuals' sense of control and resilience in the prevention, control and management of hypertension in settings where they live, work and play. Consult and engage with community members and organizations to adopt evidence-based health promotion and disease prevention services and structures.

Develop personal skills for better self-management

Ensure all people in Canada have the resources, knowledge and ability they need to optimally prevent, detect and control hypertension recognizing this recommendation is highly dependent on implementing and maintaining supportive environments.

Improve decision support

Promote a culture of evaluation and continuous quality cycles in the collection of key indicators of high blood pressure prevention, detection, treatment and control, and evaluate the uptake of findings – that the knowledge about the processes and outcomes of interventions is making a difference.

Optimize information systems

Use rapidly evolving information technology and systems to their ultimate potential to transfer knowledge on how to improve hypertension prevention, detection, treatment and control.

Table of Contents

1 The public health importance of high blood pressure 1

Disease Burden of High Blood Pressure 2

Cardiovascular and Cerebrovascular Diseases 2

Renal Failure 3

Dementia 3

The Profile of High Blood Pressure in Canada 3

2 Achievements in High Blood Pressure Management in the Last Decade 7

Health Outcomes 7

Hypertension Management Processes 8

Strengthened and Expanded Partnerships 11

Hypertension Canada 11

Heart and Stroke Foundations 13

Canadian Stroke Network 14

Canadian Chair in Hypertension Prevention and Control 14

Government of Canada 15

Multi-stakeholder Working Group for Sodium Reduction 15

National Surveillance System Development 16

3 Lifestyle Factors affecting Vascular Disease – Status, Trends and Initiatives that Address Them 18

Diet 18

Physical Activity 20

Tobacco 20

Alcohol 21

Stress 21

Weight 22

Dyslipidemia 23

Diabetes 24

Action on Lifestyle Factors 25

Policies and Legislation (1997-2007) 25

Federal/Provincial/Territorial Collaboration and Coordination 25

Other National Initiatives 26

4 Social Determinants and High Blood Pressure 27

5 Future work to achieve healthy blood pressure across Canada's populations 29

An expanded framework for action 29
Strategic team-based evaluation and research 31
Secure resources and support 33
An international role for Canada 34
Specific gaps and opportunities for research, knowledge translation and action 34
Build healthy public policy 34
Re-orient/redesign the health services delivery system 35
Create supportive environments 37
Strengthen community action 38
Self-management/develop personal skills 39
Decision support 40
Information systems 42

6 Towards Healthy Blood Pressure 43

Vision 43
Objectives for 2020 43
Recommendations 47
Build Healthy Public Policy 47
Re-orient/redesign the health services delivery system 48
Build partnerships to create supportive environments and evolve the healthcare system 49
Strengthen community action 50
Develop personal skills for better self-management 50
Improve decision support 51
Optimize information systems 53

Appendix 1: International Perspective **..... 64**

Appendix 2: An Historic Overview of Prevention, Detection, Treatment and Control of High Blood Pressure in Canada **..... 76**

Appendix 3: The Canadian Hypertension Education Program (CHEP) **..... 96**

1 The public health importance of high blood pressure

The health of the blood supply – the vascular system – affects the health of the whole body and its organs. While risk for vascular damage and with it the risk for several diseases was once attributed to a "cut-off" blood pressure in adults of 140/90 mm Hg, it is now understood to start when blood pressure rises beyond 115/75 mm Hg and it increases progressively and linearly with blood pressure elevation. Once high normal levels are reached, compared to optimal blood pressure, they are associated with a three-fold greater risk of progression to hypertension and approximately double the risk of cardiovascular disease (CVD) (independent of hypertension). (1)

In 2000, 26% of the adult population around the world had hypertension. The number is predicted to increase to 42% by 2025 as people live longer (2). Hypertension is the leading risk for premature death in the world, responsible for 13% of mortality. Accounting for its impact on death plus disability, it is attributed to 6% of disability adjusted life years (DALYs) lost globally, with over half of the loss affecting middle-aged people in both economically developed and developing countries. (3)

Category	Blood pressure (mm Hg)
Risk begins	Systolic ≥ 115 and diastolic ≥ 75
High Normal Blood Pressure	Systolic 130 to 139 or diastolic 85 to 89
Hypertension	Systolic ≥ 140 or diastolic ≥ 90
Stage 1 hypertension	Systolic 140 to 159 or diastolic 90 to 99
Stage 2 hypertension	Systolic ≥ 160 or diastolic ≥ 100
Hypertension among individuals with diabetes or kidney disease	Systolic ≥ 130 or diastolic ≥ 80

Adapted from: Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (6)

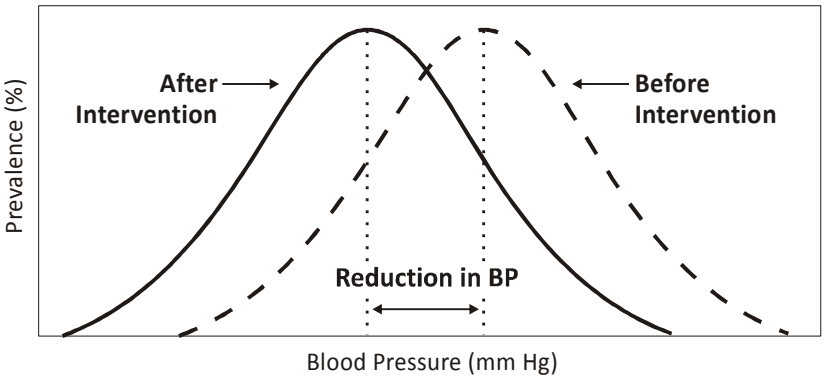
What is alarming is that even with a growing understanding of its cause and knowing that in some societies it does not exist (4), prevention at the aggregate level has been largely ineffective in Canada, leaving high blood pressure to appear almost inevitable with advancing age. Similarly in the United States, the Framingham Heart Study reported in 2002 the estimated lifetime risk of hypertension to be approximately 90% for men and women 55 to 65 years of age who were non-hypertensive. Among people 65 years and older, if blood pressure is in the 130–139/85–89 mmHg range, the Study found that 50% will be hypertensive in four years, and in the same period, for those with blood pressure between 120–129/80–84 mmHg, 26% will have hypertension. (5)

Treating hypertension with medication is expensive. It is the most expensive CVD with total direct health expenditures being similar to stroke, heart attack, and other ischemic hearts diseases combined. If the direct costs of diseases caused by hypertension are added to independent hypertension costs, hypertension overall accounts for almost half of all direct CVD healthcare spending. (7) In 2001 alone, worldwide direct medical costs related to elevated blood pressure came to at least $370 billion US – about 10% of developed countries' healthcare expenditures. If indirect costs are added e.g. welfare losses from premature death, the costs could be nearly 20 times higher. (8) In Canada,

the costs of hypertension related physician visits, laboratory tests and medications were estimated in 2003 to be almost $2.4 billion. (9)

Yet blood pressure at the population level is amenable to change. (10) Finland for example has taken broad based approaches including regulations to support improved lifestyle and limit dietary sodium, successfully lowering the average population blood pressure by over 10 mmHg in 30 years. (11) Even small decreases in blood pressure can result in substantial reductions in the burden of blood pressure related diseases, demonstrated in Figure 1.

FIGURE 1: Changes in Blood Pressure Distribution and Estimated % Reductions in CVD-related Mortality



Reduction in BP (mm Hg)	Reduction in Mortality (%)		
	Stroke	CHD	TOTAL
2	-6	-4	-3
3	-8	-5	-4
5	-14	-9	-7

Source: Whelton PK, He J, Appel LJ, Cutler JA, Havas S, Kotchen TA, Roccella EJ, Stout R, Vallbona C, Winston MC, Karimbakas J; National High Blood Pressure Education Program Coordinating Committee. Primary prevention of hypertension: clinical and public health advisory from the National High Blood Pressure Education Program. JAMA. 2002; 288:1882-88.

Disease Burden of High Blood Pressure

Cardiovascular and Cerebrovascular Diseases

High blood pressure causes atherosclerosis – the main cause of vascular diseases, the most common being cardiovascular – ischemic heart disease, myocardial infarct, congestive heart failure – and cerebrovascular – stroke. Every 20 mm Hg systolic or 10 mm Hg diastolic increment upward in blood pressure doubles the mortality rates for ischemic heart disease and stroke. (12;13) Increased blood pressure (> 115/75 mmHg) is attributed to 54% of strokes and 49% of myocardial infarctions worldwide. (14–16)

Although the mortality rates for ischemic heart disease and stroke have fallen in Canada in recent years, cardiovascular and cerebrovascular diseases remain a major cause of death, accounting for almost one-third of all deaths. In 2007, this amounted to about 76,000 deaths of which almost 33,000 were among elderly people over 85 years of age

and about the same number among younger people between 45 to 64 years of age. (17) Among Aboriginal peoples in Canada, the rate of developing and dying of heart disease and stroke is twice that in the rest of the population. (13)

Renal Failure

Vascular disease affects the kidneys – 27% of the kidney failure is attributable to high blood pressure, second only to diabetes (45%). (18) However in people with diabetes, 50% of renal failure is attributable to hypertension and, unlike lowering glucose, lowering blood pressure has been shown to reduce the progression to renal failure.(19–21) Similarly in other forms of renal disease, hypertension is often central to the progressive loss of function that leads to renal failure.(18)

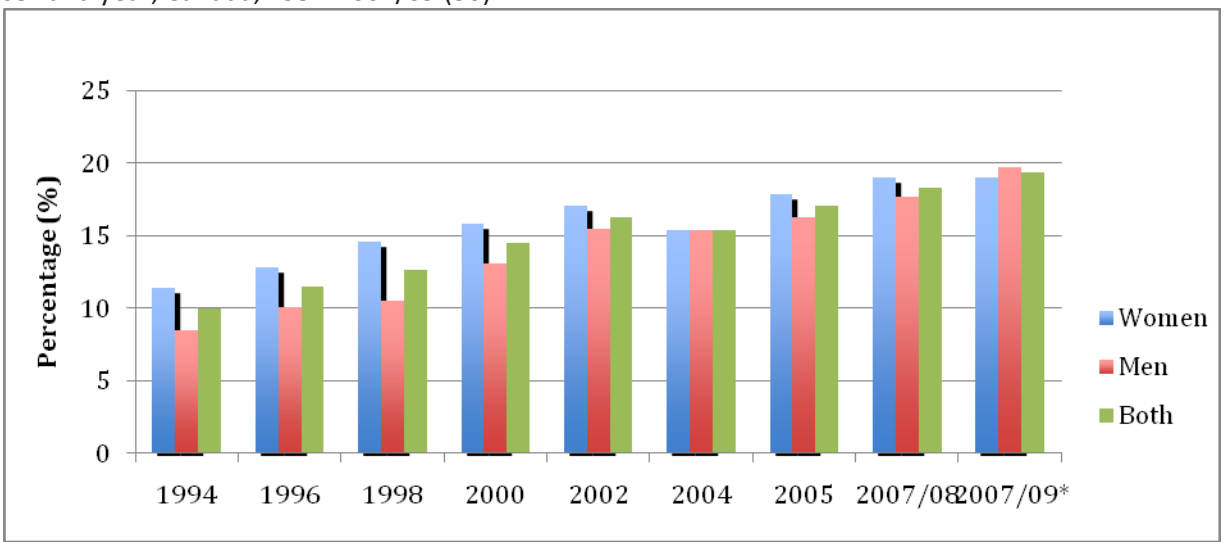
Dementia

Individuals with high systolic blood pressure are prone to cerebrovascular disease that constitutes a significant risk for dementia. In Canada, the Alzheimer Society estimates that the incidence of dementia will more than double in the period 2008 to 2038. (22–24) Early data suggests treatment of hypertension may prevent or slow the progression of dementia.(25)

The Profile of High Blood Pressure in Canada

In 2006-07 nearly six million people in Canada were diagnosed with hypertension (prevalence). (26) Figure 2 shows prevalence over the last few years to be climbing slowly (27) but as physicians become more aware of hypertension and people overall live longer, the rate is expected to accelerate. Add to this the high rates, particularly among young people, of the main risk factors for high blood pressure – lack of physical activity, excess weight and unhealthy diet (5) – and prevalence is certain to rise. Already in 2003, antihypertensive medications cost over $1.7 billion to healthcare systems in Canada with each subsequent year showing a linear increase. Almost half of all people in Canada over age 60 are taking drugs to control high blood pressure.(28;9;29)

FIGURE 2: Percentage of the population age 20+ years with diagnosed high blood pressure, by sex and year, Canada, 1994-2007/09 (30)



* Wilkins K, Campbell NRC, Joffres MR, McAlister FA, Nichol M, Quach S et al. Blood pressure in Canadian adults. Health Reports. 2010;21:1-10.

Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada. Data from the Canadian Community Health Survey (various years) and the Canadian Health Measures Survey 2007/09 (Statistics Canada).

Between 2007 and 2009, about one in five people in Canada had high normal blood pressure. (30) Even young adults – about 15% of those between 20 and 39 years of age – had higher than optimal blood pressure (120-139/80-89 mmHg) (30). These blood pressure levels are associated with coronary atherosclerosis 20 years later and with a much higher rate of developing hypertension. (31) Furthermore, the risk of vascular disease increases as blood pressure rises even within the normal range e.g. about one half of stroke, heart and kidney disease is caused by increases in still normal blood pressure (3;32) (but the relative risk is much higher at the upper end than the lower end).

Hypertension and high normal blood pressure are also found among children and adolescents. A child with high normal systolic blood pressure has three to four times the risk of developing high blood pressure in adulthood as a child with normal systolic pressure. (33) In Canada between 2007 and 2009 an estimated 0.8% of children and youth aged 6 to 19 had hypertension and 2% had high normal levels. (34) Where blood pressure is increasing among children and adolescents, it is being attributed to physical inactivity, unhealthy diet and overweight/obesity. (35)

Crucial in Canada's context is recognizing that people with particular cultural and ethnic backgrounds have different prevalence rates of hypertension. (36) An example is high blood pressure prevalence among First Nations adults, consistently higher compared to other adults in Canada: almost 8% in the 30-39 age group compared to 4% in other adults; in the 40-49 age group, 16% compared to 10%; and among those 50-59 years of age, 31% compared to 22% in other adults. (37) Another group found to have a

significant difference in the prevalence of hypertension is black adults: 49.8% among those 40-59 years of age resident in Ontario compared to 22.6% of the overall population in the same age group in the province. (38)

Hypertension and increased blood pressure is nearly always an unintended consequence of lifestyle and is therefore highly preventable. What the diagnosis of high normal blood pressure offers is a window for early modification of lifestyle to lower pressure, delay progression to hypertension or avoid it altogether. Yet it is a huge challenge for individuals to change behaviour and sustain it. In Canada, despite ongoing media coverage and education campaigns, 85% of adults are not active enough to meet Canada's physical activity recommendation. (39) Similarly with tobacco, despite consistent messaging on its harmful effects, in 2008, 18% of the Canadian population aged 15 years and older self-reported as current smokers. (40) Even the familiar and efficacious Dietary Approaches to Stop Hypertension (DASH) diet, recommended since 1997 for individuals with hypertension, has been shown to have poor adherence. (41) Barriers to personal change strategies are numerous and complicated, and can include geographic isolation, social disadvantage, marginalization, lack of motivation, and mental illness, to name a few.

Two mutually reinforcing prongs of action are needed for the prevention and control of hypertension nationally: population level interventions and intensive strategies focused on individuals at higher risk for hypertension. (42) Both, through different approaches, need to address at least two of the main contributors to rising blood pressure, namely poor diet and lack of physical activity. (43)

While adopting population level interventions via policy and system changes (such as in tobacco control) is critical to hypertension prevention and control, so too is the need to systematically identify and target 'high risk 'individuals, defined here as those who are disproportionately vulnerable to experiencing high blood pressure based on defined socio-demographic characteristics and/or those for whom generic hypertension programs do not work[1]. For such groups, interventions need to be tailored to reflect the various determinants of health (47) and how these influence lifestyle and decision-making.

Aboriginal individuals and communities are particularly vulnerable demographic groups[2]. Compared to non-Aboriginal Canadians, Aboriginal individuals experience a higher prevalence of cardiovascular and chronic conditions including diabetes, obesity, cancer, heart disease and hypertension (49). Developing appropriate strategies aimed at the prevention and management of CVDs in the Aboriginal population will need to be based in a solid understanding of the unique social, economic and cultural factors that

[1] Included in this definition are individuals of Chinese, South Asian, decent, black Canadians, Aboriginal Canadians, older (<60 years) individuals and those living in rural/remote locations (38, 44-46)

[2] The term "Aboriginal" refers to individuals who identify with at least one Aboriginal group, i.e. First Nation (North American Indian), Métis or Inuit (Eskimo), and/or those who report being a Treaty Indian or a Registered Indian as defined by the Indian Act of Canada and/or who are members of an Indian Band or First Nation (48)

have compromised, and continue to compromise, the health of Aboriginal peoples and communities.

With blood pressure and hypertension prevalence continuing to rise, there has been an increasing research emphasis on better understanding, and responding to, the way in which individuals' external environments influence health. Strategies are in place and emerging outside the health sector that reflect this. (50) Key among them, and important to blood pressure, is the food supply – addressing food security while pricing food to privilege healthy choices especially fresh produce, eliminating trans fats, and reducing sodium, simple sugars and saturated fats in processed and packaged foods and in what food service establishments prepare. Important as well is scrutiny of the built environment – designing walkable neighborhoods, promoting active transport, giving priority to safe public leisure spaces and evenly distributing healthy food outlets. These actions will integrate well with national and provincial/territorial strategies for e.g. Healthy Living and Heart Health, to the benefit of the health and wellbeing of all people living in Canada.

2 Achievements in High Blood Pressure Management in the Last Decade

Health Outcomes

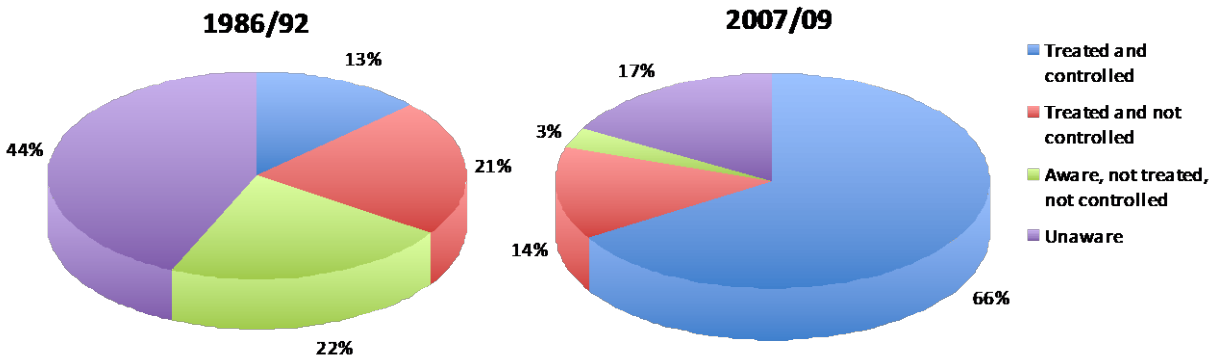
The hypertension community has the advantage of knowing the main causes of hypertension and, to a large extent, the strategies and tactics that can prevent it. Canada has been successful in implementing many of these strategies relative to other countries; Canada now has the highest reported rates of treating and controlling hypertension in the world. Below are the most recent key indicators for Canada and three peer countries with comparable data. Appendix 1 has more details on how hypertension is being addressed in the United States, the United Kingdom and Australia.

Country	Year of survey	Prevalence as % of adult population*	*Awareness of diagnosis**	Pharmacological treatment rate*	Pharmacological control rate*
Canada (45)	2007-9	19%	83%	80%	66%
United States (46)	2008	29%	80%	72%	50%
England (45)	2006	30%	66%	54%	28%
France (47)	2007	31%	52%	43%	22%

** as % of prevalence*

Among people in Canada diagnosed with hypertension, indicators of blood pressure management have improved over the last decade, summarized in Figure 3.

FIGURE 3: Profile of people in Canada with diagnosed hypertension in 1986/92 and 2007/09.



1986/92 Source: Joffres MR, Hamet P, MacLean DR, L'Italien GJ, Fodor G. Distribution of Blood Pressure and Hypertension in Canada and the United States. Am J Hypertens. 2001;14:1099-105.

2007/09 Source: Wilkins K, Campbell NRC, Joffres MR, McAlister FA, Nichol M, Quach S, Johansen HL, Tremblay MS. Blood pressure in Canadian adults. Health Reports. 2010; 21:1-10.

The 2000 National High Blood Pressure Prevention and Control Strategy called for 10% reductions by 2005 in incidence, prevalence, those unaware of hypertension, those with untreated hypertension and those with uncontrolled hypertension. In all cases except one (incidence), the 2000 targets for these indicators were met and surpassed in the 2000-2010 period. (48) The pre- and post-2000 status of these and other key outcome indicators are given below. (An age gender population standardized analysis is being conducted; although the surveys in pre- and post-2000 periods had similar age and gender compositions, there may be changes in some of the values.)

Indicator	Status and values pre-2000	Status and values post-2000; % change from pre-2000.
Incidence of diagnosed hypertension (48)	1998-9: 23.8/1000	2005-6: 22.7/1000 Almost 5% decrease
Prevalence of hypertension by physical measurement (48)	1985-1992: 22%	2007-09: 19% 14% decrease
Unaware of hypertension (48)	1985-1992: 43%	2007-09: 17% 60% decrease
Self-reported diagnosed hypertension but untreated (48;30)	1985-1992: 65%	2007-09: 21% 68% decrease
Prescribing of anti-hypertensive medications (49;50)	Use of diuretics and calcium channel blockers not growing. Annualized antihypertensive drug use increasing by 2% per annum (but decreasing among elderly by 0.6% per annum).	Annual prescription rates of four recommended classes accelerated significantly, including diuretics and calcium channel blockers, with diuretics (inexpensive and generic) showing the largest growth. Annualized antihypertensive drug prescriptions increasing by 10% per annum (increasing by almost 6% among elderly).
Uncontrolled hypertension (48;30)	1985-1992: 87%	2007-09: 34% 60% decrease
Hospitalizations (50–52)	Decreasing age- and sex-adjusted rates of hospitalizations for stroke and congestive heart failure.	Starting in 1999 more than 50% increases in the annual rate of decline for stroke and heart failure (with a strong inverse correlation to the increase in antihypertensive prescriptions).
Mortality rates (50–52)	Decreasing age- and sex-adjusted rates of mortality for acute myocardial infarction, stroke and congestive heart failure	Starting in 1999, the decline in age- and sex-adjusted mortality rates for stroke and congestive heart failure more than doubles and for acute myocardial infarct, the mortality rate drops by more than 50% (with a strong inverse correlation to the increase in antihypertensive prescriptions between 1992 and 2003)

NOTE: The only incidence data available are for diagnosed hypertension and are not available prior to 1998-9.

Hypertension Management Processes

The positive changes that evolved over the last decade are due to significant improvements instituted by the hypertension community largely in the processes through which high blood pressure is managed, guided by the Canadian Hypertension Education Program (CHEP), with some health promotion and disease prevention initiatives taking hold. The changes in the key components of the processes are described below, again comparing their status pre- and post-2000.

Component	Status pre-2000	Status 2000-2010
Information on hypertension management (29;53)	No widely disseminated clear messaging available to primary care practitioners or the public about what was critically important for the treatment of hypertension.	• Core messages from the CHEP promote the need to measure blood pressure at all encounters, assess overall CVD risk, use lifestyle to prevent and control hypertension in all Canadians and treat people with hypertension to recommended targets using combination drug therapy. • Highly systematic and structured annual updating of hypertension management recommendations overseen by the CHEP Recommendations Task Force: systematic annual literature searches per topic subgroup (55); acceptance of only high quality RCT study designs to reduce bias for pharmacological recommendations; applying a refined evidence grading scheme; assessment for revisions to all draft recommendations by a Central Review Committee of methodologists, then opened for comment by national CVD experts, and finally adopted if gain 70% approval of the Recommendations Task Force. • Integrated and extensive hypertension knowledge translation program overseen by the CHEP Implementation Task Force: largely comprising experts in health education and front line primary healthcare professionals who tailor recommendations to their respective disciplines; national primary care organizations, government agencies, non-governmental agencies and pharmaceutical industry actively disseminate recommendations through their professional channels. (See Appendix 2 for publications about CHEP.) • Specific recommendations and implementation programs based on care gaps identified by surveillance (e.g. patient-centered and provider-oriented recommendations for hypertension treatment in diabetics). • Development of a Train the Trainer program targeting key opinion leaders in local primary care communities. • Development of standardized tools for Peer Educators and primary care.
Surveillance (54–56)	No standardized process to identify gaps in treatment or to assess the impacts of strategies to reduce hypertension in Canada	• Increasingly comprehensive hypertension surveillance and monitoring system using existing data and new surveys: national physical measures surveys of blood pressure; analysis of national cross-sectional and longitudinal population-based health surveys to assess diagnosis and treatment levels; use of commercial databases to assess national and regional pharmacotherapy patterns; assessment of national and regional trends in disease complications of hypertension; national system based on provincial administrative health data to determine incidence, prevalence and management of diagnosed hypertension; monitoring of knowledge attitudes and behaviours of hypertensive Canadians; determining educational needs of health care professionals.
Prevention - dietary sodium	Most of the public and health care professional literature on sodium	• Extensive network of healthcare professionals, their respective professional organizations and non-government organizations

Component	Status pre-2000	Status 2000-2010
intake (57)	derived directly or indirectly by the food/salt industry sector.	advocating for reductions in dietary sodium. • Specific knowledge translation program developed for the Canadian public and healthcare professionals on dietary sodium by a board base of healthcare professionals and their respective organizations and non-government organizations • Two websites developed to disseminate information on sodium to healthcare professionals and the public • Extensive media coverage of the health impact of high dietary sodium with media releases led by the Canadian Stroke Network and the Heart and Stroke Foundation. • Multi-stakeholder Sodium Working Group mandated by the federal minister of health to develop a comprehensive strategy to reduce sodium consumption in Canada to recommended levels. • Multi-stakeholder Sodium Working Group recommends interim targets to reach an average consumption of 2,300 mg of sodium per day by 2016 in Canada, endorsed by the federal minister of health and provincial counterparts
Public awareness (54;57;58)	A pilot program for a public awareness campaign on hypertension shows little impact. A 'Heart Health Kit' and a Heart and Stroke Foundation pamphlet "know your blood pressure by heart' developed to aid people with hypertension but the material is not updated or reprinted. A textbook on hypertension for patients is developed by the Canadian Hypertension Society. There is little standardized up-to-date non-commercial public and patient information on hypertension that is widely disseminated or available.	• Development of extensive hypertension knowledge translation program by a Public Education Task Force struck by Blood Pressure Canada for people with or at risk of hypertension. • Direct to public dissemination as well as through the extensive primary care knowledge translation program of the CHEP developed and disseminated multiple knowledge translation tools for people with hypertension aimed at improving self-efficacy in the prevention and management of hypertension. • Recommendations for the public and educational tools for patients, based on healthcare professional recommendations, are annually updated. • People can sign up to be regularly updated with the new hypertension resources at www.hypertension.ca and a national hypertension association for patients is being formed. • Specific survey developed to assess the knowledge, attitudes and awareness of hypertension among Canadians (65) and among those with hypertension.
Developing and advocating policy	Limited approach to advocacy to prevent and control	• Chair in Hypertension as a new leadership position • Sodium program as an advocacy program through Blood Pressure

Component	Status pre-2000	Status 2000-2010
	hypertension through Blood Pressure Canada	Canada, 2006 (66) • Hypertension Canada develops a specific public policy committee in 2010 (63) • Heart and Stroke Foundation and Canadian Stroke Network advocacy focuses on dietary sodium and blood pressure

Strengthened and Expanded Partnerships

The 2000 National High Blood Pressure Prevention and Control Strategy, though not endorsed by either the federal or provincial governments, did serve as a template for action. The healthcare community in Canada responded – it organized itself into partnerships of non-government and government sectors who strategically oriented and leveraged for the most part existing resources and volunteer time towards collaborative projects.

Three partners , with overlapping memberships, have been central to the achievements made to date: the Canadian Coalition of High Blood Pressure Prevention and Control (the Coalition) established in 1984 that became Blood Pressure Canada (BPC) in 2005 and is now part of Hypertension Canada – a volunteer non-profit charitable organization comprising national organizations of health professionals, government, industry, and other voluntary organizations; the Canadian Hypertension Society; and, subsequent to 2000, CHEP – a body of hypertension experts and scientists formalized in 2000 that is now the clinical education arm of Hypertension Canada. Within both of these broad groups, clusters of partners have taken specific roles consistent with their respective mandates to support the overall objectives of the larger group.

Broader and deeper partnerships – developed, maintained and coordinated – are critical for Canada to advance in research, clinical practice, community and population level interventions that will contribute to achieving the next set of goals for healthy blood pressure.

The initiatives and contributions of the various partners in hypertension prevention and management are very briefly described below. It is noteworthy that many of the partners' activities were integrated into and coordinated with CHEP and Blood Pressure Canada programs. An historic overview of the partners' roles and more details are in Appendix 2; CHEP is more fully described in Appendix 3.

Hypertension Canada

Hypertension Canada was important in many of the hypertension management efforts prior to 2000 and was formed in 2010 through merging the resources and expertise in education, policy and research of three organizations – Blood Pressure Canada, the Canadian Hypertension Society (CHS) and CHEP. Regarding education, it has expanded

CHEP (further described below) and is actively promoting the integration of hypertension management recommendations with those for cardiovascular disease (CVD) prevention through the C-Change (Canadian Cardiovascular Harmonization of National Guidelines Endeavour) initiative. C-Change, a project of the Canadian Institutes for Health Research (CIHR), aims to address the need for a common set of clinical practice guidelines for CVD.)

Having assumed responsibility for research, Hypertension Canada will be developing mechanisms to enhance and integrate the CIHR's four pillars of research (biomedical, clinical, health services and population based) around blood pressure. It is also continuing the public policy work formerly done by BPC, now through a Public Policy Committee to address population health, health services, community programs, vulnerable populations and to evaluate policy.

Blood Pressure Canada (BPC)

Prior to merging into Hypertension Canada, BPC had a consistent and broad impact on hypertension management in Canada. Focusing on the past decade, it led the process that resulted in the 2000 National Strategy for High Blood Pressure Prevention and Control, was integral to gathering the partners to develop standardized clinical recommendations for hypertension management that became the foundation for CHEP and led the proposal for a Canadian Chair for Hypertension Prevention and Control. Once the Chair was confirmed (2006), BPC became its public education arm. It developed a process for implementing blood pressure management recommendations, parallel to CHEP but adjusting them for a public audience, providing a wide variety of resources to assist people to become more self-efficacious in preventing and managing high blood pressure.

BCP was also the national non-government leader in dietary sodium reduction. It was active in the effort to revise Canada's Food Guide to have increased prominence for dietary sodium and together with other national health organizations, developed a policy statement that became the banner for non-governmental organization (NGO) advocacy to reduce dietary sodium. BPC went on to establish a Sodium Task Force with over 30 healthcare professionals to develop tools and resources for their associations and the public, was a core organization on the Sodium Strategic Planning Committee and a member of the steering committee of the multi-stakeholder Sodium Working Group.

Canadian Hypertension Society (CHS)

The Canadian Hypertension Society (CHS) was important in many of the hypertension management efforts prior to 2000. It was a founding member of CHEP and was a lead organization within BPC. It funded in part the Canada Chair in Hypertension Prevention and Control, hosted the annual CHEP meetings and otherwise provided critical support to CHEP and Blood Pressure Canada. The Canadian Hypertension Society is made up of researchers and clinicians with a strong interest in hypertension.

The Canadian Hypertension Education Program (CHEP)

Now in its 12th year CHEP is a partnership of over 150 multidisciplinary hypertension experts – healthcare professionals and health scientists from governments, non-government organizations and health and scientific organizations who have been steadfast in their voluntary contributions to annually and systematically update hypertension management recommendations to assist primary health practitioners and patients to deal with hypertension. The improvements noted in the processes of hypertension management pre- and post-2000 are largely attributed to CHEP and in the same period there is a close temporal association between CHEP and the positive changes found in key health indicators for high blood pressure. For more on history and current operations of CHEP, see Appendix 3.

Critical to CHEP's performance is the effective uptake of its recommendations for healthcare professionals and the public. This is achieved through a network of organizations, partners in dissemination: Canadian Cardiovascular Society, Canadian Council of Cardiovascular Nurses, Canadian Diabetes Association, Canadian Pharmacists Association, Canadian Public Health Association, Canadian Society of Internal Medicine, Canadian Society of Nephrology, College of Family Physicians of Canada, Dietitians of Canada, Heart and Stroke Foundation of Canada (and provincial Heart and Stroke Foundations), Kidney Foundation of Canada, Canadian Association Cardiac Rehabilitation, Canadian Heart Failure Network, Canadian Medical Association, Canadian Nurses Association, Canadian Stroke Network as well as the Public Health Agency of Canada and several provincial government programs.

The Canadian Institutes for Health Research (CIHR) (for circulatory and respiratory health), the Public Health Agency of Canada (PHAC), the Heart and Stroke Foundation of Canada (HSFC) and the pharmaceutical industry have provided unrestricted grants and funding.

> "CHEP remains the premiere example of Knowledge to Action as it takes new evidence from inquiry to synthesis to a full set of implementable recommendations each year. Further, these recommendations are adapted into tools for patients and providers with feedback sought to improve the process in the following year's cycle. Finally, the impact of CHEP is monitored with the Outcomes Research Task Force, integrating national and provincial administrative databases with methodological and statistical expertise."
>
> *CHEP Program Report 2010* (59)

Heart and Stroke Foundations

The Heart and Stroke Foundation of Canada (HSFC) was a founding member of CHEP and was involved in the early efforts to reduce dietary sodium as a member of the multi-stakeholder Sodium Working Group and the Sodium Strategic Planning Committee. It is active in both the clinical side of hypertension management and in public awareness:

- Working with healthcare professionals to develop models to improve hypertension

management in healthcare teams (primarily in Ontario) including interprofessional education.

- Distribution of BPC and CHEP materials, including a hypertension toolkit for professionals and blood pressure awareness information for the public.

Provincial Heart and Stroke Foundations (Ontario and Quebec) have been and continue to be active partners in the hypertension community, with some having made contributions beyond their provincial mandates. For example, the Heart and Stroke Foundation of Ontario has:

- Collaborated with the Registered Nurses' Association of Ontario to develop a nursing best practice guideline in 2005 on hypertension – Nursing Management of Hypertension – consistent with CHEP recommendations and endorsed by CHEP.

- Completed a 2006 Ontario Survey on the Prevalence and Control of Hypertension in partnership with the Ottawa Heart Institute and Statistics Canada, an update that includes the first-ever physical measures survey on hypertension in key ethnic groups in Canada.

- Created an interactive eHealth tool – the My Heart & Stroke Blood Pressure Action Plan – that assists people with self-management by providing e-mail support, helping them to track/monitor their progress on blood pressure and lifestyle change, and offering them the option to download and print a report for their healthcare provider.

- Focused investment in hypertension research.

The Heart and Stroke Foundation of Quebec has:

- Published from 2002 to 2011 a newsletter, "Les Actualités du Coeur" whose mission was to facilitate knowledge translation by disseminating clinical practice guidelines on diabetes and cardiovascular diseases, including CHEP's recommendations and summaries.

- Disseminated information and posters to help healthcare professionals to educate patients (and healthcare professionals) at the proper technique for blood pressure measurement.

Canadian Stroke Network

Since 2006, the Canadian Stroke Network has supported dietary sodium reduction primarily by raising public awareness of the relationship between sodium consumption and blood pressure through an extensive series of media launches. It has developed public education resources, sodium consumption guides, numerous articles and lectures and a popular website (sodium101.ca). The Network was a member of the multi-stakeholder Sodium Working Group and the Sodium Strategic Planning Committee.

Canadian Chair in Hypertension Prevention and Control

Starting in July 2006, with funds from the CHS, CIHR and an unrestricted grant from the pharmaceutical company Sanofi-Aventis, a Canadian Chair in Hypertension Prevention

and Control was piloted – a new academic position to run until June 2011. The first Chair, Dr. Norm Campbell at the University of Calgary, has had the mandate to lead and collaboratively develop activities to prevent and control hypertension, among them the enhancement of CHEP, further development of surveillance systems for monitoring and evaluation of interventions, increased public awareness, policy development and advocacy to reduce dietary sodium, and raising the international profile of Canada's success with hypertension management. The position is being renewed through support from HSFC and CIHR.

Government of Canada

Before the Public Health Agency of Canada (PHAC) was created in 2004, Health Canada was the lead federal government department in hypertension prevention and control. Now through PHAC, the federal government supports CHEP and community-based projects for hypertension screening and prevention. Its key roles are to foster and strengthen partnerships and coordinate the activities of various federal departments and provincial/territorial governments. Currently, a Canadian Task Force on Preventive Health Care, established by PHAC, is helping address gaps related to high blood pressure screening.

The federal government has participated in a number of health promotion and disease prevention initiatives – the Heart Health Strategy and Action Plan (2010), the Sodium Reduction Strategy for Canada (2010), the Diabetes Strategy (renewed in 2005) and the Pan-Canadian Healthy Living Strategy (2005). These strategies address risk factors common to a number of chronic diseases and relevant to hypertension.

For policy-related knowledge development, the federal government has supported systematic literature reviews relevant to hypertension and through Statistics Canada, Canadian Institutes for Health Research and PHAC, is building up the components of a comprehensive surveillance system to collect physical measurements, self-reported and administrative data.

Canadian Institutes for Health Research

Over the last decade, CIHR has invested over $100 million per year in cardiovascular research that includes hypertension. It has also funded national projects that have served hypertension management e.g. CHEP meetings, hypertension surveillance, the integration of CHEP recommendations into C-CHANGE, participated in the multi-stakeholder Sodium Working Group, and has funded in part the Canadian Chair in Hypertension Prevention and Control, all noted above.

Multi-stakeholder Working Group for Sodium Reduction

The non-government partners in the hypertension community initiated the movement that has culminated in the 2010 Sodium Reduction Strategy for Canada. (67) They began in 2006 as a lobby of 10 national NGOs and first succeeded in increasing the visibility and improving the sodium-related content in Canada's Food Guide as it was undergoing

revision. At the core of the lobby was a national Sodium Strategic Planning Committee: BPC, CHS, Canadian Cardiovascular Society, Canadian Stroke Network, Canadian Council of Cardiovascular Nurses, Canadian Society of Nephrology, Dietitians of Canada and HSFC. The Planning Committee went on to develop a policy statement on dietary salt reduction for Canada and shortly after it was extensively released across media in 2007, the Government of Canada announced the formation of the Canadian multi-stakeholder Sodium Working Group, chaired by Health Canada. It had representatives from the food manufacturing and food service industries, health-focused non-government organizations, the scientific community, consumer advocacy groups, health professional organizations and government representatives.

In 2010, the Working Group submitted a comprehensive multipronged Sodium Reduction Strategy dependent on food manufacturers and food service establishments reducing the sodium content of their products on a voluntary basis. It called for close government oversight and monitoring, research to aid the effort and broad based education of the public. Subsequently the federal and provincial Ministers of Health and Health Promotion/Healthy Living adopted the interim goal recommended by the Sodium Working Group – a population average sodium consumption target of 2,300 mg/day by 2016 – a 33% decrease from current average consumption. The Ministers also agreed that regulation to limit the sodium content of foods remains an option in case the voluntary approach lacks substantive progress.

National Surveillance System Development

Since 2000, surveillance methods and processes have changed significantly to the extent that Canada now has one of the most advanced national surveillance systems that exist, providing a comprehensive picture of the prevalence, incidence (currently only as diagnosis), treatment, control and complications of hypertension. The table below summarizes the survey instruments that capture national hypertension relevant data.

Particularly important to high blood pressure surveillance is the Canadian Health Measures Survey (CHMS), first administered over 2007-2009. It collects physical measurements and self-reported data; actual blood pressure is captured along with body measurements and cardio-respiratory and musculoskeletal fitness.

Collecting objective physical measures is crucial to understanding the actual status of the health of Canadians. Self-reported data on behaviours have been shown to be subject to bias e.g. recall difficulties. An example is the comparison of self-reported to actual measures of physical activity among adults: according to self-reported estimates, about 53% of adults in Canada are physically active while the CHMS, using accelerometers, found that only 15% of adults in fact meet the recommended level of activity associated with health benefits. (39) With hypertension, because of low awareness levels, prevalence based on self-reporting is underestimated. (68)

Instrument	Date instituted; periodicity	Hypertension relevant data
Canadian Health Measures Survey	Between March 2007 and February 2009; every 2 years	• Blood pressure distribution • Hypertension prevalence • Self reported awareness of the diagnosis • Self reported treatment with antihypertensive medications • Control of hypertension • Anti-hypertension drug use
National Longitudinal Population Health Survey	1994; every 2 years until 2000	• Self-reported diagnosis of hypertension by a health care professional (estimates of incidence) • self reported treatment with antihypertensive medications
Canadian Community Health Survey	2000; up to 2007, every 2 years and since then annually	• Self-reported diagnosis of hypertension by a health care professional • Self reported treatment with antihypertensive medications. • Self reported frequency of measurement of blood pressure • In 4 provinces (i.e. optional), self-reported last time blood pressure checked and barriers to checking
Proprietary Pharmaceutical Databases	Ongoing	• Numbers of antihypertensive prescription drugs dispensed • Costs of antihypertensive drugs • Diagnoses (including hypertension) for visits to physicians
Statistics Canada reporting of Canadian Institute for Health Information data on trends in mortality and morbidity	Ongoing	• National, provincial and territorial data on mortality rates and hospitalizations due to conditions associated with hypertension.
Canadian Chronic Disease Surveillance System (CCDSS)	2009; Ongoing	• Health insurance, physician billing and hospitalizations to which case criteria are applied to estimate incidence and prevalence of diagnosed hypertension with and without diabetes and associated total mortality.
Hypertension Outcomes Survey Trial (HOST) of the CHEP Outcomes Research Task Force	2006; ongoing	• Develops and assesses methodology and tests validity for the CCDSS. • Individualized anonymous data linking hypertension diagnosis, treatment and outcomes at regional, provincial or national levels
Survey of Living with Chronic Disease in Canada – hypertension module	2008/09	• Knowledge, attitudes and behaviours of people diagnosed with hypertension
First Nations Regional Longitudinal Health Survey	October 2002 for 12 months	First Nations communities on-reserve self-reported • High blood pressure (age at which first told of condition, whether currently undergoing treatment or taking medication and whether related to pregnancy)

3 Lifestyle Factors affecting Vascular Disease – Status, Trends and Initiatives that Address Them

This section first presents the levels and trends in Canada for modifiable lifestyle factors for vascular disease. Most of them act at least in part through increased blood pressure. The section concludes with a short summary of actions that are in effect or emerging in Canada to address them. Other factors age-, sex- and genetic-related are considered not modifiable at this time.

Diet

An important determinant of controlled blood pressure is a healthy diet, one that is high in fresh fruits and vegetables, low in saturated fats, trans fats and salt such as the DASH diet (69). Of particular importance to maintaining healthy blood pressure are the consumption levels of sodium, potassium. (69) And emerging from new research is an independent direct association between consumption of sugar-sweetened beverages (fructose) and higher blood pressure levels. (70;71)

Increasing sodium consumption raises blood pressure even in people who eat an otherwise healthy diet. (72;73) The Intersalt study reported in 1997 that “habitual high salt intake is one of the quantitatively important, preventable mass exposures causing the unfavorable population-wide blood pressure pattern that is a major risk factor for epidemic cardiovascular disease”. (74)

High dietary sodium is attributed to 30% of hypertension in Canada and causes increases in blood pressure in normotensive adults, children and infants. The 2004 Canadian Community Health Survey on nutrition found that a very high proportion of people in Canada consume more than the upper limit (UL) of sodium (over 85% of men and 60% of women between 17 and 90 years; 77% of children ages 1 to 3 and 93% of those with ages 4 to 8). If referring to adequate intakes (AI) of sodium, which are the recommended optimal intakes and about one-third lower than the UL, almost 100% of the people in Canada currently over consume sodium. (75)

Blood pressure in early life may be an indicator of risk for adult hypertension. Among children and youth under 18, modest reductions in salt intake have been shown to

cause an immediate drop in blood pressure and if sustained, may lessen the rise in blood pressure with age. (76)

By contrast to sodium, westernized diets are generally deficient in potassium e.g. the NHANES surveys show widespread low potassium intake in the United States. (69;77) If a diet is deficient in potassium, supplementation reduces blood pressure, with both the US Institute of Medicine and the CHEP recommending that this be achieved by increasing the consumption of fresh fruits and vegetables. (69;59)

While the Canadian Community Health Survey does not currently examine potassium intake, it found that in 2004 half of adults and 70% of children aged 4 to 8 did not meet the minimum requirement of five daily servings of fruit and vegetables[3]. (78)

Knowledge about healthy diet is not always sufficient to change behaviour. In the trial of Dietary Approaches to Stop Hypertension (DASH), when the specific foods provided to study participants were combined with advice and support to maintain a healthy diet, there was a reduction in systolic blood pressure of 9 mmHg, expected to reduce the prevalence of hypertension by 17%. (69) (Notably, there was no weight loss in the DASH trial by design.) Advice to follow the Dash diet is much less effective than providing the advice in addition to the food. (79) Table 1 below shows the extent to which salt intake reduction, increased potassium and the DASH diet are estimated to influence hypertension prevalence in the US Population from Selected Lifestyle Interventions.

Lifestyle intervention	References	Anticipated change in hypertension prevalence (range)
DASH diet	Appel et al., 1997 (72)	-17% (14-22%)
Reduce salt intake	Institute of Medicine (69), Joffres (9)	-30%
Increase potassium intake	Whelton et al., 1997 (80)	-5% (4-7%)

Adapted from IOM report – *A population-based policy and systems change approach to prevent and control hypertension*. (63)

[3] Because guidelines for vegetable and fruit intake are now higher than 5 a Day for adults, this data may overestimate Canadian adults meeting current Canada's Food Guide recommendations.

Physical Activity

Lack of physical activity is an important cause of increased blood pressure and many other health risks and diseases. It is estimated to that 17% of hypertension is attributable to physical inactivity and conversely, increased activity can reduce systolic blood pressure by 2 to 4 mmHg. (69)

Objective measures of physical activity from the Canadian Health Measures Survey (2007 to 2009) showed that only 15% of adults in Canada meet Canada's physical activity recommendations. (39)

As for children, Canada's Physical Activity Guide recommends 16,500 steps daily for children and youth to have a healthy weight and to engrain a lifelong active lifestyle. The Canadian Fitness and Lifestyle Research Institute's study – Canadian Physical Activity Levels Among Youth – using pedometers to measure daily steps, found in 2007-09 that 88% of children and youth from 5 to 19 years of age did not accumulate 16,500 steps daily with a notable variation across provinces. (81)

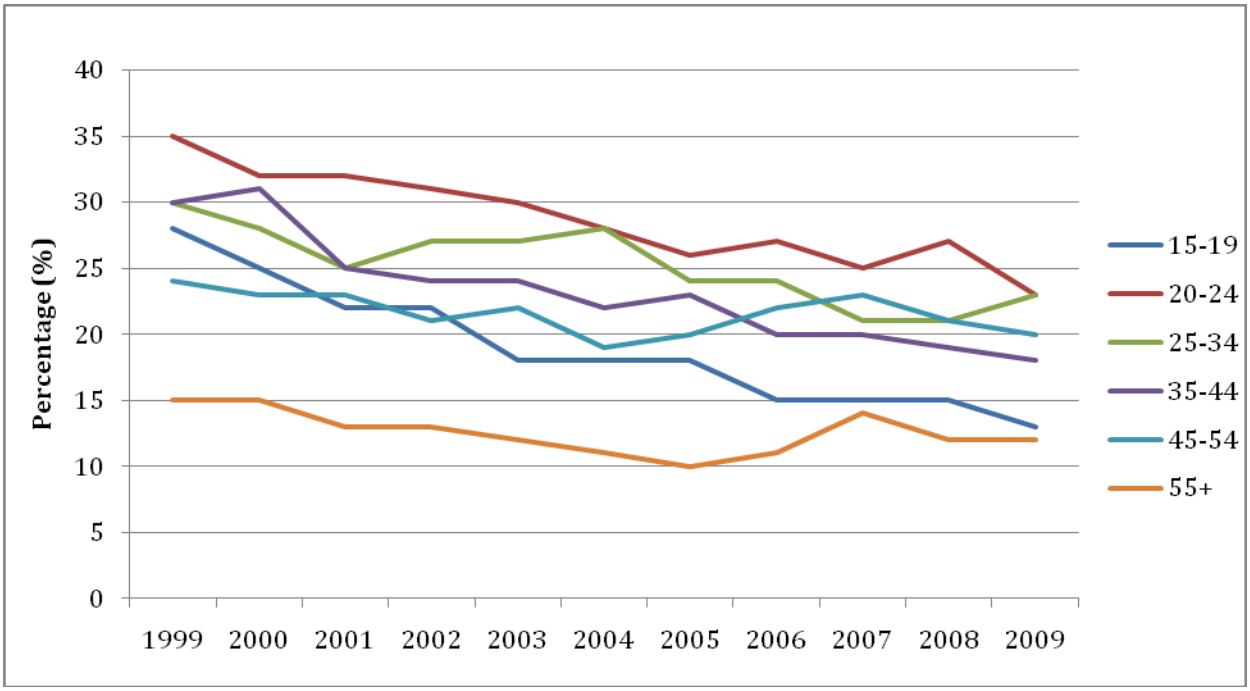
Tobacco

Short-term smoking increases blood pressure. Determining whether there is or is not a casual relationship between regular smoking and long term increases in blood pressure still requires research, but nevertheless, both smoking and hypertension are leading risks for death and disability and their negative health impacts are additive.

Between 1999 and 2009, the overall rate of tobacco smoking declined among people in Canada aged 15 years and older, from 25% to 18%, apparent in Figure 4. (82) In 2009, the age group 20 to 34 years of age had the highest percentage of current smokers at 23%. (82)

There are cultural and ethnic differences in tobacco smoking. For example, in 2004 prevalence of smoking (non-traditional use) among Aboriginal peoples was found to be higher than age-specific national averages: 50% of youth aged 10-19 in a small northwestern Ontario community smoked with the rate climbing to 82% for the 15-19 age group (83); 60% of on-reserve First Nations people between the ages of 18 and 34 smoked; and 70% of Inuit in the Canadian north between the ages of 18 and 45 smoked. (84)

FIGURE 4: Percentage of current smokers by age group and sex, 15+ years, Canada, 1999 to 2009.



Source: Health Canada. Tobacco Use Statistics. Accessed December 6, 2010 at http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/_ctums-esutc_2009/ann-histo-eng.php.

Alcohol

Excess alcohol consumption is associated with a wide variety of social and health consequences including increased blood pressure. An option to consider to lower hypertension prevalence is to reduce alcohol consumption among heavy drinking adults. (69) At an individual level, if intake is reduced from 3-6 drinks per day to 1-2 drinks, both hypertensive and normotensive people experience reductions in blood pressure. (85) The estimated fraction of population level hypertension attributable to excess alcohol intake is 3%. (69)

In 2009, the majority of Canadians self-reported drinking lightly – less than five drinks per drinking occasion; 36% self-identified as "light infrequent" – less than once a week; and 31% were "light frequent" – once a week or more often. Heavy frequent drinking was reported by 5% and heavy infrequent drinking by almost 4%. (86) Important to note is that self-reported alcohol intake generally underestimates actual consumption.

Stress

Good mental health underpins the effectiveness of any program that intends to promote healthy behaviours. As a mental health issue, stress can elicit some coping mechanisms that are unhealthy e.g. smoking, misuse of alcohol, overeating and non-adherence to pharmacotherapy, which among other adverse effects, can contribute to raising blood pressure and can counter control efforts. Unmanaged prolonged stress,

highest among Canadians 25 to 64 years of age, is also associated with biochemical and physiologic risks, among them, increased cholesterol levels, artery damage, irregular heart rhythms and the development of hypertension. (17)

In 2007 23% of Canadians (23% of women and 22% of men) reported “quite a bit “or “extremely high” levels of daily stress. However, overall self-reported stress has decreased by 13% since 2001. (17)

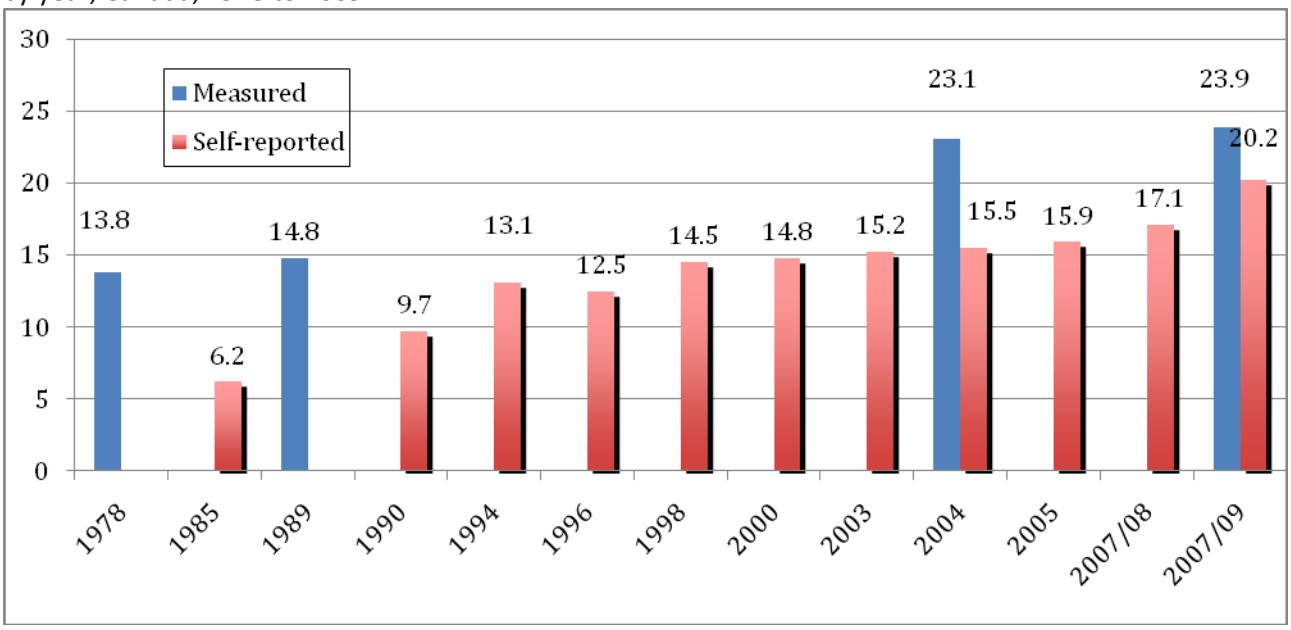
Weight

Increasing body weight is a risk for multiple medical and health issues. While observational studies have found 28% of hypertension attributable to obesity (69) most recent data are indicating that abdominal adiposity (waist to hip ratio greater than one) more than excess body weight (and BMI) is strongly related to cardiovascular disease and hypertension. Furthermore, a substantive amount of the relationship between body weight and hypertension may be indirect (the direct factors being unhealthy diet and physical inactivity). Supporting the position are some long-term studies showing that very extensive weight loss following surgery did not reduce blood pressure or hypertension prevalence suggesting a complex interaction of diet, activity and obesity. (87) Overweight and obesity among young people is of particular concern as studies have shown the likelihood that excess weight in youth persists into adulthood. (88)

In and of itself, the prevalence of obesity has been rising in Canada–measured to be almost 14% among adults in 1978/79, 23% in 2004 and almost 24% in the period 2007–09. (See Figure 5.) In 2004, another 36% of adults were overweight.

Longitudinal data from the National Population Health Survey (1996/97 through 2004/05) show that almost a third of Canadians whose weight had been in the acceptable range in 1994/95 became overweight in the following eight years, and about a quarter of those who had been overweight became obese. (89)

FIGURE 5: Percentage of the population 18+ years that was obese (measured and self-reported) by year, Canada, 1978 to 2009.



Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada. Data from the Canadian Community Health Survey (various years) and the Canadian Health Measures Survey 2007/09 (Statistics Canada). Note: Excludes territories.

In the age group 40 to 69, the percentage of males and females whose waist circumference placed them at a high risk for health problems more than doubled between 1981 (data from the Canada Fitness Survey) and 2007-2009 (data from the CHMS); for ages 20 to 39 years, percentages more than quadrupled.

The regional differences in obesity are dramatic: 19% in BC compared to 34% in Newfoundland in 2004. (90) That same year, among off-reserve Aboriginal people with ages 19 to 50, the rates of overweight and obesity were higher than those among non-Aboriginal populations, primarily attributed to higher rates among Aboriginal women. (91)

Dyslipidemia

The causal effects of dietary lipids on hypertension and increased blood pressure have not been well studied. However unhealthy levels of total cholesterol, triglycerides, and bad cholesterol (low density lipoprotein) are generally associated with higher measured blood pressure. Data from the CHMS from 2007 to 2009 show that 41% of Canadian adults had a high total cholesterol level: 27% among those from 20 to 39 years of age; 47% among people from 40 to 59; and 54% of those aged 60 to 79. (27)

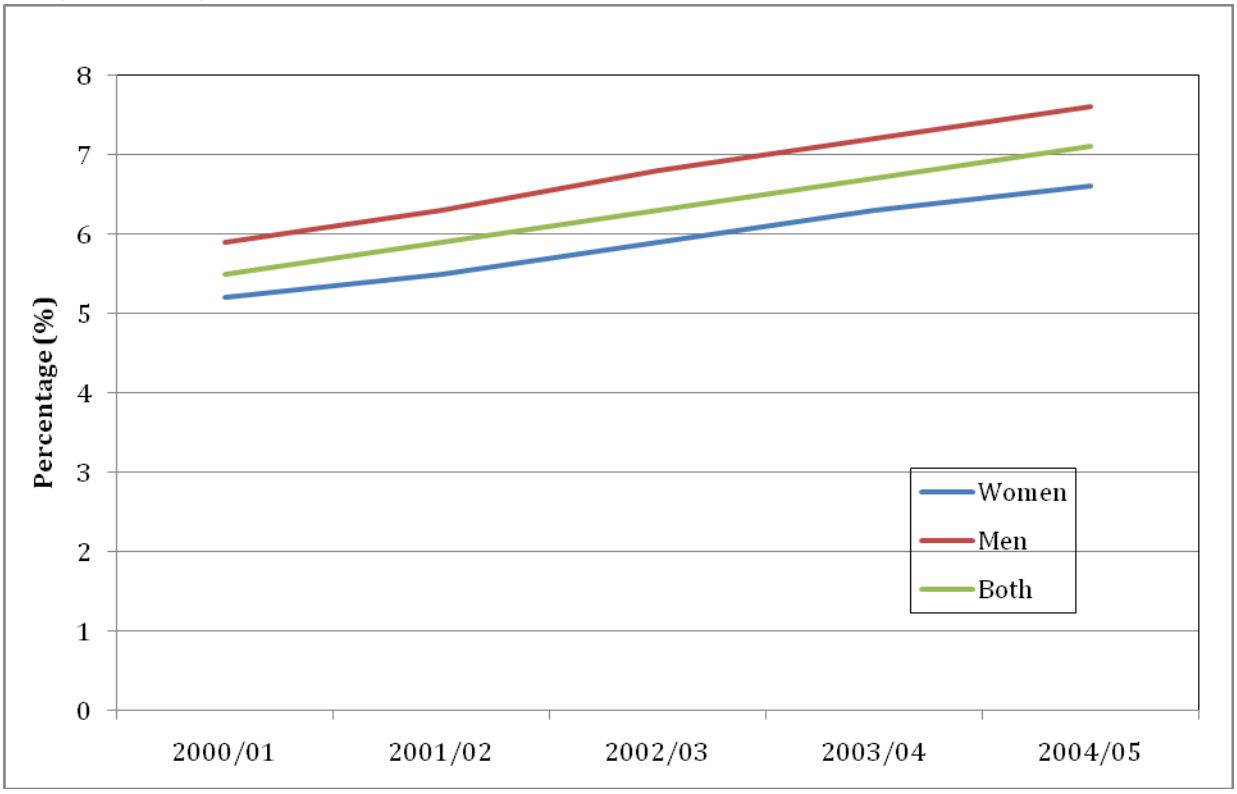
About 36% of adult Canadians had unhealthy levels (too high) of low density lipoprotein cholesterol, 30% had unhealthy levels (too low) of high density lipoprotein cholesterol and about 25% had unhealthy levels of triglycerides, with the latter increasing with age, from 17% among adults aged 20 to 39 to twice that in the 60 to 79 age group. (27)

Diabetes

Most people with diabetes also have hypertension and the prevalence of Type II diabetes – largely determined by lifestyle – is rising in Canada. In 2004/05 about 7% of people in Canada aged 20+ were diabetic, compared to just over 5% four years earlier. Isolating the over 65 age group, about 1 in 5 had diabetes in 2004/05. (4) Among those aware of having diabetes, 75% also have hypertension.

Much of the health risk associated with diabetes is due to coexistent hypertension: 75% of stroke, 50% of kidney failure and 35% of coronary artery disease is attributed to hypertension and it accounts for more than 40% of deaths among people with diabetes. In Canada the mortality rate among people with both diabetes and hypertension is almost 3 times higher than the rate among people with neither diagnosis. (65)

FIGURE 6: Percentage of the population 20+ years with diabetes, by sex and year, Canada, 2000/01 to 2004/05



Source: Public Health Agency of Canada. 2009. Tracking Heart Disease and Stroke in Canada. Accessed December 6, 2010 at http://www.phac-aspc.gc.ca/publicat/2009/cvd-avc/index-eng.php. Note: Data contributed by all provinces and territories as of October 31, 2007.

Diabetes is a critical public health concern for Aboriginal peoples. They are three to four times more likely to experience Type 2 diabetes than non-Aboriginal Canadians. (92)

Action on Lifestyle Factors

Policies and Legislation (1997-2007)

A 2009 environmental scan looking for cancer prevention legislation and policies found a number implemented from 1997 to 2007 by all three levels of government (federal, provincial and local) and school boards. They were addressing the key modifiable risk factors for cancer most of which are common to other chronic diseases and conditions including high blood pressure. The scan also identified a number of areas where a growing consensus is influencing political will towards policy-based responses. Together they are (93):

- the adoption of advertising and promotion restrictions on tobacco products by most provincial and territorial governments that go beyond the federal limitations stipulated in the federal *Tobacco Act*;
- bans on smoking in enclosed public places and workplaces by all Canadian provinces/territories (with some variance in exemptions for Designated Smoking Rooms/Areas);
- growing interest in (and utilization of) policy options promoting healthy food environments in schools;
- an increasing number of provinces/territories implementing daily physical activity requirements in schools;
- increases in economic levers aimed at encouraging young people to be physically active;
- a trend towards encouraging healthy eating and physical activity through provincial/territorial health promotion/healthy living strategies that include policy components.

Federal/Provincial/Territorial Collaboration and Coordination

Relevant to hypertension prevention, most recently the F/P/T Ministers of Health and of Health Promotion/Healthy Living adopted the *Declaration on Prevention and Promotion* – a public statement of vision to work together and with other stakeholders to make a priority for action the promotion of health and the prevention of disease, disability and injury. (94)

Earlier in 2009 the Ministers of Sport, Physical Activity and Recreation, and in January 2010, the Ministers of Health and of Health Promotion/Healthy Living endorsed the "Intersectoral Action on Children and Youth Physical Activity". Subsequently an F/P/T framework for action to promote healthy weights entitled "Curbing Childhood Obesity" was released. (95)

Other National Initiatives

In its Strategic Plan 2008-2012, the Canadian Partnership Against Cancer Corporation (CPACC), has a priority area on primary prevention, focusing on modifiable risk factors that, in addition to cancer burden, predispose people to other negative health outcomes, among them hypertension. These include physical inactivity, poor nutrition, obesity, tobacco and alcohol use. For these common risk factors, CPACC is looking to ongoing collaboration with other areas of public health to avoid duplication and maximize opportunities to leverage action. (96)

Similarly, the 2009 Canadian Heart Health Strategy and Action Plan, apart from its specific targets for hypertension treatment and control, states an intention to work with other initiatives on achieving goals that refer to healthy diet, physical activity and reducing overweight/obesity among adults and children. (55) Overall its directions include many components being recommended by the hypertension community:

- Create heart healthy environments through education, legislation, regulation and policy.
- Help Canadians lead healthier lives by developing common messages about risk factors, providing self help tools and by bringing screening and follow-up to community settings.
- End the heart health crisis among Aboriginal/indigenous peoples by actively involving them in developing their own solutions and plans and providing culturally appropriate support.
- Continue the reform of health services by fostering innovation to support chronic disease prevention and management programs embedded in primary care teams interfacing with regional integrated networks of specialized patient-centred cardiac care.
- Build the knowledge infrastructure to enhance prevention and care by ensuring more accurate, timely information and efficient sharing of it.
- Support focused knowledge development.
- Develop the right service providers with the right education and skills by systematically planning the workforce and spurring innovation.

Other disease-based strategies including those for diabetes, stroke and lung disease advocate physical activity, healthy eating and avoidance of smoking – again the lifestyle factors to maintain vascular health. (97)

4 Social Determinants and High Blood Pressure

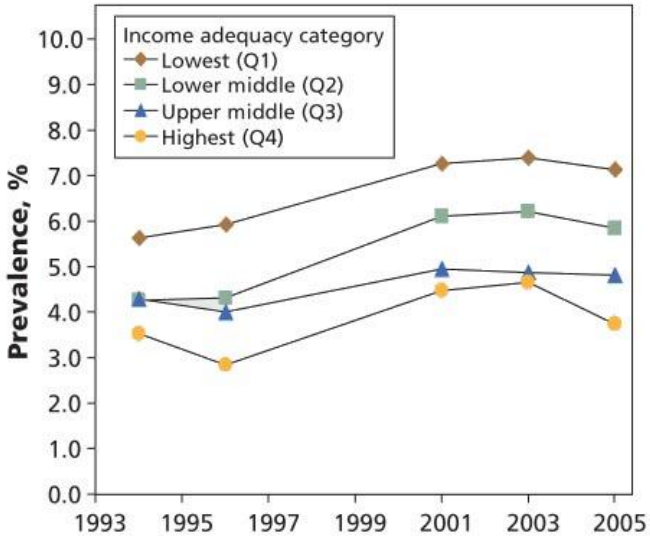
Over the 35 years since the Lalonde Report, even with some government attention given to population health, the uptake of the knowledge about and understanding of the determinants of health and health disparities has been slow. In the mix has been unwillingness on the part of some policy makers to acknowledge and act on the growing body of research that point out the relationship between social determinants of health, lifestyle and disease onset. Some of these directly relate to risk factors for high blood pressure as well as several other chronic conditions and diseases. Below are some examples:

- Adolescents with higher socio-economic status (SES) are more physically active, have better nutritional habits and lower risk of smoking compared to peers with lower SES. Among school-age children, there is less obesity with higher SES. (98–102)
- The accumulation of negative SES experiences/conditions throughout the life course increases e.g. CVD risk factors/morbidity/mortality and early exposure to low SES is associated with increased CVD and stroke in adults. (98–102)
- Lower SES is related to increased use of healthcare services that has little impact on poorer health outcomes and particularly mortality. Universal healthcare is not eliminating historic disparities in health outcomes experienced by disadvantaged groups. It is large-scale preventive strategies early in people's lives that can help change unhealthy behaviour. (103)

A significant obstacle to the uptake of research that relates SES to health is that the work on determinants and disparities is usually the responsibility of health departments typically preoccupied by the political and public attention to immediate issues in treatment services. Add to this that the public health sector has not been an effective promoter of the population health approach among the non-health sectors implicated in SES, such as education, housing, employment, income and poverty. (104)

In Canada, for reasons that remain unclear, there is an increase in hypertension diagnosis in lower income quintiles. See Figure 7 below.

FIGURE 7: Age- and sex-adjusted prevalence of hypertension from 1994 to 2005, stratified by income adequacy category



Source: Lee DS, Chiu M, Manuel DG, Tu K, Wang X, Austin PC, Mattern MY, Mitiku TF, Svenson LW, Putnam W, Flanagan WM, Tu JV, Canadian Cardiovascular Outcomes Research Team. Trends in risk factors for cardiovascular disease in Canada: temporal, socio-demographic and geographic factors. CMAJ. 2009;181:E55-66.

Regarding high blood pressure detection and control, demographic characteristics are emerging for the people not having blood pressure assessment, not taking antihypertensive drugs or non-compliant with prescribed drug regimens:

- Of the people who have not had their blood pressure measured, they are observed to be younger, male, recent immigrants or visible minorities (non-white and non-Aboriginal) and speaking neither French nor English. (105)
- Over half of people with hypertension between 20 and 39 years of age report no anti-hypertension treatment compared with 17% and 5% among those 40 to 59 years and 60 + years respectively; several factors are noted e.g. male sex, self-perceived excellent health status and fewer healthcare professional consultations. (106)
- Among people 60+ years of age, men are more likely than women to be unaware of having hypertension whereas women who are aware are more likely to have uncontrolled blood pressure. (107)

Education programs need to extend to hard-to-reach populations at the same time that healthcare professionals need to be better alerted to the characteristics of people most likely to not feel themselves to be at risk.

5 Future work to achieve healthy blood pressure across Canada's populations

An expanded framework for action

The hypertension community in Canada has been very successful in advancing high blood pressure detection and management from its origins as a chronic care model (108) to an expanded approach with community engagement and population health promotion emerging. The achievements, especially the strong established interdisciplinary partnerships foundational to CHEP (for recommendations development and dissemination), are such that hypertension management is potentially a model for evolving chronic disease management in Canada. Being able to shift blood pressure downward in the population as a whole and lowering it with pharmacotherapy in patients with hypertension makes blood pressure control – improving vascular health – one of the few interventions that translates into clear health benefits at both the population and individual levels.

As to future action for the hypertension community, the literature gives direction, providing the features of a broad framework for healthy blood pressure (109–113):

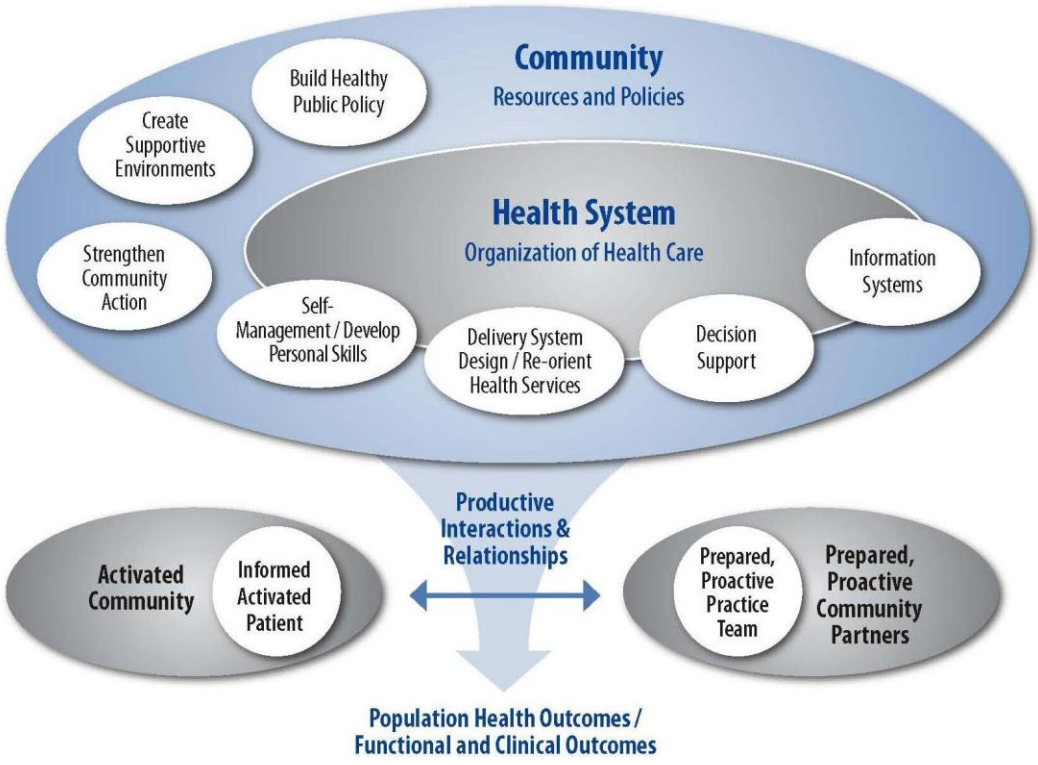
- account for social, economic and cultural elements that are determinants of health and health equity
- be multi-level and multi-component
- integrate community resources with clinical care
- comprise comprehensive actions simultaneously oriented towards people with and without hypertension, healthcare providers, the healthcare system (operating in clinical and community settings) and non-health sectors implicating several actors:
    - ➔ government departments of health and public health, other government departments and central agencies (e.g. education, transport, urban affairs, rural affairs, agriculture/farming, treasury, finance, culture), health research institutions, non-government organizations, marketing and media industries, food and drink producers and retailers, food service establishments, and the leisure and fitness sector.

Apart from specifying hypertension, the features above are applicable to dealing with any other chronic condition and are evident in several examples of organizing frameworks for prevention and control of chronic diseases and their common risk factors. To name a few – the WHO Strategy for Diet and Physical Activity, the US Action

Model to Achieve Healthy People 2020, and familiar in Canada, the Expanded Chronic Care Model (Figure 8 below) applied locally and abroad e.g. in the latest New York State Department of Health Strategic Plan for Chronic Disease and Injury Prevention. (114–119) They are unanimous in recognizing the conditions and constructs that underpin people's ability to make healthy choices and lead healthier lives in a sustained manner to avoid and delay chronic disease.

We have chosen the Expanded Chronic Care Model (ECCM) to guide into future work what has been achieved or underway regarding high blood pressure prevention and management in Canada. The challenge well recognized is the ECCM emphasis on enriching the community sphere of action, this from two directions: continue to extend and adapt into local community settings high blood pressure detection and care practices and at the same time advance population health promotion measures that translate broadly and equitably into healthier local living environments.

FIGURE 8: Expanded Chronic Care Model: Integrating Population Health Promotion



Source: Office of the [BC] Provincial Health Officer. September 2010. Provincial Health Officer's Special Report. Investing in Prevention, Improving Health and Creating Sustainability.

In the ECCM components beyond clinical care, those with lifestyle factors and health determinants, hypertension converges with other chronic diseases. This points to the potential for an umbrella partnership – a joined-up chronic disease community in Canada – guided by a broad chronic disease prevention framework with an optimal mix of current and future strategies (120) e.g. linking high blood pressure, cancer, stroke, diabetes, heart health, lung and kidney diseases and healthy living. An already shared priority is dealing with key risk factors held in common, to shift their distribution at the

population level: smoking cessation; consumption of a healthy diet such as the DASH diet that is high in fresh fruit and vegetables, and low intake of saturated fats and sodium; an increase in physical activity; low risk alcohol consumption and reduced adiposity and obesity. (69;110;121-122) A joined-up chronic disease community may also achieve the critical mass that can drive changes through to political levels for population health and determinants. Revitalizing the Chronic Disease Prevention Alliance of Canada may serve in this regard.

More in the immediate, another perspective on expanding the framework for action specific to Canada's context is the potential for authoritative national governance across the F/P/T spectrum to lead and coordinate initiatives dealing with high blood pressure, from prevention, to early detection, to treatment. One step up from that, with the various F/P/T chronic disease and health promotion/healthy living strategies in place in Canada now, already there is need for a clearly resourced and sustained leadership that bridges chronic disease management with health promotion at the same time that it respects and protects the resources of each discipline. Within the government and the non-government sectors charged with implementation of the strategies, clear accountability for attaining objectives and goals is essential.

Strategic team-based evaluation and research

Evaluation and research are foundational in the achievements in high blood pressure prevention, early detection, treatment and control. Evaluating all interventions and programs is critical to ensure that the health promotion and healthcare resources available are applied efficiently and effectively for the benefit of the largest number of people possible.

On research, the creation of Hypertension Canada with its mandate crossing all four pillars of CIHR research – biomedical; clinical; health systems and services; and the social, cultural, environmental elements of population health – presents an opportunity to increase the engagement of CIHR. Many knowledge gaps are impeding advances in better management of hypertension and in more people in Canada maintaining healthy blood pressure. The gaps include but are not limited to:

- the basic mechanisms of blood pressure and its control including genetic influences
- pharmacotherapies that more optimally treat hypertension across diverse groups (different ages, co-morbidities, ethnicities, etc)
- positive and negative nutritional factors (sodium, fats, magnesium, potassium, simple sugar additives, natural sugars) and diets that affect blood pressure and other health outcomes
- "healthy eating" and its determinants and deterrents across age groups, diverse ethnic and cultural groups, and socio-economic status.
- the effects of physical activity, stress, alcohol, overweight/obesity, mental health, and low

socio-economic status on healthy blood pressure

- methods for assessing blood pressure (home, ambulatory, automated office and manual office) and the optimal lifetime schedule of assessment, integrated into the diagnosis and management of hypertension, to confer maximum benefit
- ancillary diagnostic testing for people with hypertension to assess risk and causes of hypertension
- the impact on outcomes of newer health services policies
- research looking at the influence and impact of the collective determinants of health in the prevention and management of hypertension
- optimal use of the electronic medical record
- integration of self-care into the healthcare system
- education and behavioural sciences research to optimize healthcare professional adherence to guidelines
- optimal use of qualitative research methods to enhance quantitative outcome indicators
- implementing evidence into healthy public policy
- implementing evidence into health systems and service delivery
- the effectiveness of community-based programs and implementation of best practices
- how to change behaviour in terms of healthier lifestyle
- implementing evidence on behaviour change with healthcare providers
- researching children and adolescents to better understand the factors influencing their development and/or management of hypertension
- knowledge translation on community programs for vulnerable, rural/remote, marginalized, hard-to-reach populations
- shifting the food system away from the production and availability of unhealthy food products to privilege healthy foods.
- how to effectively advocate to government the policies to improve the health of people in Canada

While recognizing the innovations that investigator-driven research can deliver, health research at the global level is at the same time changing, increasingly directed into strategic areas where the results are expected to benefit whole populations, with large teams of scientists forming to attract funding. Hypertension Canada in collaboration with partners e.g. researchers in international, national and provincial institutions, and with various funding agencies, needs to develop a comprehensive research strategy to

encourage sole investigators and fully support and propose networks of researchers and collaborations to address specific gaps and strategic research opportunities. An example is intersectoral collaborative research groups forming through team grants and National Centres of Excellence. Currently a vascular network is being proposed for a National Centre of Excellence application. In addition, given that provincial/territorial governments bear almost all the acute care burden of hypertension, they can collectively develop a hypertension evaluation and research agenda related to their common priorities.

With national non-government organizations, partnerships for priority research programs can involve (123):

- Heart & Stroke Foundation of Canada
- The Kidney Foundation of Canada
- Canadian Society of Nephrology
- Canadian Cardiovascular Society
- Canadian Society of Atherosclerosis, Thrombosis and Vascular Biology
- Canadian Stroke Network
- Canadian Diabetes Association
- Canadian Obesity Network
- Canadian Council of Cardiovascular Nurses
- Canadian Nurses Association

Permanent leadership chairs and traineeships established through strategic partnerships between the CIHR and the appropriate charitable peer review funding agencies can help align non-government and government organizations to prevent and control not only hypertension but other chronic conditions and diseases and their common risk factors.

Secure resources and support

Substantive ongoing resources are needed to sustain and expand what has contributed to the successes achieved to date: the leadership currently in place; the coordinating mechanisms that have emerged and that need further development; the ongoing development of standards of practice; primary prevention; and the much needed research and evaluation of innovations in community and population-based interventions.

An international role for Canada

There are several potential opportunities for Canada to increase its international role, to disseminate its approach to treat and control of hypertension. The hypertension community could develop a standardized knowledge translation program to assist other countries to develop similar programs. Canadian programs could even develop policies to specifically and freely share their hypertension programs and resources with other countries' programs. To facilitate this dissemination, Canada can host international events here or symposia and workshops at international meetings elsewhere.

Canada can also interact and collaborate more closely with the United States. With each country having highly evolved programs to control hypertension, sharing what has been learned and the strengths and weaknesses of the differing and sometimes novel approaches could aid both countries. And given that many Canadians and Americans have similar (unhealthy) lifestyles and trends in risk factors common to chronic diseases, there may be opportunities to undertake initiatives with mutual benefit for example, harmonized restrictions on advertizing to children to avoid mixed messages from cross border communications.

Specific gaps and opportunities for research, knowledge translation and action

Gaps and opportunities are organized below under the components of the Expanded Chronic Care Model.

Build healthy public policy

The factors that affect blood pressure, hypertension and most other chronic non-communicable diseases in Canada are rooted within the social and cultural contexts that determine lifestyles, so profoundly that today's children are predicted to be the first generation to have shorter life spans than their parents. Addressing the factors needs the attention of all government jurisdictions, from federal down to municipal and has to involve multiple departments within a given government, each willing to consider the full range of policy instruments available to it, especially where voluntary initiatives e.g. to promote healthy lifestyle, are shown to not deliver an effective population level preventive "dose".

A "whole-of-government" approach taking an upstream view is needed (110), enabled through e.g. cabinet level committees operating with mechanisms and incentives for horizontal and vertical collaboration (124), underpinned by the formalized requirement for health impact assessments of policies intended for sectors/environments that influence lifestyle. (110;124) Of particular importance in Canada is support and funding for the parallel collaborative development of healthy public policies and strategies for Aboriginal peoples. (121;124)

Further to making public policy healthy, multi-sector advisory committees that include commercial entities must consistently uphold the principle of transparency and apply conflict of interest standards to minimize commercial bias and influence. This has been the practice of the hypertension community when engaging the pharmaceutical industry in the development of recommendations for optimal hypertension management. And the committees must revise the standards as needed to reflect best practices to ensure that central to their advice are the health interests of the people of Canada, that commercial entities or those with substantial funding from commercial entities are not in a position to dictate recommendations on government or non-governmental policy or on educational advisory committees.

A clear opportunity in Canada for a population level impact on healthy blood pressure will come with the implementation of the 2010 Sodium Reduction Strategy. Other international agencies, organizations, academic/scientific institutions and advocacy groups have been promoting dietary salt reduction as a public health measure for several years. (See Appendix 1.) A comprehensive dietary salt reduction strategy that combines regulation, voluntary reductions and education of the public and healthcare professionals, in place for example in Finland since the late 1970s, has been proven effective – a 40% drop in dietary intake of sodium accompanied by a 10 mmHg reduction in mean blood pressure and 80% fewer deaths due to stroke. (11) If the recommendations in the Sodium Reduction Strategy for Canada are implemented, about 30% of hypertension cases in Canada could be prevented, treatment and control rates markedly improved, more than $430 million a year in direct hypertension treatment costs saved (9) and over 10% of cardiovascular events prevented annually. (125) The potential benefits to the Canadian population are so substantial that governments must be ready to apply regulatory instruments to realize them in a timely manner given at best slow and inconsistent action if not failure to take action where voluntary approaches relying on corporate social responsibility have been trusted to protect and promote public health.

Re-orient/redesign the health services delivery system

To improve management of patients with hypertension and any chronic condition, healthcare system infrastructure and personnel need to be better integrated and coordinated to facilitate implementation of primary care guidelines and alignment to specialty care. At the same time, better health workforce planning should aim for an appropriate balance of healthcare professionals within an integrated model governed by scopes of practice determined by skill sets.

The BC General Practice Services Committee (GPSC) – a partnership under the Physician Master Agreement of the BC Ministry of Health Services (MOHS) and BC Medical Association – has responsibility for patient care related to family physicians and primary health care and includes chronic disease management. In 2006 the GPSC worked in partnership with the Heart and Stroke Foundation BC & Yukon to develop an approach to improve the management of hypertension (a disease management incentive for family doctors for diabetes and congestive heart failure had already proven successful). The MOHS also commissioned some patient survey research through UBC to identify the barriers to ideal hypertension management to

assist the approach. What resulted was the Heart and Stroke Foundation taking on public awareness and GPSC taking on improved management through family physicians. At the end of 2006/7 2,058 family physicians had applied the approach with 146,665 patients – an average of 71 patients per practice. By 2009/10 2,882 family physicians were providing improved hypertension care to over 250,000 patients. Doctors can only bill the hypertension incentive for patients not already receiving incentive based care (those living with diabetes, congestive heart failure, COPD and complex conditions of two or more chronic diseases). Altogether incentive based care that includes hypertension management involves approximately 300,000 patients. At the same time, patients from BC's Chronic Disease Self-Management Program are working with the GPSC to improve the hypertension flow sheet for it to be more useful for individual self-management. (Although BC cannot track process outcomes for hypertension as it can for diabetes and congestive heart failure, it is noted that the incidence of stroke since 2006 has been declining –hypertension control is an important aspect of that decline.]

Ambulatory care systems continue to need reshaping to better integrate the work of primary care cross-disciplinary teams with community health workers and family members for optimal blood pressure control. (109;114;121;126–128)

Within the teams themselves, often lacking is the knowledge of blood pressure and hypertension management as there are no accreditation standards for the topics in health education programs at the undergraduate, postgraduate and continuing education levels, nor are health professionals necessarily trained to work as multidisciplinary teams. (113;121) Education programs need to be evaluated and credentialed from the perspective of continuous quality improvement, specifically how they incorporate and transmit new knowledge on preventing hypertension, lowering blood pressure, case finding, treatment and control of hypertension. With their constant interaction and experience with patients and their families, healthcare professionals once informed can be instructors in these programs.

Alberta Hypertension Initiative
Alberta had a lower rate of treating diagnosed hypertension relative to other provinces hence a partnership of 15 provincial organizations developed an initiative using the national CHEP and BPC resources and tactics. The initiative also had innovations that have since been adopted by CHEP and BPC: one used provincial annual meetings of healthcare professionals to train community leaders to train other people about hypertension and its management, now the basis of the national 'train the trainer' programs for either healthcare professionals or the public and patients; another was an automated electronic dissemination of annual updates on a website made accessible to people with hypertension and healthcare professionals. Specific Alberta hypertension surveillance mechanisms were also developed.

The literature also identifies specific gaps and issues that remain barriers to effective clinical intervention within health services: therapeutic inertia; uneven clinician adoption of newer thresholds, treatment protocols and lifestyle recommendations; clinician uncertainty of normal blood pressure or the extent of medication non-adherence; and clinician hesitancy in cases of co-morbidities. (110;129)

How to adjust health system based interventions to be effective and appropriate for particular vulnerable groups requires further research. Barriers to accessing health services are social, economic, geographic, cultural/ethnic, each of them potentially a deterrent to effective prevention, detection

and treatment of any chronic condition.

Create supportive environments

Making healthy choices the easy choices is now a universal maxim, referring for the most part to diet and physical activity. Various policy instruments operating at the population level can enable food/nutrition policies to improve health status in terms of a number of risk factors, for example: limits to sodium in processed foods; restricting the use of industrially produced trans fats; and pricing policies to disadvantage less healthy energy-dense foods. Other mechanisms are healthy food procurement policies targeting public institutions and in "closed systems" such as schools and workplaces, taxes or subsidies on food choices to steer behaviour and the removal of soft drinks and junk food. (110;121;130)

In Canada, over the past five years many provincial jurisdictions have developed and implemented policies and/or guidelines to dramatically reduce the availability of unhealthy products in school vending machines. The success of these policies should lead to their expansion into other institutions and settings (public and private) such as day care centres, healthcare facilities, workplaces, correctional institutions, military bases etc. Other examples are the strategic distribution/location of healthy food outlets in neighborhoods coordinated with limited unhealthy outlets in the vicinity of schools.

In Canada, in all provinces except Québec (where the Consumer Protection Act prohibits any advertising to children under 13 years of age (134)) the Broadcast Code of Advertising to Children applies, developed by the Canadian Association of Broadcasters as a self-regulatory instrument with Advertising Standards Canada that represents the advertising industry. The code applies to all commercials targeting children during children's programming. The only guideline regarding food calls for snack products to be presented as such and not as substitutes for meals. (135)

There is also growing interest and advocacy to regulate the marketing, advertising and sponsorship of unhealthy/junk food to effectively reduce and restrict the exposure of children and youth to messaging on unhealthy foods, particularly during prime time children's television viewing. (131) The UK recently implemented a total ban on junk food ads during children's programs, on children's channels, as well as adult programs watched by large numbers of children. Of all the genres of programming on North American television, those specifically designed for children under 12 have the highest proportion of food advertising (50% of all ad time). (132) There are further suggestions to restrict unhealthy food promotions at major sporting or outdoor physical activity events in a manner similar to that currently applied to the tobacco, brewery and distillery industries. (133)

To improve physical activity levels across populations, the urban planning and transportation sectors are implicated. Advocates are calling for active transport policies, the design of walkable communities and comprehensive public/private physical activity strategies that intend people of all social strata to have access to safe and affordable leisure space and sports facilities. (110;121;130)

Important in creating supportive environments is civil society. The hypertension community is challenged to expand the reach of its existing partnerships and develop new ones to engage new broadly-based elements of civil society e.g. school associations, parent associations, children's advocacy groups, seniors' organizations, community development organizations, immigrant integration initiatives, quality of life/ quality of living projects, that have a vested interest in health promoting environments and equity in access to and experience of what constitutes healthy lifestyle.

The hypertension community is now in a position to strengthen and expand its links and support to health promotion initiatives in government and non-government sectors, to better integrate health promoting and blood pressure management initiatives and explore opportunities for e.g. joint projects or campaigns and leveraging of resources.

Strengthen community action

A key strategy within both the ECCM and health promotion models is strengthening local community based action. Health interventions that reflect community needs and priorities and which are embedded in models of community development and capacity building are key to the well-being of Canadians and the sustainability of health care interventions, including those addressing hypertension and associated risk factors (136, 137).

Communities vary widely in their infrastructure, economic assets, socio-economic demographic, cultural make-up and overall identity. The reality of current Canadian demographics and socio-economic status (SES) is such that interventions reflect the needs of ethnic and culturally distinct populations, people in rural and remote locations and otherwise hard-to-reach, and those experiencing marked health disparities.

There are examples of programs in Canada with positive results that have potential for broad based adoption with adjustments to suit particular community characteristics:

- the Cardiovascular Health Awareness Program (CHAP) – a collaborative, multipronged community-based health promotion program in Ontario targeted at older adults, unique in Canada in reducing cardiovascular events, that brings together local family physicians, pharmacists, other health professionals, public health representatives, volunteers, and health and social service organizations, offering opportunities for multiple blood pressure readings in pharmacies and other familiar community settings while promoting healthy eating, physical activity and smoking cessation (110;119;138)
- the Community Hypertension Awareness and Management Program – a community-based program for Alberta seniors to raise awareness and better manage hypertension, where trained volunteer peer health educators team up with local family physicians and community pharmacists to deliver blood pressure screening sessions in local pharmacies (139)
- a community pharmacist and nurse team-based intervention in local pharmacies identifying, working with and monitoring hypertensive diabetics (140)
- addressing the higher rates of hypertension, CVD, dyslipidemia and poorly controlled

diabetes in people of Indo-Asian descent e.g. through a health literacy initiative (141), a community consultation and CVD teaching project set in a pharmacy in an Indo-Asian neighborhood (142) and CVD risk assessment by trained community volunteers set in local places of worship (108)

- the Diabetes Risk Evaluation and Microalbuminuria (DREAM 3) project – community-based nurse-directed hypertension treatment among on reserve First Nations people with diabetes and hypertension in the Battleford Saskatchewan region (143)
- the Heart & Stroke Hypertension Management Program, an evidence-informed inter-professional primary care program shown to be successful in a three-year demonstration project across 11 primary care sites in Ontario. It includes a toolkit for healthcare providers and for patients (144)
- the Heart & Stroke Aboriginal Hypertension Management Program, a culturally congruent adaptation of the Heart & Stroke Hypertension Management Program and currently a demonstration project in 14 First Nations communities in Ontario (144)
- The Calgary Fire Department Blood Pressure Program where all fire stations in the city are open every afternoon and evening for people to have high quality blood pressure assessments. Several other communities in Canada have adopted the program (145)

Very important in this component of the ECCM is partnership building and collaboration as well as on-going monitoring and quality improvement of programs so they can achieve their intended purpose. (146) Evaluation of the various types/modes of community-based interventions employed is essential: their reach, effectiveness, scalability, generalizability and the relative contributions of specific aspects. (110;147) Found to be lacking in some evaluation designs is particular regard for length of follow-up, mode of outcome data collection, matching of intervention and control communities and the number of intervention/reference communities. (147)

With pilot projects, implementation plans need to include upfront how to scale up and sustain a program if the pilot achieves its intended goals. The Canadian Heart Health Initiative supplies an important lesson in this regard. While a very large number of small-scale short-term community-based pilots were conducted, there was little scaling up or longer-term implementation of the interventions that were found to be effective, a missed opportunity.

That said, promising practices within Aboriginal communities – yet which can be applied to non-aboriginal contexts - suggest that effective interventions need to be developed through strong community partnerships and collaboration; apply a team approach; create capacity within the community to promote health; use a life-course approach; focus on specific risk factors; provide more equitable access to care; be culturally appropriate and match the needs and readiness of the community involved (49).

Self-management/develop personal skills

As the CHEP makes advances in patient self-management and training in skills like home monitoring of blood pressure, the need for local support tools, programs and facilities

can be expected to increase guided by continuous quality improvement. (114;130;146) The methods and techniques that are promoting the uptake of patient self-management best practices, often linked to community level interventions, need evaluation and more research as innovations are ongoing e.g. community health workers are matched to specific high-risk groups of individuals to focus attention and adjust approaches to the contexts in which people find themselves (69;110), and like-patients are partnered for mutual support. (148)

With various health and disease-based non-government initiatives e.g. cancer, heart health, healthy living, obesity, diabetes, making similar lifestyle recommendations as those to avoid high blood pressure – a healthy diet and optimal physical activity – there is opportunity for joint branding and leveraging of consistent advice and messages. This is potentially reassuring to a public that is continually if not increasingly the target for advice and recommendations about healthy living, coming from various directions and sources.

Decision support

For CHEP to continue to advance best practices, it needs formal recognition as a guidelines-based decision support system specific to hypertension operating within the healthcare system. (110;111) There is also untapped potential for common messaging across guidelines e.g. C-CHANGE. Centres of excellence for vascular health would make a great contribution to blood pressure control if provided responsibility and accountability for the implementation and evaluation of community and population based interventions, with corresponding knowledge translation to improve self-management and primary care. (121)

As the surveillance system in Canada becomes more comprehensive of chronic conditions and diseases and their associated risk factors, it needs to be underpinned by a culture of evaluation and continuous quality improvement in terms of the processes of data collection and the data elements themselves. The knowledge development and transfer processes attached to the surveillance systems also need evaluation to ensure they provide timely feedback to those who need the results and are accountable for appropriate responses to them.

Specific to surveillance data relevant to hypertension, better analytic methods are needed to exploit existing data as much as possible, and for surveys to systematically capture the continuum of elements, from risk factors to protective factors to “negative” outcome indicators of disease. National and provincial/territorial surveys, continually refined, need to be regularly administered and include physical measurements to track blood pressure, sodium and potassium intake and other components of diet and elements of lifestyle pointed to by research as affecting blood pressure. (69;121) Very important is collecting data on groups shown to be hard-to-reach and otherwise most subject to health disparities.

As surveillance evolves, new elements of an “ideal” system are emerging, described

below:

Instrument	Date instituted; periodicity	Hypertension relevant data
Canadian Longitudinal Study on Aging	2009; continuous recruitment and follow-up of 20 to 30 years	• Prospective national cohort study • Recruiting up to 50,000 healthy people in Canada ages 45 to 85 • Physical and self reported information about health, lifestyle and environment.
Tomorrow Project	2010; continuous recruitment and follow-up of 20 to 30 years	• Prospective national cohort study • Recruiting up to 300,000 healthy people in Canada ages 35 to 69 • Physical (including bio-repository) and self reported information about health, lifestyle and environment.
Electronic Medical Records (the Canadian Primary Care Sentinel Surveillance Network)	Feasibility project begun in 2007	• Electronic record surveillance system (a network of family practice networks that exclusively use EMRs) to collect longitudinal data on initially five chronic diseases including hypertension from family practices across Canada. (149)
Regional/international research projects		• The Prospective Urban Rural Epidemiology (PURE, a large-scale epidemiological study of 140,000 individuals residing in >600 communities in 17 low-, middle-, and high-income countries around the world including Canada. Individual data collection includes medical history, lifestyle behaviours (physical activity and dietary profile including 24-hour urine collection), blood collection and storage for biochemistry and future genetic analysis, electrocardiogram, and anthropometric measures.

Prioritizing public health expenditures goes without saying; in the case of hypertension prevention, the relative attributions to hypertension of key risk factors give guidance as to where emphasis should be placed to derive the best value for money (43), and choosing interventions must be based on cost-benefit estimates. To help set priorities, a number of countries and health development agencies around the world have adopted disease burden analyses using disability adjusted life years (DALYs) – to demonstrate the potential years of life lost due to premature death and productive years lost due to disability – and quality adjusted life years (QALYs) – to account for quality and quantity of life lost or gained by virtue of interventions. Canada is not among them. (150) Analysis of relative burden is further hampered in Canada by the lack of high quality trials of lifestyle interventions and of timely and comprehensive administrative and economic data about healthcare system operations and service utilization.

Specific to First Nations communities is the systematic collection of hypertension relevant information. Matching Status Verification Files (at Indian and Northern Affairs Canada) or First Nations Client Files with provincial data sets (e.g. physician diagnostic codes or hospitalization data) could yield important profiles on First Nations populations at high risk for hypertension sequelae. Further, data on the utilization of anti-hypertension medications can be drawn from Health Canada's First Nations and Inuit Health Non-insured Health Benefits plan.

Information systems

In general terms the availability and optimal use of electronic health and medical records can contribute to improving hypertension management not to mention other chronic conditions. (110) CHEP in particular would be supported and enhanced by the vertical integration of data (e.g. electronic medical records, "community accounts", national data) into a pan-Canadian population health database. (124)

6 Towards Healthy Blood Pressure

Vision

The people of Canada have the healthiest blood pressure distribution, lowest prevalence of hypertension and the highest rates of awareness, treatment and control in the world.

Objectives for 2020

1. The prevalence of hypertension* among adults in Canada is reduced to 13%.

The prevalence of hypertension is an indicator of the population distribution of blood pressure; if prevalence is reduced, the distribution of blood pressure in the whole population would shift downwards. The current prevalence is 19%.

A one-third reduction in the age-sex standardized prevalence rate of hypertension in Canada is feasible with substantive policy changes on nutrition and food supply, physical activity, alcohol use and smoking cessation. Implementation requires collaborative action amongst a variety of players and sectors e.g. non-governmental organizations and federal, provincial, territorial and municipal governments, health regions, the food and agriculture industries.

* People with hypertension are those who have been diagnosed with hypertension or are on drug treatment to specifically lower their blood pressure or have blood pressure readings in the hypertension range of systolic ≥ 140 or diastolic ≥ 90 mm Hg.

2. 90% of adults in Canada are aware of the risk of developing hypertension and of the lifestyle factors that influence blood pressure

3. 85% of adults in Canada are aware that high blood pressure increases the risk of major vascular disease (stroke, heart attack, dementia, kidney failure, heart failure)

There are no reliable current data on the extent to which people in Canada are aware of their high risk of becoming hypertensive nor of the high risk for major vascular diseases caused by hypertension, even though it is considered the leading risk for premature death in the country. “Lifestyle therapy” is the cornerstone of hypertension management regardless of pharmacological therapy. 90% of adults in Canada who are aware of having hypertension report having a high body mass index (BMI), being sedentary or smoking. On the other hand, these same people are also either all of the time or most of the time attempting to reduce dietary sodium (82%), improve their diets (81%), be physically active (62%), quit or reduce smoking (66% of smokers at time of diagnosis) and reduce weight if BMI is high. (151) The Canadian Community Health Survey needs to include indicators of personal awareness of risk as can the Survey of Living with Chronic Disease in Canada, that latter through a hypertension module with these indicators – an opportunity for 2015 and 2020 surveys.

The interdisciplinary care teams in primary care across Canada need to adopt a strong lifestyle focus to promote blood pressure self-efficacy, for people to be empowered to adjust their lifestyles while monitoring their blood pressure. Workplace and community based hypertension programs need to be instituted with a substantive component that focuses on lifestyle change. More work needs to be done with non-governmental organizations involved in public awareness to consolidate and coordinate their programs for knowledge transfer about self-efficacy of blood pressure management through lifestyle.

4. 95% of people in Canada who have hypertension are aware of their condition

Nearly all people in Canada access the healthcare system in the course of a year and should have their blood pressure measured regularly during their visits. Currently 83% of adult Canadians who have hypertension are aware that their blood pressure is high. While assessment of blood pressure is increasingly possible in various settings other than physicians’ offices e.g. at home, in community centres, workplaces and pharmacies, subgroups of people e.g. young men, visible minorities, those who speak neither official language and recent immigrants, are found to be less likely to have blood pressure assessed within a two year interval.

To improve awareness of blood pressure levels and especially of high blood pressure in general and in the subgroups and vulnerable populations that are hard to reach, more

programs need to tailor their case finding (take an outreach approach in various settings), promote awareness of hypertension and self efficacy in measuring blood pressure.

5. 90% of those with hypertension are attempting to follow appropriate lifestyle recommendations

Depending on the specific lifestyle, 60 to 90% of Canadians diagnosed with hypertension were attempting to make a lifestyle change in 2009. (102)

6. 40% of Canadians initially diagnosed with hypertension will become normotensive through lifestyle therapy

The Canadian Health Measures Survey found that 8% of the people in Canada who reported being diagnosed with hypertension have controlled blood pressure and are not taking antihypertensive drug therapy. In the survey of Living with Chronic Disease in Canada, 10% of those diagnosed with hypertension responded that they have blood pressure controlled through lifestyle changes.

7. 87% of people unable to be successfully treated for hypertension through lifestyle therapy have appropriate drug therapy

Approximately 10% of people with hypertension do not have additional risk factors and may have low cardiovascular risk justifying not taking drug therapy. 95% of the people in Canada who are aware of being diagnosed with hypertension are taking drug therapy and hence most of the gains in treatment rate will occur through their improved awareness. Of those aware of having hypertension, younger age, male sex, perceived excellent health, low risk of cardiovascular disease except if smoking were factors associated with not being treated with antihypertensive drugs.

8. 78% of people on drug therapy have hypertension under control

Improving hypertension control rates among people who need medication can be achieved by improving awareness (from 83% to 95%), increasing the treatment rate (from 80% to 87%) and improving the control rate among those on drug therapy (from 86% to 90%). Improved lifestyle therapy will also contribute to improved blood pressure control.

Healthcare professionals need more tools to improve hypertension control rates through medication, tailored to the research that has found that e.g. more men than women are unaware of their hypertension diagnosis but older women on drug therapy are less likely to have blood pressure control than men on drug therapy. Patients also need more assistance to improve self-efficacy in adhering to medication schedules.

9. Aboriginal populations have similar rates for blood pressure health indicators as the general population

Data from the 2002/03 First Nations Regional Longitudinal Health Survey reported higher rates of blood pressure among First Nation adults compared to other Canadians (20.4% versus 16.4%), which may be attributable to Aboriginal people's having a higher prevalence of overweight, obesity, physical inactivity, diabetes and smoking compared to non-Aboriginal Canadians. (49)

For many health indicators there is inadequate information collected on Aboriginal populations on and off reserve to assess current status or epidemiological trends with regards to cardiovascular diseases. Political territorial associations need to be engaged in consultative processes with Aboriginal communities and leaders to develop comprehensive culturally safe surveys that include the collection of physical measures and corresponding interventions based on findings.

10. Populations at higher risk have similar rates for blood pressure health indicators as the general population.

Compared to the general Canadian population, individuals of Filipino, Chinese, South Asian and Black decent experience a higher prevalence of hypertension. (38, 44, 45) Within these groups, gender differences have further been noted, with one study finding higher prevalence of hypertension among South Asian males and black and East Asian woman. (38,45)

Canadians living in rural areas experience a higher incidence of circulatory disease, attributable, in part, to higher prevalence of smoking (32% in rural versus 25% in cities); obesity (57% in rural; 47% urban) and consumption of less than the recommended 5 servings of fresh fruit and vegetables per day (31% rural; 38% urban). A 2010 Alberta-based study also showed higher baseline rates of obesity, waist circumference, hypertension and hypercholesterolemia among adult subjects living in rural indigenous and other remote communities. (46)

As with Aboriginal groups, more consistent and reliable monitoring and surveillance of cardiovascular trends among these groups is needed in determining trends over time as well as in identifying key intervention areas from increasing awareness of risk factors to improving early detection.

Recommendations

Build Healthy Public Policy

Develop one comprehensive multi-sector strategy whose goal is for people in Canada to meet the nationally recommended benchmarks for physical activity and diet (including the recommended dietary reference intakes for nutrients and especially sodium)

- Use a whole-of-government approach – full and comprehensive power of government instruments across sectors – to ensure that children grow up in environments that support and facilitate healthy eating and regular physical activity, that they remain smoke free, avoid high risk alcohol consumption and generally maintain a mindset that has health and well being as a priority.

  ➔ All governments adequately fund a comprehensive cross-ministry platform for healthy living initiatives that integrates major chronic disease and health promotion strategies, involving all major government departments that can impact on health.
  ➔ Governments routinely conduct health impact analyses of all major proposed government policies that from a population perspective will affect the main modifiable risk factors for healthy living (e.g. transportation policies, alcohol regulation).
  ➔ Governments analyze and where necessary revise current policies that directly or indirectly affect healthy living (e.g. reconsider subsidies to food supply processes that contribute to production of unhealthy foods or transportation policies that promote sedentary behaviour over public transport or active transport).
  ➔ Governments exercise their full regulatory power to protect and promote health where voluntary approaches are likely to or have been shown to be ineffective.

- Implement the 2010 Sodium Reduction Strategy for Canada and aggressively pursue the interim national goal of reducing the average population sodium consumption to 2,300 mg sodium by 2016.

  ➔ In advance of 2016 Health Canada convene a working group to develop and implement the recommendations on how to achieve the ultimate target of 95% of people in Canada consuming less than 2,300 mg for sodium.
  ➔ Relevant federal agencies apply strategies to deal with the globalization of food production, processing and marketing and become involved in the international coordination of efforts to ensure that positive changes in the food sector e.g. what is achieved in Canada, results in healthier foods for the populations of the world.

- Ensure all governments (federal, provincial, territorial, regional, municipal) and health authorities identify leaders for vascular health – blood pressure lowering and control of hypertension – with specific responsibility and resources for implementing and integrating aspects of this strategy into relevant other chronic disease and health strategies that are within the mandate of their government or organization while avoiding uncoordinated efforts that risk mixing messaging and losing opportunities for leveraged actions.

➔ Health authorities set targets for processes and outcomes that will reduce hypertension and its risk factors, closely monitor these and adjust interventions as needed for targets to be met.

- F/P/T structures coordinate federal, provincial, territorial action on important health promotion and disease prevention policies. Municipalities also apply coordinating mechanisms to their policy development processes.

- Enhance tobacco reduction strategies in all jurisdictions of Canada and include a review of the provision of smoking cessation medication and access to provincial and national quit lines and web sites.

Re-orient/redesign the health services delivery system

Use an integrated interdisciplinary primary healthcare team approach focusing on healthy living and chronic disease management. A healthy blood pressure/hypertension management approach in Canada – with its partnership base and continuum of health promotion, disease prevention, early detection, treatment and control – is a best practice model for how to prevent and control other chronic conditions and diseases.

- Enhance the healthcare system to ensure that case finding, the development of rosters and registries and the management of hypertension is systematically applied and optimized from an outcomes and cost perspective.

- Clinical hypertension management should be sited at the primary care level with the roles of the patient and provider defined and facilitated, with the rest of the system supporting the patient-primary care provider relationship.

  ➔ Each person should have an identified primary care provider who works with the individual to educate and promote health, assess blood pressure at each appropriate visit to screen for incident high blood pressure, and initiate appropriate therapy e.g. through rosters and otherwise whenever possible, continuity with the same provider.
  ➔ There should be education and resources made available to identify and manage factors related to non-adherence to hypertension management
  ➔ An appropriate healthcare team supports the primary care provider and resources are available to them to screen for high blood pressure and optimally assist the patient with lifestyle and drug therapies.
  ➔ The role of specialists in the provision of hypertension services should be defined and they be provided with the appropriate tools and resources with which to support primary care in an equitable and efficient manner
  ➔ The development and use of evidence-based care maps or processes should be encouraged, encompassing evidence-based guidelines but allowing for individualization of treatment based on clinical circumstances and patient wishes.
  ➔ Engage physicians in innovative funding mechanisms for the management of complex chronic diseases such as hypertension.

Build partnerships to create supportive environments and evolve the healthcare system

Expand and maintain the partnerships whose contributions have been integral to the current Canadian successes in lowering blood pressure and controlling hypertension. Build new partnerships to better integrate disease management with population health promotion, engaging all levels of government, health organizations and healthcare professionals, non-government organizations, academics, relevant institutions and corporations/businesses.

- Governments collaborate to develop on a pan-Canadian governance and funding model to coordinate, monitor and report on the implementation of the recommendations in this Framework and its alignment with the Integrated Pan-Canadian Healthy Living Strategy, the Canadian Heart Health Strategy, and the Sodium Reduction Strategy for Canada, given their potential combined impact on blood pressure.
  - ➔ Adequately fund all agents of processes and products proven to have positive cost-effective impacts on hypertension prevention, treatment and control.

- Expand and maintain the partnerships critical for healthcare professionals to be trained and maintain competencies for optimal blood pressure management.

  - ➔ To provide up-to-date resources in clinical and community settings to assist in blood pressure lowering, hypertension case finding and management.
  - ➔ For all schools and postgraduate and continuing education programs for healthcare professionals to have access to high standard and consistent up-to-date Canadian hypertension educational material and that the provision of the material is linked to program accreditation standards.
  - ➔ To develop forums for healthcare professional schools (e.g. medicine, nursing, dietetics, pharmacy) and continuing health education programs to share best practices in delivering training to prevent and control hypertension using standardized educational approaches and materials.

- Develop a forum for provincial and territorial ministries of health and health regions to share best practices in health services delivery for blood pressure lowering and the prevention, case finding, treatment and control of hypertension.

- Develop a forum for non-government stakeholders that contribute to high blood pressure prevention and control to share best practices.

- Develop international collaborations and a forum to share best practices in hypertension prevention and control with other countries.

- Sustain the position of Canadian Chair in Hypertension Prevention and Control with the responsibility and accountability for leading the implementation of this Framework.

Strengthen community action

Strengthen coordination and leadership for community initiatives which involve the active participation of community stakeholders in advocacy and action for environmental and policy change which addresses the prevention, detection and control of hypertension.

- Support community-led and community based interventions that address hypertension risk factors around health eating and active living. Examples include supporting local food security initiatives (such as Toronto's Good Food Box program and BC's Healthy Eating Active Living program)
- Support funding for participatory research that enhances healthy eating/active living environments (such as Nova Scotia's Activating Change Together (ACT), a research project that enhances food security for all Nova Scotians)
- Broadly and systematically implement established evidence-based community and workplace programs that foster healthy living and enhance the prevention, case finding, diagnosis, treatment and control of hypertension throughout Canada.
- Engage the political territorial associations representing First Nations and Inuit peoples to implement established evidence-based community level blood pressure programs adapted to specific community circumstances
- Develop or adapt blood pressure programs to suit rural and remote communities, marginalized groups or otherwise hard-to-reach populations in Canada.
- Evaluate and revise best practices of established community and workplace blood pressure programs on an ongoing basis for the programs to continue to optimally achieve their intended purposes and outcomes.

Develop personal skills for better self-management

Ensure all people in Canada have the resources, knowledge and ability they need to optimally prevent, detect and control hypertension recognizing this recommendation is highly dependent on implementing and maintaining supportive environments.

- Patient education about blood pressure and hypertension should use modern educational principles and methods encompassing considerations of behavior change to facilitate and support individuals to reduce their risk factors related to high blood pressure.

  ➔ Educate/inform/instruct individuals to live healthy lifestyles, to understand:

  - the serious health consequences of hypertension.
  - the link between high blood pressure and modifiable risk factors (smoking, adiposity, physical inactivity, excessive sodium / salt in the diet, excessive alcohol

consumption, stress, unhealthy eating (e.g. low consumption of fruits and vegetables, and high stress levels).

- the recommended average daily intakes of sodium and fruits and vegetables, of recommended physical activity levels, optimal waist circumference and weight.
- the need to be regularly screened for hypertension.

- Facilitate and support individuals to actively participate in their treatment of hypertension.

➔ The healthcare system makes provision for and supports patient self-management through access to educational materials, data, tools (such as personal electronic health applications for PDAs, social networking vehicles, etc) and other supports through which patients can stay informed of the best evidence about hypertension and its risk factors and the interventions available, and that can help them to track their own progress in risk reduction and hypertension control.

- Continue development of new and more effective tools and resources for self-management.
- Ensure the tools and resources are appropriate and available to people with different levels of literacy, ethnic and linguistic groups and vulnerable populations.

Improve decision support

Promote a culture of evaluation and continuous quality cycles in the collection of key indicators of high blood pressure prevention, detection, treatment and control, and evaluate the uptake of findings – that the knowledge about the processes and outcomes of interventions is making a difference.

- Continue to develop and resource the pan-Canadian blood pressure and hypertension surveillance monitoring and evaluation systems at national and provincial levels

➔ Use existing surveillance and evaluation programs to their fullest extent and continue to resource the development of new programs and instruments to assess blood pressure over the life course and the impact of changes in blood pressure and hypertension on the health of the people in Canada, and to identify the impact and appropriateness of interventions and find the “care gaps” to assist in the development of new policies, interventions and strategies.

- Ensure that surveys capture data such that the goals of this Framework can be assessed regularly.
- Sustain the Canadian Health Measures Survey and ensure it focuses on the major health issues of the people in Canada including blood pressure and hypertension across all age groups. Oversample vulnerable populations such as new immigrants.
- Revise existing surveys (e.g. Canadian Community Health Survey, National Population Health Survey, and Canadian Health Measures Survey) to increase the

content on lifestyle factors that affect blood pressure (diet, physical activity, stress, alcohol consumption, adiposity etc).

- Repeat the Survey of Living with Chronic Disease in Canada with a hypertension module in 2015 and 2020 to allow tracking of lifestyle changes.
- Ensure that all major longitudinal surveys in Canada incorporate blood pressure, hypertension assessment and risk factors such as diet (e.g. longitudinal diet reviews).

➔ Engage political territorial associations of First Nations and Inuit peoples to participate in designing physical measures surveys that apply culturally safe methods to collect data on blood pressure and hypertension levels on an ongoing basis.

➔ Continue to develop and resource the Canadian Hypertension Outcomes Research Task Force for it to coordinate the monitoring and evaluation of all components of the blood pressure surveillance monitoring and evaluation program.

➔ Develop and implement Canadian standards for blood pressure surveys and data sources along with appropriate data sharing agreements to ensure pan-Canadian blood pressure and hypertension data or otherwise that inter- and intra-jurisdiction comparisons can be made in a timely manner using local and provincial surveys and administrative data sources.

- Conduct validation studies of hypertension related data (diagnosis, blood pressure, treatments) from electronic medical records and other data sources.
- Governments at all levels partner with the stakeholders in health services assessment, including academics and researchers to ensure timely and affordable access to data relevant to blood pressure surveillance and relevant administrative data.
    - Ensure Canadian administrative data on hypertension, hospitalization for and death from major cardiovascular diseases (e.g. stroke, heart failure, ischemic heart disease, myocardial infarction, chronic kidney disease, peripheral vascular disease, aortic aneurysm) and their estimated direct costs are publically accessible within two years of the calendar year of the year the events occurred in.
    - Regularly determine the direct costs of hypertension management (ambulatory and hospital costs including healthcare professional payments, visits, drug costs, laboratory costs and facility costs) and hypertension outcomes (e.g. stroke, heart failure, ischemic heart disease, myocardial infarction, chronic kidney disease, peripheral vascular disease, aortic aneurysm).

- Enhance the capacity for public health policy research and analysis and for evaluating the impacts of implemented policies.

➔ Examine the impacts of hypertension and interventions to prevent, detect, treat and control it using established comprehensive health and economic predictive models.

➔ Model the health and economic impacts of population level preventative measures that address the main modifiable risk factors for increasing blood pressure e.g.

reducing dietary sodium, increasing activity, low risk alcohol consumption and improved diet.

➔ Determine the impact of increased blood pressure and hypertension on death and disability in Canada (in relationship to other major chronic conditions and diseases) using accurate and current Canadian data.

➔ Track and model the effectiveness, cost-effectiveness and comparative effectiveness of interventions to lower blood pressure on hypertension prevalence, awareness, diagnosis, treatment and control and on major blood pressure related outcomes (stroke, dementia, heart failure, kidney failure or progressive kidney disease, heart attack, ischemic heart disease) including their costs. Include models that assess case finding.

- Strategically plan and fund research and evaluation to better understand the etiology of hypertension and address the key barriers to its prevention, detection and control

  ➔ Apply the four pillars of research – basic science, clinical, health services and population level – to create a culture of evaluation and continuous quality improvement to optimally move knowledge into action

  ➔ Create a comprehensive prioritized list of research gaps from a societal perspective and update the list on an ongoing basis

  ➔ Develop a pan-Canadian network of researchers to develop research protocols and conduct research on the prioritized gaps.

  ➔ Foster independent research on the prioritized gaps.

  ➔ Commit research dollars for the CIHR and provincial funding agencies to address the priority blood pressure and hypertension research gaps in across the four pillars.

Optimize information systems

Use rapidly evolving information technology and systems to their ultimate potential to transfer knowledge on how to improve hypertension prevention, detection, treatment and control.

- Enhance the electronic medical and health records used in Canada

  ➔ To ensure they contain national care indicators for hypertension along with a capacity to track outcomes to be used for pan-Canadian blood pressure and hypertension surveillance while ensuring patient confidentiality and privacy

  ➔ To provide convenient up-to-date point of care best hypertension management (CHEP) practices for health care professionals and people with hypertension

  ➔ To provide a hypertension registry function, alerts and reminders

  ➔ To provide easy access to organized practice data on hypertension that can be compared by the health care professional to average data from other practitioners.

- Data within all parts of the health care system should be linked and accessible to all appropriate providers and system planners in a timely manner.

- Promote patient access to medical and health records to better self-management.

References

1. Egan BM, Julius S. Prehypertension: risk stratification and management considerations. Cur Hypertens Reports. 2008;10:359-66.
2. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. Lancet. 2005; 365:217-23.
3. World Health Organization. 2009. Global health risks: mortality and burden of disease attributable to selected major causes.
4. Meneton P, Jeunemaitre X, de Wardener HE, Macgregor GA. Links Between Dietary Salt Intake, Renal Salt Handling, Blood Pressure, and Cardiovascular Diseases. Physiol Rev. 2005;85:679-715.
5. Vasan RS, Beiser A, Seshadri S, Larson MG, Kannel WB, D'Agostino RB, Levy D. Residual lifetime lisk for developing hypertension in middle-aged women and men – The Framingham Heart Study. JAMA. 2002; 287:1003-10.
6. U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute, National High Blood Pressure Education Program. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. NIH Publication No. 04-Canaaca30, August 2004.
7. Heidenreich PA, Trogdon JG, Khavjou OA, Butler J, Dracup K, Ezekowitz MD, Finkelstein EA, Hong Y, Johnston SC, Khera A, Lloyd-Jones DM, Nelson SA, Nichol G, Orenstein D, Wilson PWF, Woo YJ, on behalf of the American Heart Association Advocacy Coordinating Committee, Stroke Council, Council on Cardiovascular Radiology and Intervention, Council on Clinical Cardiology, Council on Epidemiology and Prevention, Council on Arteriosclerosis, Thrombosis and Vascular Biology, Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation, Council on Cardiovascular Nursing, Council on the Kidney in Cardiovascular Disease and Council on Cardiovascular Surgery and Anesthesia, and Interdisciplinary Council on Quality of Care and Outcomes Research. Forecasting the Future of Cardiovascular Disease in the United States: A Policy Statement From the American Heart Association. Circulation. 2011;123;933-44
8. Gaziano TA, Bitton A, Anand S, Weinstein MC; International Society of Hypertension. The global cost of nonoptimal blood pressure. J Hypertens. 2009; 27:1472–1477
9. Joffres M, Campbell NRC, Manns B, Tu K. Estimate of the benefits of a population-based reduction in dietary sodium additives on hypertension and its related health care costs in Canada. Can J Cardiol. 2007;23:437-43.
10. Danaei G, Finucane MM, Lin JK, Singh GM, Paciorek CJ, Cowan MJ, Farzadfar F, Stevens GA, Lim SS, Riley LM, Ezzati M, on behalf of the Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group (Blood Pressure). National, regional, and global trends in systolic blood pressure since 1980: systematic analysis of health examination surveys and epidemiological studies with 786 country-years and 5·4 million participants. Lancet 2011; 377: 568–77
11. Karppanen H, Mervaala E. Sodium intake and hypertension. Prog Cardiovasc Dis. 2006;49:59-75.
12. National Heart, Lung and Blood Institute. National Institutes of Health. US Department of Health and Human Services. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. August 2004.
13. Canadian Heart Health Strategy and Action Plan. Building a Heart Healthy Canada. February 2009. http://www.chhs.ca/sites/default/files/Document%20Links/Reports/English/CHHS%20-%20Building%20a%20Heart%20Healthy%20Canada%20-%20EN%20-%20Feb%202009.pdf

14. Turnbull F, Neal B, Algert C, Chalmers J, Woodward M, MacMahon S. Effects of different blood-pressure-lowering regimens on major cardiovascular events: results of prospectively-designed overviews of randomised trials. Lancet. 2003;362:1527-35.
15. Neal B, MacMahon S, Chapman N. Effects of ACE inhibitors, calcium antagonists, and other blood pressure lowering drugs: results of prospectively designed overviews of randomised trials. Lancet. 2000;356:1955-64.
16. Smith SCJr, Blair SN, Criqui MH, Fletcher GF, Fuster V, Gersh BJ et al. Preventing heart attack and death in patients with coronary disease. Circulation. 1995;92:2-4.
17. Public Health Agency of Canada. 2009. Tracking Heart Disease and Stroke in Canada. http://www.phac-aspc.gc.ca/publicat/2009/cvd-avc/pdf/cvd-avs-2009-eng.pdf
18. Abboud H, Henrich WL. Stage IV Chronic Kidney Disease. N Engl J Med. 2010;362:56-65.
19. Bild D, Teutsch SM. The control of hypertension in persons with diabetes: a public health approach. Public Health Rep. 1987;102:522-29.
20. Lewis EJ, Hunsicker LG, Clarke WR, Berl T, Pohl MA, Lewis JB et al. Renoprotective effect of the angiotensin-receptor antagonist irbesartan in patients with nephropathy due to type 2 diabetes. N Eng J Med. 2001;345:851-60.
21. Brenner BM, Cooper ME, de Zeeuw D, Keane WF, Mitch WE, Parving H-H et al. Effects of losartan on renal and cardiovascular outcomes in patients with type 2 diabetes and nephropathy. N Engl J Med. 2001;345:861-69.
22. Kivipelto M, Ngandu T, Fratiglioni L, Viitanen M, Kareholt I, Winblad B, Helkala EL, Tuomilehto J, Soininen H, Nissinen A. Obesity and vascular risk factors at midlife and the risk of dementia and Alzheimer disease. *Arch Neurol.* 2005; 62: 1556–1560.
23. Vladimir Hachinski, MD, DSc; Costantino Iadecola, MD; Ron C. Petersen, MD, PhD; Monique M. Breteler, MD, PhD; David L. Nyenhuis, PhD; Sandra E. Black, MD; William J. Powers, MD; Charles DeCarli, MD; Jose G. Merino, MD; Raj N. Kalaria, PhD, FRCP; Harry V. Vinters, MD; David M. Holtzman, MD; Gary A. Rosenberg, MD; Anders Wallin; Martin Dichgans, MD; John R. Marler, MD Gabrielle G. Leblanc, PhD. National Institute of Neurological Disorders and Stroke–Canadian Stroke Network Vascular Cognitive Impairment Harmonization Standards. Stroke. 2006;37:2220-2241
24. Alzheimer Society of Canada. 2010. Rising Tide: The impact of dementia on Canadian Society. Accessed December 15, 2010 at http://www.alzheimer.ca/docs/RisingTide/Rising%20Tide_Full%20Report_Eng_FINAL_Secured%20version.pdf
25. Staessen JA, Richart T, Birkenhäger WH. Less Atherosclerosis and Lower Blood Pressure for a Meaningful Life Perspectives With More Brain. Hypertension. 2007;49:389-400.
26. PHAC 2010. Report from the Canadian Chronic Disease Surveillance System: Hypertension in Canada, 2010. http://www.phac-aspc.gc.ca/cd-mc/cvd-mcv/ccdss-snsmc-2010/2-2-eng.php
27. Canadian Health Measures Survey. 2007 to 2009. Accessed November 29, 2010 at http://webcache.googleusercontent.com/search?q=cache:B_QeGPNXvWMJ:www.statcan.gc.ca/daily-quotidien/100323/dq100323a-eng.htm+CHMS+AND+lipids&cd=1&hl=en&ct=clnk&gl=ca&client=safari
28. Hemmelgarn BR, Chen G, Walker R, McAlister FA, Quan H, Tu K et al. Trends in antihypertensive drug prescriptions and physician visits in Canada between 1996 and 2006. Can J Cardiol. 2008;24:507-12.
29. Onysko J, Maxwell C, Eliasziw M, Zhang J, Johansen H, Campbell N. Large Increases in Hypertension Diagnosis and Treatment in Canada Following a Health Care Professional Education Program. Hypertension. 2006;48:853-60.

30. Wilkins K, Campbell NRC, Joffres MR, McAlister FA, Nichol M, Quach S, Johansen HL, Tremblay MS. Blood pressure in Canadian adults. Health Reports. 2010; 21:1-10.
31. Pletcher MJ, Bibbins-Domingo K, Lewis CE, Wei GS, Sidney S, Carr JJ, Vittinghoff E, McCulloch CE, Hulley SB. Prehypertension during young adulthood and coronary calcium later in life. Ann Intern Med. 2008;149:91-99.
32. Lawes CMM, Vander Hoorn S, Rodgers A. for the International Society of Hypertension. Global burden of blood-pressure-related disease, 2001. Lancet. 2008; 371:1513-18.
33. Falkner B, Lurbe E, Schaefer F. High blood pressure in children: clinical and health policy implications. J Clin Hypertens. 2010;12:261-76.
34. Paradis G, Tremblay MS, Janssen I, Chiolero A, Bushnik T. Blood pressure in Canadian children and adolescents. Health Reports. 2010; 21:15-22.
35. Muntner P, He J, Cutler JA, Wildman RP, Whelton PK. Trends in blood pressure among children and adults. JAMA. 2004;291:2107-13.
36. Saposnik G, Redelmeier DA, Lu H, Lonn E, Fuller-Thomson E, Ray JG. Risk of premature stroke in recent immigrants (PRESARIO): population-based matched cohort study. Neurology. 2010;74:451-7.
37. Assembly of First Nations/First Nations Information Governance Committee. 2007. First Nations Regional Longitudinal Health Survey (RHS) 2002/03 – Results for Adults, Youth and Children Living in First Nations Communities. (Chapter 4 page 52) Pages 59-60. Accessed November 22, 2010 at http://www.rhs-ers.ca/english/pdf/rhs2002-03reports/rhs2002-03-technicalreport-afn.pdf
38. Leenen FHH, Dumais J, McInnis NH, Turton P, Stratychuk L, Nemeth K, Lum-Kwong MM, Fodor G. Results of the Ontario Survey on the Prevalence and Control of Hypertension. CMAJ. 2008;178:1441-49.
39. Colley RC, Garriguet D, Janssen I, Craig CL, Clarke J, Tremblay MS. Physical activity of Canadian adults: accelerometer results from 2007 to 2009 Canadian Health Measures Survey. Health Reports. 2011;22:1-8.
40. Canadian Tobacco Use Monitoring Survey. Summary of Results for 2008. Accessed on March 16, 2011 at http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/_ctums-esutc_2008/ann_summary-sommaire-eng.php
41. Mellen PB, Gao SK, Vitloins MZ, Goff Jr DC. Deteriorating dietary habits among adults with hypertension: DASH dietary accordance, NHANES 1988-1994 and 1999-2004. Arch Intern Med. 2008;168:308-14.
42. Whelton PK, He J, Appel LJ, Cutler JA, Havas S, Kotchen TA, Roccella EJ, Stout R, Vallbona C, Winston MC, Karimbakas J; National High Blood Pressure Education Program Coordinating Committee. Primary prevention of hypertension: clinical and public health advisory from the National High Blood Pressure Education Program. JAMA. 2002;288:1882-88.
43. Geleijnse JM, Grobbee DE, Kok FJ. Impact of dietary and lifestyle factors on the prevalence of hypertension in Western populations. Eur J Pub Health. 2004;14:235-9.
44. Liu R, So L, Mohan S, Khan N, King K, Quan H. Cardiovascular risk factors in ethnic populations within Canada: results from national cross-sectional surveys. Open Med. 2010: 4 (3): E143
45. Chiu M, Austin P, Manuel DG, Tu JV. Comparison of cardiovascular risk profiles among ethnic groups using population health surveys between 1996 and 2007. CMAJ. 2010:182 (8): E301-E310 doi: 10.1503/cmaj.091676
46. Ralph-Campbell K, Oster R, Connor T, Toth EL. Emerging Longitudinal Trends in Health Indicators for Rural Residents Participating in a Diabetes and Cardiovascular Screening

Program in Northern Alberta, Canada. International Journal of Family Medicine. 2011; 2011: Article ID 596475 doi:10.1155/2011/596475
47. Public Health Agency of Canada. The Social Determinants of Health: An Overview of the Implications for Policy and the Role of the Health Sector. Accessed February 24, 2012 at: http://www.phac-aspc.gc.ca/ph-sp/oi-ar/01_overview-eng.php
48. Statistics Canada. (2008). *Canadian Community Health Survey 2007*. Ottawa: Statistics Canada.
49. Canadian Heart Health Strategy and Action Plan. Building a Heart Healthy Canada. February 2009. Accessed on January 7, 2011 at http://www.chhs.ca/sites/default/files/Document%20Links/Reports/English/CHHS%20-%20Building%20a%20Heart%20Healthy%20Canada%20-%20EN%20-%20Feb%202009.pdf
50. Fisher Wilson J. Can disease prevention save health reform? Annals Int Med. 2009;151:145-8.
51. Wilkins K, Campbell NRC, Joffres MR, McAlister FA, Nichol M, Quach S, Johansen HL, Tremblay MS. Blood pressure in Canadian adults. Health Reports. 2010; 21:1-10.
52. Egan BM, Zhao Y, Axon RN. US Trends in Prevalence, Awareness, Treatment, and Control of Hypertension, 1988-2008. JAMA. 2010;303:2043-50.
53. Godet-Thobie H, Vernay M, Noukpoape A, Salanave B, Malon A, Castetbon K, de Peretti C. Niveau tensionnel moyen et prévalence de l'hypertension artérielle chez les adultes de 18 à 74 ans, ENNS 2006-2007. BEH thématique. 2008;49-50:478-83.
54. McAlister FA, Wilkins K, Joffres M, Leenen F, Fodor G, Baclic O, Gee M, Tremblay MS, Walker R, Johansen H, Robitaille C, Campbell N. Changes in hypertension awareness, treatment, and control rates in Canada over the past two decades. Submitted.
55. Campbell, N.R., et al., Temporal trends in antihypertensive drug prescriptions in Canada before and after introduction of the Canadian Hypertension Education Program. J Hypertens, 2003. 21(8): p. 1591-7.
56. McAlister FA, Feldman RD, Wyard K, Brant R, Campbell NRC for the CHEP Outcomes Research Task Force. The impact of the Canadian Hypertension Education Programme in its first decade. European Heart Journal 2009; 30:1434–39 doi:10.1093/eurheartj/ehp192
57. Campbell, N.R., et al., Changes in cardiovascular deaths and hospitalization in Canada. Can J Cardiol, 2006. 22(5): p. 425-7
58. Campbell NCR, Brant R. Johansen H, Walker RL, Wielgosz A, Onysko J, Gao R, Sambell C, Phillips S, McAlister FA for the Canadian Hypertension Education Program Outcomes Research Task Force. Increases in Antihypertensive Prescriptions and Reductions in Cardiovascular Events in Canada. Hypertension. 2009; 53:128-34.
59. Canadian Hypertension Education Program Report 2010. Accessed November 30, 2010 at http://hypertension.ca/bpc/wp-content/uploads/2010/11/Annual-Report-CHEP-2010-Final-Sept-22.pdf
60. Canada Chair in Hypertension Prevention and Control. 2006-2010 Report.
61. Campbell NRC, Onysko J. for the Canadian Hypertension Education Program and the Outcomes Research Task Force. The Outcomes Research Task Force and the Canadian Hypertension Education Program. Can J Cardiol. 2006; 22:556-58.
62. Campbell NRC, Tobe S. The Canadian effort to prevent and control hypertension: can other countries adopt Canadian strategies? Curr Opinion Cardiol. 2010;25:366-72.
63. Hypertension Canada. Accessed November 30, 2010 at http://hypertension.ca/bpc/
64. Petrella RJ, Speechley M, Kleinstiver PW, Ruddy T. Impact of a Social Marketing Media Campaign on Public Awareness of Hypertension. AJH. 2005;18:270-275.
65. Norm RC Campbell MD1, Richard E Gilbert MD PhD2, Lawrence A. Leiter MD2, Pierre Larochelle MD3, Sheldon Tobe MD 4, Arun Chockalingam PhD5, Richard Ward MD6,

Dorothy Morris, BScN,,MA, CCN(C) 7, Ross T Tsuyuki PharmD MSc8, Stewart Harris. The Scientific Basis for Hypertension Management in People with Diabetes. Accessed December 7, 2010 at http://hypertension.ca/chep/wp-content/uploads/2010/04/DiabetesScientificSummary_April10.pdf

66. Blood Pressure Canada, 2006. Policy – Sodium. Accessed on February 22, 2011 at http://www.hypertension.ca/bpc/wp-content/uploads/2007/10/bpc-sodium-policy-with-endorsements-clean.pdf
67. Health Canada. Sodium Reduction Strategy for Canada. Accessed on November 27, 2010 at http://www.hc-sc.gc.ca/fn-an/nutrition/sodium/strateg/index-eng.php.
68. Connor Gorber S, Tremblay M, Campbell N, Hardt J. The Accuracy of Self-Reported Hypertension: A Systematic Review and Meta-Analysis. Curr Hypertens Rev. 2008;4:36-62.
69. Institute of Medicine. A population-based policy and systems change approach to prevent and control hypertension. Washington: National Academies Press. 2010. pages 99-111 and table 4-6 page 83.
70. Brown IJ, Stamler J, Van Horn L, Robertson CE, Chan Q, Dyer AR, Huang CC, Rodriguez BL, Zhao L, Daviglus ML, Ueshima H, Elliott P; for the International Study of Macro/Micronutrients and Blood Pressure Research Group. Sugar-Sweetened Beverage, Sugar Intake of Individuals, and Their Blood Pressure: International Study of Macro/Micronutrients and Blood Pressure. Hypertension. 2011 Feb 28. [Epub ahead of print]. Accessed on March 16, 2011 at http://www.ncbi.nlm.nih.gov/pubmed/21357284?dopt=Abstract.
71. Jalal DI, Smits G, Johnson RJ, Chonchol M. Increased Fructose Associates with Elevated Blood Pressure. J Am Soc Nephrology. 2010;21:1543-49.
72. Lawrence J. Appel, M.D., M.P.H., Thomas J. Moore, M.D., Eva Obarzanek, Ph.D., William M. Vollmer, Ph.D., Laura P. Svetkey, M.D., M.H.S., Frank M. Sacks, M.D., George A. Bray, M.D., Thomas M. Vogt, M.D., M.P.H., Jeffrey A. Cutler, M.D., Marlene M. Windhauser, Ph.D., R.D., Pao-Hwa Lin, Ph.D., Njeri Karanja, Ph.D., Denise Simons-Morton, M.D., Ph.D., Marjorie McCullough, M.S., R.D., Janis Swain, M.S., R.D., Priscilla Steele, M.S., R.D., Marguerite A. Evans, M.S., R.D., Edgar R. Miller, M.D., Ph.D., and David W. Harsha, Ph.D. for the DASH Collaborative Research Group. A Clinical Trial of the Effects of Dietary Patterns on Blood Pressure. N Engl J Med 1997; 336:1117-1124.
73. He FJ, MacGregor GA. Effect of modest salt reduction on blood pressure: a meta-analysis of randomized trials. Implications for public health. J Hum Hypertens. 2002;6:761-70.
74. Stamler J. The Intersalt Study: background, methods, findings and implications. Am J Clin Nutr. 1997;65:626S-642S.
75. Garriguet D. Sodium consumption at all ages. Health Reports. 2007;18:47-52. http://www.statcan.gc.ca/pub/82-003-x/2006004/article/sodium/9608-eng.pdf
76. He FJ, MacGregor GA. Importance of Salt in Determining Blood Pressure in Children: Meta-analysis of Controlled Trials. Hypertension. 2006;48:861-9.
77. Fulgoni VL, Zaripheh S, Huth PJ, DiRienzo DB and Miller GD. Usual intake of vitamin A, calcium, magnesium, phosphorous and potassium from NHANES (2003-2004) The FASEB Journal. 2008;22:1081.5.)
78. Garriguet D. Canadians' eating habits. Health Reports. 2007;18:17-32. http://www.statcan.gc.ca/pub/82-003-x/2006004/article/habit/9609-eng.pdf
79. Appel LJ, Champagne CM, Harsha DW, Cooper LS, Obarzanek E, Elmer, PJ, Stevens VJ, Vollmer WM, Lin P-H, Svetkey LP, Young DR. Effects of comprehensive lifestyle modification on blood pressure control: main results of the PREMIER clinical trial. *JAMA*. 2003;289:2083–93.

80. Whelton, P. K., J. He, J. A. Cutler, F. L. Brancati, L. J. Appel, D. Follmann, and M. J. Klag. 1997. Effects of oral potassium on blood pressure. Meta-analysis of randomized controlled clinical trials. *Journal of the American Medical Association* 277(20):1624-1632.
81. Canadian Fitness and Lifestyle Research Institute. Kids CAN PLAY! – 2009 series. Bulletin I: Activity levels of Canadian children and youth. Accessed November 22, 2010 at http://www.cflri.ca/eng/statistics/surveys/documents/CANPLAY2009_Bulletin01_PA_levelsEN.pdf.
82. Canadian Tobacco Use Monitoring Survey (CTUMS) 2009. Accessed November 30, 2010 at http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/ctums-esutc_2009-eng.php
83. 7Retnakaran R, Hanley AJ, Connelly PW, Harris SB, Zinman B. Cigarette smoking and cardiovascular risk factors among Aboriginal Canadian youths. CMAJ. 2005;173:885-9.
84. Facts on Smoking Rates. First Nations, Inuit and Aboriginal Health. Accessed on March 16, 2011 at http://www.hc-sc.gc.ca/fniah-spnia/substan/tobac-tabac/index-eng.php#facts
85. Padwal R, Campbell N, Touyz RM for the CHEP. Applying the 2005 Canadian Hypertension Education Program recommendations: 3. Lifestyle modifications to prevent and treat hypertension. CMAJ. 2005;173:749-51
86. Health Canada. Canadian Alcohol and Drug Use Monitoring Survey. Accessed December 15, 2010 at http://www.hc-sc.gc.ca/hc-ps/drugs-drogues/stat/_2009/summary-sommaire-eng.php#alc
87. Sjöström CD, Peltonen M, Wedel H, Sjöström L. Differentiated Long-Term Effects of Intentional Weight Loss on Diabetes and Hypertension. Hypertension. 2000;36:20-25.
88. Singh AS, Mulder C, Twisk JW, van Mechelen W, Chinapaw MJ. Tracking of childhood overweight into adulthood: a systematic review of the literature. Obes Rev. 2008;9:474-488.
89. Orpan HM, Tremblay MS, Fiinès P. Trends in weight change among Canadian adults. Health Reports. 2007;18:9-16. http://www.statcan.gc.ca/pub/82-003-x/2006005/article/trends-tendances/9633-eng.pdf
90. Shields M, Tjepkema M. Regional differences in obesity. Health Reports. 2006; 17:61-67. http://www.statcan.gc.ca/studies-etudes/82-003/archive/2006/9280-eng.pdf -
91. Garriguet D. Obesity and the eating habits of the Aboriginal population. Health Reports. 2008; 19:1-15. http://www.statcan.gc.ca/pub/82-003-x/2008001/article/10487-eng.pdf
92. Diabetes. First Nations, Inuit and Aboriginal Health. Health Canada. Accessed January 7, 2011 at http://www.hc-sc.gc.ca/fniah-spnia/diseases-maladies/diabete/index-eng.php
93. Primary Prevention Action Group of the Canadian Partnership Against Cancer Corporation. Environmental Scan of Primary Prevention Activities in Canada: Part 1 – Policies and Legislation. Accessed on January 7, 2011 at http://www.partnershipagainstcancer.ca/wp-content/uploads/3.2.1.1.1-EnviroScan_PP_Policies_Canada_EXEC.pdf
94. A Declaration on Prevention and Promotion from Canada's Ministers of Health and Health Promotion/Healthy Living. Accessed on January 26, 2011 at http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/declaration/index-eng.php
95. Curbing Childhood Obesity – A federal, provincial and territorial framework for action to promote healthy weights. 2010. Accessed on January 13, 2011 at http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/framework-cadre/intro-eng.php
96. Canadian Partnership Against Cancer Corporation. Strategic Plan 2008-2012. Accessed January 7, 2011 at http://www.partnershipagainstcancer.ca/wp-content/uploads/3.1.5-Strategic_Plan_2008_2012_Feb2008.pdf
97. Krueger H and Associates Inc. 2007. Comparative Analysis of National Disease-specific Strategies. Accessed on February 1, 2011 at http://www.cdpac.ca/media.php?mid=449

98. Stalsberg R, Pedersen AV. Effects of socioeconomic status on the physical activity in adolescents: a systematic review of the evidence. Scandinavian J Med & Sci in Sports. 2010; 20: 368-83.
99. Shrewbury V, Wardle J. Socioeconomic status and adiposity in childhood: a systematic review of cross-sectional studies 1990-2005. Obesity. 2008; 16: 275-84.
100. Hanson MD, Chen E. Socioeconomic status and health behaviours in adolescence: a review of the literature. J Behavioral Med. 2007; 30: 263-85.
101. Galobardes B, Smith GD, Lynch JW. Systematic review of the influence of childhood socioeconomic circumstances on risk for cardiovascular disease in adulthood. Ann Epid. 2006; 16: 91-104.
102. Pollitt RA, Rose KM, Kaufman JS. Evaluating the evidence for models of life course socioeconomic factors and cardiovascular outcomes: a systematic review. BMC Public Health. 2005; 5: 7.
103. Alter DA, Stukel T, Chong A, Henry D. Lesson from Canada's Universal Care: Socially Disadvantaged Patients Use More Health Services, Still Have Poorer Health. Health Affairs. 2011;30:274-83.
104. Subcommittee on Population Health of the Standing Senate Committee on Social Affairs, Science and Technology. Third Report, April 2008. Population Health: Federal, Provincial and Territorial Perspectives. Accessed January 7, 2011 at http://www.parl.gc.ca/39/2/parlbus/commbus/senate/com-e/soci-e/rep-e/rep09apr08-e.htm#_Toc193008613
105. Amankwah E, Campbell NRC, Maxwell C, Onysko J, Quan H. Why some adult Canadians do not have blood pressure measured. J Clin Hypertens. 2007;9:944-951.
106. Campbell NRC, So L, Amankwah E, Quan H, Maxwell C. for the Canadian Hypertension Education Program Outcomes Research Task Force. Characteristics of hypertensive Canadians not receiving drug therapy. Can J Cardiol. 2008;24:485-90.
107. Gee, ME, Bienek A, Campbell NRC, Bancej CM, Robitaille C, Kaczorowski J, Joffres M, Dai S, Gwadry-Sridar F, Nolan RP. Lifestyle change for management of high blood pressure among Canadian adults with hypertension. Am J Cardiol 2011. In press)
108. Lewanczuk R. Innovations in primary care: Implications for hypertension detection and control. Can J Cardiol. 2006;22:614-16.
109. Kotchen TA. The Search for Strategies to Control Hypertension. Circulation. 2010;122:1141-43.
110. Karwalajtys T, Kaczorowski J. An integrated approach to preventing cardiovascular disease: community-based approaches, health system initiatives, and public health policy. Risk Management and Healthcare Policy. 2010;3:39–48.
111. Lewanczuk R. Innovations in primary care: Implications for hypertension detection and treatment. Can J Cardiol. 2006;22:614-616.
112. National Institute for Health and Clinical Excellence. 2010. Prevention of cardiovascular disease: quick reference guide. NICE public health guidance 25. London: National Health Service.
113. Thompson A, Campbell NR, Cloutier L, Costello J, Dawes M, Hickey J, Kaczorowski J, Lewanczuk RZ, Semchuk W, Tsuyuki RT. Tackling the burden of hypertension in Canada – Encouraging Collaborative Care. Can Family Physician. 2008;54:1659-62.
114. Lewanczuk R. Hypertension as a chronic disease: What can be done at a regional level? Can J Cardiol. 2008;24:483-84.
115. Barr VJ, Robinson S, Marin-Link B, Underhill L, Dotts A, Ravensdale D, Salivaras S. The Expanded Chronic Care Model: An Integration of Concepts and Strategies from Population Health Promotion and the Chronic Care Model. Hospital Quarterly. 2003; 7:73-82.

116. World Health Organization. 2008. Global Strategy on Diet, Physical Activity and Health: a framework to monitor and evaluate implementation. Accessed on January 27, 2011 at http://www.who.int/dietphysicalactivity/M&E-2008-web.pdf
117. Office of Disease Prevention and Health Promotion. US Department of Health and Human Services. 2008. Healthy People 2020: The Road Ahead. Accessed on January 27, 2011 at http://www.healthypeople.gov/hp2020/default.asp
118. New York State Department of Health. Division of Chronic Disease and Injury Prevention. Strategic Plan 2010-2013. Accessed on January 27, 2011 at http://www.health.ny.gov/diseases/chronic/plans_reports/docs/2010-2013_strategic_plan.pdf
119. Cardiovascular Health Awareness Program (CHAP). Accessed on February 2, 2011 at http://www.chapprogram.ca/
120. Capewell S, Lloyd-Jones DM. Optimal Cardiovascular Prevention Strategies for the 21st Century. JAMA. 2010;304:2057-58.
121. Smith ER. The Canadian Heart Health Strategy and Action Plan. Can J Cardiol. 2009;25:451-52.
122. World Health Organization. 2008. 2008-2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases. Geneva: WHO Press.
123. From Michael Adams' paper "Topic 4: Current Hypertension-related Activities in Canada" and "Topic 6: Future Work in the Area of High Blood Pressure Prevention and Management".
124. The Standing Senate Committee on Social Affairs, Science and Technology. 2009. A Healthy, Productive Canada: A Determinant of Health Approach. Final Report of Senate Subcommittee on Population Health.
125. Penz ED, Joffres MR, Campbell NR. Reducing dietary sodium and decreases in cardiovascular disease in Canada. Can J Cardiol. 2008;24:497-1.
126. Wagner EH. Chronic Disease Management: What Will It Take To Improve Care for Chronic Illness? Eff Clin Pract. 1998;1:2-4.
127. Coleman K, Mattke S, Perrault PJ, Wagner EH. Untangling Practice Redesign from Disease Management: How Do We Best Care for the Chronically Ill? Annu Rev Public Health. 2009;30:385–408.
128. Ho PM, Rumsfeld JS. Beyond inpatient and outpatient care: alternative model for hypertension management. BMC Public Health 2006;6:257.
129. Redón J, Coca A, Lázaro P, Aguilar MD, Cabañas M, Gil N, Sánchez-Zamorano MA, Aranda P. Factors associated with therapeutic inertia in hypertension: validation of a predictive model. J Hypertens. 2010;28:1770–77.
130. World Health Organization. 2009. Interventions on diet and physical activity: what works: summary report. Geneva: WHO Press.
131. World Health Organization. Set of recommendations on the marketing of foods and non-alcoholic beverages to children. Accessed on February 10, 2011 at http://www.who.int/dietphysicalactivity/publications/recsmarketing/en/index.html
132. Food for Thought: Television Food Advertising to Children in the United States (2007).
133. Hawkes C. 2007. Marketing Food to Children: the Global Regulatory Environment 2004-2006. Geneva: WHO Press.
134. Media Awareness Network. 2010. Regulations under the Québec Consumer Protection Act concerning advertising directed to children. Available at http://www.media-awareness.ca/english/resources/legislation/canadian_law/provincial/quebec/consumer_protection_actqc.cfm. Accessed January 11, 2011.

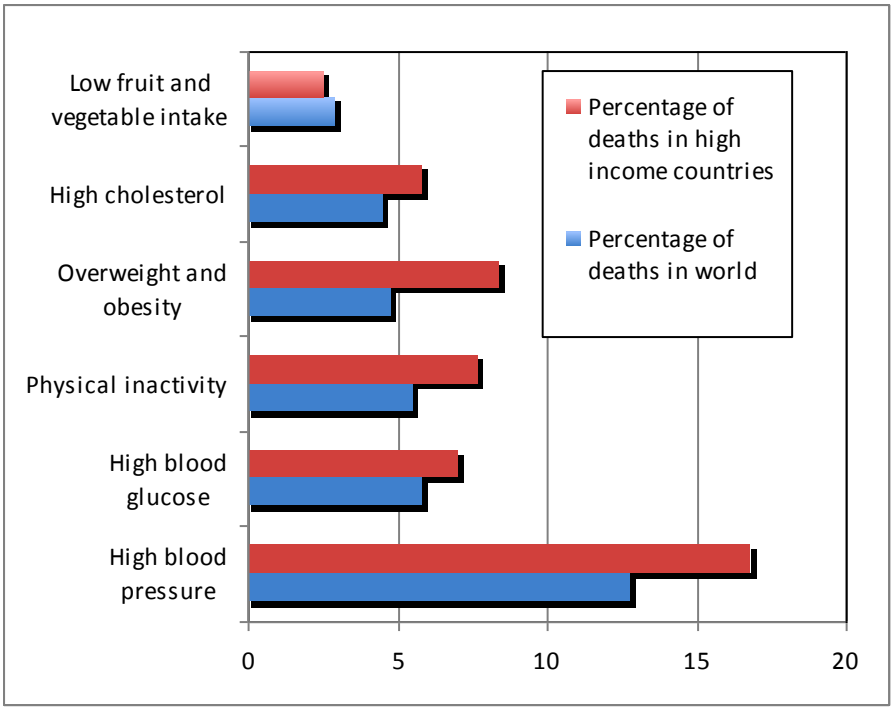
135. Canadian Association of Broadcasters. The Broadcast Code for Advertising to Children. Revised April 2007. Available at: http://www.adstandards.com/en/clearance/childrens/broadcastCodeForAdvertisingToChildren.pdf. Accessed January 11, 2011.
136. Neale Smith, L., B. Littlejohns, and D. Thompson. Shaking out the cobwebs: insights into community capacity and its relation to health outcomes. Community Development Journal, 2001. 36(1): p. 30-41.
137. Dresemndorfer, RG, Raine, K, Dyck RJ, Plotnikoff RC, Collins-Nakai RL, McLaughlin WK, Ness K. A Conceptual Model of Community Capacity Development for Health Promotion in the Alberta Heart Health Project. Health Promot Pract 2005 6:31 DOI: 10.1177/1524839903259302
138. Kaczorowski J, Chambers LW, Dolovich L, Paterson JM, Karwalajtys T, Gierman T, Farrell B, McDonough B, Thabane L, Tu K, Zagorski B, Goeree R, Levitt CA, Hogg W, Laryea S, Carter MA, Cross D, Sebaldt RJ. Improving cardiovascular health at the population level: A 39 community cluster-randomized trial of the Cardiovascular Health Awareness Program (CHAP). BMJ, 2011;342:d442 doi:10.1136/bmj.d442
139. Jones C, Simpson SH, Mitchell D, Haggarty S, Campbell N, Then K, Lewanczuk RZ, Sebaldt RJ, Farrell B, Dolovitch L, Kaczorowski J, Chambers LW. Enhancing hypertension awareness and management in the elderly: lessons learned from the Airdrie Community Hypertension Awareness and Management Program (A-CHAMP). Can J Cardiol. 2008;24:561-7.
140. McLean DL, McAlister FA, Johnson JA, King KM, Makowsky MJ, Jones CA, Tsuyuki RT; SCRIP-HTN Investigators. A randomized trial of the effect of community pharmacist and nurse care on improving blood pressure management in patients with diabetes mellitus: study of cardiovascular risk intervention by pharmacists-hypertension (SCRIP-HTN). Arch Intern Med. 2008;168:2355-61.
141. Coleman M, Barnachea K, Hefferton J, Koppel J, Mainville W, Wilson A, Yau H, Hatoum B, Wiens S, Cox C, Gukert M, Hassam N, Jones CA. A CATCH Alberta Inter-professional Indo-Asian Cardiovascular Health and Management Program. Canadian Cardiovascular Congress 2010. CCS410 Poster OUTCOMES AND REGISTRIES IN CVD: 415. Accessed on February 22, 2011 at http://www.pulsus.com/ccc2010/abs/328.htm
142. Jones CA, Mawani S, King KM, Allu SO, Mohan S, Campbell NRC. Tackling Health Literacy: Adaptation of Public Hypertension Educational Materials for an Indo-Asian Population in Canada. BMC Public Health 2011:11:24 doi:10.1186/1471-2458-11-24.
143. Tobe SW, Pylypchuk G, Wentworth J, Kiss A, Szalai JP, Perkins N, Hartman S, Ironstand L, Hoppe J. Effect of nurse-directed hypertension treatment among First Nations people with existing hypertension and diabetes mellitus: the Diabetes Risk Evaluation and Microalbuminuria (DREAM 3) randomized controlled trial. CMAJ. 2006;174:1267-71.
144. Margaret Moy Lum-Kwong, Director, High Blood Pressure Strategy, Heart and Stroke Foundation of Ontario. Personal communication, January 2011. Aboriginal Hypertension Management Program. Accessed on February 12, 2011 at http://www.heartandstroke.on.ca/site/c.pvI3IeNWJwE/b.5339629/k.E94C/HCP__Aboriginal_Hypertension_Management_Program_Pilot.htm
145. Campbell NRC, Jeffrey P, Kiss K, Jones C, Anton AR. Building capacity for awareness and risk factor identification in the community: the blood pressure assessment program of Calgary Fire Department. Can J Cardiol. 2001;17:1275-9.
146. Walsh JME, McDonald KM, Shojania KG, Sundaram V, Nayak S, Lewis R, Owens DK, Goldstein MK. Quality Improvement Strategies for Hypertension Management: A Systematic Review. Med Care. 2006;44:646–57.

147. Pennant M, Davenport C, Bayliss S, Greenheld W, Marshall T, Hyde C. Community Programs for the Prevention of Cardiovascular Disease: a systematic review. Am J Epid. 2010;172:501-16.
148. Montague TJ, Gogovor A, Krelenbaum M. Time for chronic disease care and management. Can J Cardiol. 2007;23:971-75.
149. Birtwhistle R, Keshavjee K, Lambert-Lanning A, Godwin M, Greiver M, Manca D, Lagace C. Building a Pan-Canadian Primary Care Sentinel Surveillance Network: Initial Development and Moving Forward. J Am Board Family Med. 2009;22:412-22.
150. Global Burden of Disease and Risk Factors. Lopez AD, Mathers CD, Ezzati M, et al., editors. Washington (DC): World Bank; 2006.
151. Gee M et al. Lifestyle change for management of high blood pressure among Canadian adults with hypertension. In preparation.

Appendix 1:
International Perspective

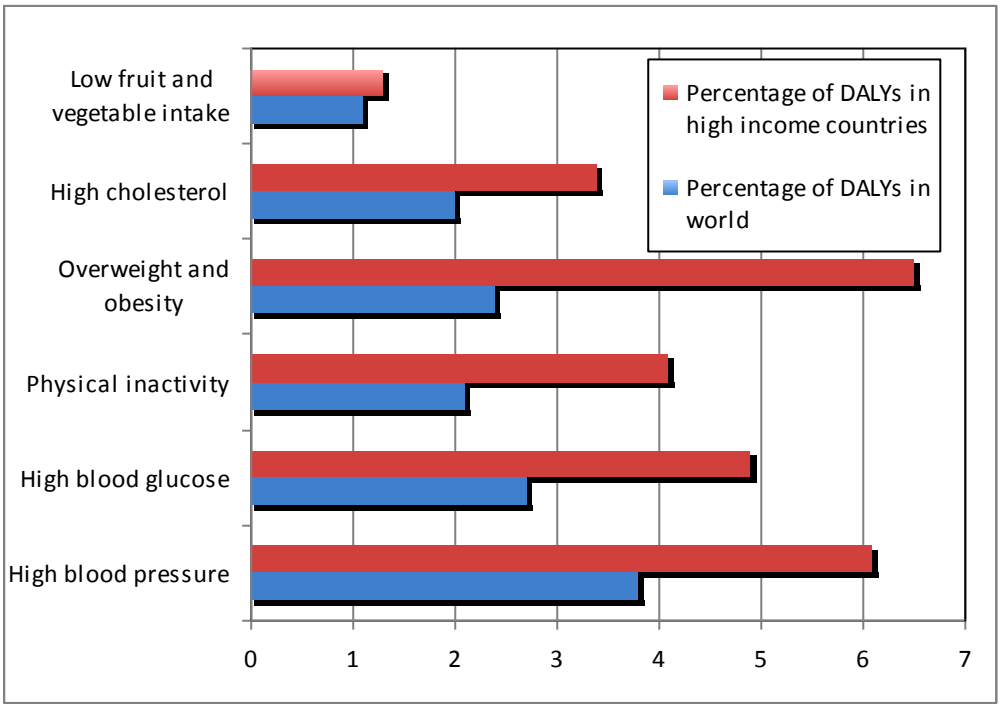
In 2000, 26% of adults worldwide had hypertension (almost 27% of men and 26% of women), with about two-thirds of them living in economically developing countries. By 2025, the number is predicted to increase to 42% of adults. (1) Mortality rates attributed to blood pressure shown in Figure 1 vary across developed countries but are consistently the highest in the group of physical activity and diet-related risks (excluding malnutrition). DALYs: Disability-adjusted life year (DALYs) attributed to high blood pressure in Figure 2 are second only to overweight and obesity.

FIGURE 1: Percentage of deaths attributable to six diet-related risks and physical inactivity, 2004



Source: World Health Organization. 2009. Global health risks: mortality and burden of disease attributable to selected major causes.

FIGURE 2: Percentage of DALYs attributable to six diet-related risks and physical inactivity, 2004



DALYs: Disability-adjusted life year. Source: World Health Organization. 2009. Global health risks: mortality and burden of disease attributable to selected major causes.

Policies and Programs

World Health Organization

The WHO together with the International Society of Hypertension (ISH) last released recommendations for hypertension management in 2003, updating a 1999 version with new evidence and improving applicability to limited resource environments. (3;4) Addressing both low and high resource environments, WHO/ISH concluded that:

- Lifestyle modification is recommended for all individuals.
- Specific agents have benefits for patients with particular compelling indications that even if more expensive, may be more cost-effective. Monotherapy is inadequate for the majority of patients in this case.
- For patients without a compelling indication for a particular drug class, on the basis of comparative trial data, availability and cost, a low dose of diuretic should be the first line of therapy.
- In high-risk patients who benefit from treatment, expensive drugs may be cost-effective but not among those at low-risk unless the drugs can somehow be made affordable.

Australia

Beginning in 2002-03, the Australian Health Ministers produced a National Chronic Disease Strategy and then five National Service Improvement Frameworks", one of which targets stroke, heart and vascular disease (coronary heart disease, heart failure, peripheral vascular disease, stroke, rheumatic heart disease and chronic kidney disease (CKD)). Each Framework is a high level policy guide (implementation is left to each jurisdiction) with critical intervention points that reflect the "patient journey": reducing risk; early detection, care and support for people with disease; best care and support for acute episodes; best long-term care and support; and best care in advanced stages. In the Framework for stroke, heart and vascular disease, specific to high blood pressure, a spectrum of critical interventions includes addressing common risk factors (diet, physical activity, smoking), raising awareness for the importance on blood pressure monitoring and subsequent treatment and management of hypertension as the condition advances. (5)

In December 2009, the Australian Institute of Health and Welfare released "Prevention of cardiovascular disease, diabetes and chronic kidney disease: targeting risk factors" as its first report with a systematic approach to monitor prevention of the modifiable risk factors for the three closely related conditions of CVD, diabetes and CKD. The risk factors discussed include smoking, high blood pressure, high blood cholesterol, obesity and physical inactivity. The report covers three aspects of prevention: the prevalence of the risk factors, initiatives aimed at the whole population and services provided to individuals. It concludes that (6)

- There is a clear need for ongoing monitoring in the area of prevention and that better data are needed, in particular those based on measurement rather than self-reported, as well as systematic data on population-level initiatives.
- There remains considerable scope for more prevention to occur in relation to the risk factors common to CVD, diabetes and CKD.
- The relevant risk factors continue to be very common in the population and are worsening in some cases, notably obesity.
- An increased policy focus on prevention is expected to result in an increased number of interventions in this area, thus making continued monitoring an important and relevant national activity.

The Australian Heart Foundation is addressing hypertension most specifically. To assist clinicians, it convened an expert committee in 2006 to review the 2004 edition of "Hypertension management guide for doctors" and other current international guidelines for the management of hypertension, including those from the US Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure, the UK National Institute of Clinical Excellence, and the European Society of Hypertension/European Society of Cardiology. The committee conducted literature searches for studies published since 2003 on key topic areas and between late 2006 and mid-2007 reached consensus on new recommendations. A web version of a "Guide to management of hypertension 2008. Updated August 2009" facilitates dissemination. (7)

The Foundation's most recent 2008 guidelines for hypertension management recommends that advice on smoking, nutrition, alcohol use, physical activity and body weight be part of routine management of hypertension for all patients regardless of drug therapy. Smoking cessation can reduce overall cardiovascular risk. Healthy eating, reducing dietary sodium and alcohol intake, regular physical activity and achieving a healthy body weight are promoted as effective in lowering blood pressure. (8)

And in 2008, the Stroke and Heart Foundations in Australia collaborated to produce a national plan to address cardiovascular disease, building on and informing previous and at that time current related national and state/territory strategies on e.g. chronic disease, obesity, health system reform, hospital reform, and stroke and heart disease. A number of action items are relevant to high blood pressure, among them: improving CVD risk identification including blood pressure monitoring; expanding the Lifescripts (lifestyle prescription) program in primary care; implementing a national referral model to support the advice given by GPs to patients and integrating advice with national campaign messages and resources on tobacco, healthy eating, alcohol and physical activity; implementing a program to increase awareness of high blood pressure in the community.; and addressing modifiable risk factors. (9)

As for research, the High Blood Pressure Research Council of Australia since its inception in 1979 has led the research into the causes, prevention and treatment of high blood pressure. The research incorporates a full range from experimental molecular biology and genetics to human physiology and drug treatment of hypertension. Council members are from among national and international leaders in the field of cardiovascular research. Its Foundation for High Blood Pressure Research, established in Melbourne in 1994, supports fellowships, postdoctural awards and provides meeting support. (10)

United Kingdom

In 2005, the Faculty of Public Health of the Royal College of Physicians of the United Kingdom published a briefing statement – Hypertension, the Silent Killer. It gave an overview of the burden of hypertension, including the implications for health and the cost to individuals, society and the National Health Service (NHS), with recommendations that action be taken at the local level. It also pointed out the key evidence, publications and organizations important to taking the next step to understand and tackle the issue. (11)

The Faculty with the National Heart Forum at the same time produced a toolkit "Easing the pressure: tackling hypertension", intended to help local health improvement partnerships – the multi-agency teams including public health, health promotion and primary care professionals, and strategic planners in both NHS and local government - develop and implement local strategies and action plans, not only to identify and treat patients with hypertension but also to promote health lifestyles and environments to prevent hypertension. It is an online resource that includes links to other online tools as

well as forms and checklists to help assess local need and monitor progress. (12) There is a detailed practical guide to develop a local strategy that includes how to monitor progress, assess performance and evaluate the strategy as well as how to "mainstream" and sustain it in terms of continued funding. (13)

Regarding guidelines for hypertension management, the National Institute for Health and Clinical Excellence (NICE) with the British Hypertension Society (BHS) in 2006 prepared "Hypertension: management of hypertension in adults in primary care", an update to a set of guidelines published in 2004 (14;15)where only the recommendations on pharmacological interventions were changed. (16)

The BHS also provides a medical and scientific research forum to enable sharing of research on the origins of high blood pressure and how to improve its treatment. In addition, the Society has established an educational programme where the research is translated to support doctors and other healthcare workers. (17)

United States

At the request of the Centers for Disease Control and Prevention (CDC), the Institute of Medicine (IOM) convened an expert committee to review available public health strategies for reducing and controlling hypertension in the US population including both science-based and practice-based knowledge, and to identify the high-priority areas on which public health organizations and professionals should focus to accelerate progress in hypertension reduction and control. In its report, released in early 2010, the IOM recommends a population-based approach that links public health and clinical care and is based on measurement, system change and accountability. There are several priority recommendations (18):

- For the CDC Division of Heart Disease and Stroke Prevention and state and local public health jurisdictions

  ➔ Enhance population-based efforts and strengthen efforts among CDC units and partners
  ➔ Strengthen leadership in reducing sodium intake and increasing potassium intake
  ➔ Improve surveillance and reporting of hypertension and risk factors

- For system change directed at individuals with hypertension

  ➔ Improve quality of care in terms of physician adherence to guidelines

- Remove the economic barriers to effective antihypertensive medication use

- Provide community support to individuals with hypertension

To assist healthcare professionals, the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure supported by the National Heart, Lung and Blood Institute prepares clinical guidelines, the 7th version released in 2004. (19)

Dietary Sodium Reduction

Below are short summaries of the dietary sodium reduction initiatives in the United Kingdom, United States and Australia. For Canada, see section 2 in the body of the document. Sodium reduction is selected from among other strategies focused on risk factors of hypertension because of its singularly significant impact on lowering blood pressure across whole populations not to mention its impact on other chronic conditions and diseases. As well, in each country it implicates the global food industry, and with the industry engagement components of national strategies being similar, if national initiatives were to be coordinated to become multilateral, they could potentially influence harmonizing food product formulations towards low/no sodium/salt products on a global scale.

United Kingdom

In May 2003, the UK Scientific Advisory Committee on Nutrition (SACN) published its report on Salt and Health, concluding that a reduction in the average salt intake of the population would proportionally lower population blood pressure levels and significantly reduce the risk of CVD. SACN recommended that the average salt intake be reduced from the then current level of 9.5g to 6g per day, with lower levels recommended for children. (20)

Following publication of the SACN report, work went forward in two main areas:

- Reformulation working with all sectors of the food industry- retailers, manufacturers, trade associations, caterers and suppliers to the catering industry to reduce the salt content of processed food products.
- An ongoing public awareness campaign to inform consumers of the issues and provide guidance on how to reduce salt intake.

Meetings with industry and the then Minister of Health began later in 2003. By October 2009 all sectors of the food industry had made over 90 formal commitments including all the major UK retailers, a number of multinational and key national manufacturers and caterers, as well as trade associations for products making major contributions to intakes.

To help guide the food industry as to the type of foods in which reductions are required, and the level of reductions that are needed to help reduce consumers' intakes, targets for salt levels in a wide range of food categories were negotiated. The most recent targets are posted at http://www.food.gov.uk/scotland/scotnut/salt/saltcommitments. Dietary salt intake in the United Kingdom has been reduced by about 1 g/day between 2000/01 and 2008. (21)

United States

In 2008, Congress asked the IOM to recommend strategies for reducing sodium intake to levels recommended in the Dietary Guidelines for Americans. In its 2010 report, the IOM concluded that reducing sodium content in food requires new government standards for acceptable levels of sodium across the food supply, to be achieved through a gradual and systematic reduction of sodium content such that consumers' tastes are slowly adjusted to lower levels of sodium.

The IOM made five overarching recommendations (22):

- The Food and Drug Administration should expeditiously initiate a process to set a mandatory national standards for the sodium content of foods.
- The food industry should voluntarily act to reduce the sodium content of foods in advance of the implementation of mandatory standards.
- Government agencies, public health and consumer organizations, and the food industry should carry out activities to support the reduction of sodium levels in the food supply. In tandem with recommendations to reduce the sodium content of the food supply, government agencies, public health and consumer organizations, health professionals, the health insurance industry, the food industry, and public-private partnerships should conduct augmenting activities to support consumers in reducing sodium intake.
- Federal agencies should ensure and enhance monitoring and surveillance relative to sodium intake measurement, salt taste preference, and sodium content of foods, and should ensure sustained and timely release of data in user-friendly formats.

In parallel to the work of the IOM, the New York City Department of Health and Mental Hygiene is coordinating the National Salt Reduction Initiative (NSRI) to reduce the amount of salt in packaged and restaurant foods. NSRI is a coalition of cities, states and health organizations working to help food manufacturers and restaurants voluntarily reduce the amount of salt in their products. The goal is to reduce Americans' salt intake by 20% over five years. (23)

A public-private partnership has developed targets to guide company salt reductions in 62 categories of packaged food and 25 categories of restaurant food. Alongside are mechanisms to monitor sodium in the food supply and to track companies' progress toward specific targets. The NSRI is modeled on the United Kingdom salt reduction initiative. (23)

The NSRI packaged food targets are at http://www.nyc.gov/html/doh/downloads/pdf/cardio/cardio-salt-nsri-packaged.pdf and restaurant food targets are at http://www.nyc.gov/html/doh/downloads/pdf/cardio/cardio-salt-nsri-restaurant.pdf

Australia

The Australian Division of World Action on Salt and Health (AWASH) launched a dietary salt reduction campaign in 2007 with the goal of reducing salt in processed foods on average by 25% over five years. AWASH consists of a network of health professionals, scientists, academics, consumer advocates and food industry businesses. The campaign has three main strategies: work collaboratively with industry to reduce the salt content of processed foods over five years; advocate government to increase funding and leadership on salt reduction; and raise awareness of salt as a health issue with consumers via public relations and media. (24)

AWASH has most recently researched its campaign to understand the stakeholders' views on the importance of salt reduction as a national health priority, the strengths and weaknesses of the campaign, the extent to which it has had an impact so far, and the barriers and opportunities for future action. The stakeholders made suggestions for future AWASH activities in the three strategic areas: (1) that NGOs consolidate their voices for greater impact on and AWASH develop a closer relationship with the federal government; (2) that Australia develop its own solutions for the Australian food industry; and (3) that consumers' understanding of health and salt be further researched as there is little current awareness of the relationship. (25)

An International Role for Canada

Since the 1974 Lalonde report (26) – A New Perspective on the Health of Canadians – Canada has been recognized as a world leader in outlining the steps required for disease prevention and health promotion. Health services are seen as only one of the influences on health status while the importance of addressing such determinants of health as lifestyle and environment has been elevated. These ideas were expanded with the development of the Ottawa Charter for Health Promotion (27) that emphasized reducing inequities and influencing the determinants of health as opposed to ad hoc health promotion strategies. Through these as well as other initiatives that focus on strengthening public health capacity and that seek to improve the ability of the health system to respond to chronic disease, Canada has been leading in providing guidance in promoting global action against chronic diseases and their risk factors.

A number of federal government departments are engaged in supporting Canada's international activities related to health. These include the Public Health Agency of Canada (health promotion, disease prevention and social determinates of health), Health Canada (nutrition and tobacco control), Canadian International Development Agency (funding for international health-specific projects, Action Plan on Health and Nutrition) and Canadian Institutes of Health Research. International collaboration work also includes formal commitments made by the Government of Canada such as the Framework of Cooperation on Chronic Diseases signed with the World Health Organization (WHO) and agreements on other chronic disease and with health promotion organizations. These commitments allow Canada to engage internationally to address common risk factors for chronic diseases, specific diseases and their underlying

conditions in society. Engagement of Canadian experts and NGOs in the work of international organizations provides Canada an opportunity to advance the health of individuals around the world. The potential benefit of these activities is significant as they allow Canada to reduce the global burden of disease as well as influence issues that imminently affect the health of Canadians such as sodium and tobacco control.

Over the last several years, international recognition for Canada's hypertension programs has grown. In 2010 Canada hosted the International Hypertension Society meeting and Canadian successes were highlighted prominently. As a result Canadians have been invited by several countries to present programs and assist in the development of hypertension recommendations processes. And Canadians will be developing a workshop on hypertension control for the World Hypertension League meeting in Beijing in 2011.

In 2010 Canada also hosted the WHO Platform II meeting on salt reduction and Canadian progress with its dietary salt program was featured. Canada and Canadians are prominent in the Pan American Health Organization Expert Group to reduce dietary salt in the Americas and Canadians are also being invited to assist countries outside the Americas to reduce dietary salt.

There are several potential opportunities for Canada to increase its international role, to disseminate its learnings on how to develop a systematic approach to the treatment and control of hypertension through its highly evolved high-risk approach. In 1995 Canada hosted an international meeting on hypertension prevention and control that had broad international representation however at the time there were no models on how to improve hypertension prevention and control. Canada could now develop a standardized education knowledge translation program to assist other countries to develop similar programs. Canadian programs could even develop policies to specifically and freely share their hypertension programs and resources with other countries' programs. To facilitate this dissemination, Canada could host a specific international meeting on hypertension prevention and control that would showcase our programs and how to adopt them. Canada could also host symposia and workshops at international meetings to both showcase our success and provide learning's on how to improve hypertension control.

Canada also needs to interact and collaborate more closely with the United States. Both countries have highly evolved programs to control hypertension albeit using different approaches and programs in some settings. Sharing what has been learned and the strengths and weaknesses of the differing and sometimes novel approaches could aid both countries in the effort to improve hypertension control. Furthermore, with the countries being strong economic partners, using similar population based approaches to reduce or "denormalize" unhealthy eating would be of great mutual benefit. Information is also commonly shared by public media across the Canadian and US borders and having similar approaches to, for example, restrict advertizing to children, may also increase the impact of these programs in both countries by avoiding mis-messaging from cross border communications.

Canadian hypertension programs have also been associated with large reductions in total and cardiovascular mortality and non-fatal cardiovascular events. Worldwide CVD is the leading risk for death and disability and with its impact and that of other chronic conditions growing, especially in developing countries, the combined effects on health and economic development are reaching such proportions that the United Nations General Assembly is holding a United Nations Summit on non-communicable diseases (NCDs) in 2011. At the UN meetings, Canada could highlight its hypertension related programs as an example if not a mechanism for other countries to likewise reduce NCDs.

References

1 Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. Lancet. 2005;365:217-23.

2 World Health Organization. 2009. Global health risks: mortality and burden of disease attributable to selected major causes. Accessed December 6, 2010 at http://www.who.int/healthinfo/global_burden_disease/global_health_risks/en/index.html

3 World Health Organization, International Society of Hypertension Writing Group. 2003 World Health Organization (WHO)/International Society of Hypertension (ISH) statement on management of hypertension. J Hypertens. 2003;21:1983-92. Accessed December 6, 2010 at http://www.who.int/cardiovascular_diseases/guidelines/hypertension_guidelines.pdf

4 WHO/ISH Hypertension guidelines. Accessed December 20, 2010 at http://www.who.int/cardiovascular_diseases/guidelines/hypertension/en/index.html

5 Australian Health Ministers' Conference. National Service Improvement Framework for Heart, Stroke and Vascular Disease. Summary. Accessed December 5, 2010 at http://www.health.gov.au/internet/main/publishing.nsf/content/75736A237DD2E583CA2571410013E62B/$File/cardsum2.pdf

6 Australian Institute of Health and Welfare 2009. Prevention of cardiovascular disease, diabetes and chronic kidney disease: targeting risk factors. Cat. no. PHE 118. Canberra: AIHW. Accessed December 20, 2010 at http://www.aihw.gov.au/publications/phe/phe-118-10696/phe-118-10696.pdf

7 [Australian] Heart Foundation. Guide to management of hypertension 2008. Assessing and managing high blood pressure in adults. Updated August 2009. Web version. Accessed December 6, 2010 at http://www.heartfoundation.org.au/SiteCollectionDocuments/A_Hypert_Guidelines2008_2009Update_FINAL.pdf

8 Huang N, Duggan K, Harman J. Lifestyle management of hypertension. Aust Prescr. 2008;31:150–3. Accessed December 5, 2010 at http://www.heartfoundation.org.au/SiteCollectionDocuments/A_Hypert_Article_AustPres_LifestyleManagement_Dec2008.pdf

9 Stroke Foundation and Heart Foundation. 2008. Time for Action: The national plan to reduce the burden of cardiovascular disease – Australia's biggest killer. Accessed December 5, 2010 at http://www.heartfoundation.org.au/SiteCollectionDocuments/A%20Time%20for%20Action.pdf

10 High Blood Pressure Research Council of Australia. Accessed December 5, 2010 at http://www.hbprca.com.au/welcome.

11 Faculty of Public Health of the Royal College of Physicians of the United Kingdom. Hypertension – the Silent Killer. Briefing Statement. Accessed December 20, 2010 at http://www.fph.org.uk/uploads/bs_hypertension.pdf

12 Easing the pressure: tackling hypertension. Accessed December 20, 2010 at http://www.fph.org.uk/easing_the_pressure%3A_tackling_hypertension and http://www.fph.org.uk/uploads/hypertension_all.pdf

13 Easing the pressure, tackling hypertension. C: Developing a local hypertension strategy. Accessed December 20, 2010 at http://www.fph.org.uk/uploads/Section%20C-hypertension.pdf

14 NHS National Institute for Health and Clinical Excellence. 2006. Hypertension: Management of hypertension in adults in primary care. Accessed December 20, 2010 at http://www.nice.org.uk/nicemedia/live/10986/30114/30114.pdf

15 Williams B, Poulter NR, Brown MJ, Davis M, McInnes GT, Potter JF, Sever PS, and Thom S. British Hypertension Society Guidelines. Guidelines for management of hypertension: report of the fourth working party of the British Hypertension Society, 2004—BHS IV. J Hum Hypertens. 2004;18:139-85.
16 National Collaborating Centre for Chronic Conditions. 2006. Hypertension: management of hypertension in adults in primary care: partial update. London: Royal College of Physicians. Accessed December 20, 2010 at http://www.nice.org.uk:80/nicemedia/pdf/CG34fullguideline.pdf
17 British Hypertension Society. Accessed December 20, 2010 at http://www.bhsoc.org/
18 Institute of Medicine. Population-based policy and systems change approach to prevent and control hypertension. Washington: National Academies Press. 2010. Accessed on December 6, 2010 at http://www.iom.edu/Reports/2010/A-Population-Based-Policy-and-Systems-Change-Approach-to-Prevent-and-Control-Hypertension.aspx
19 National Heart, Lung and Blood Institute. National Institutes of Health. US Department of Health and Human Services. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. August 2004. http://www.nhlbi.nih.gov/guidelines/hypertension/jnc7full.pdf
20 Food Standards Agency – UK Salt Reduction Initiatives. Accessed December 21, 2010 at http://www.food.gov.uk/multimedia/pdfs/saltreductioninitiatives.pdf
21 Food Standards Agency. Dietary Sodium Levels Surveys. Accessed February 18, 2011 at http://www.food.gov.uk/science/dietarysurveys/urinary.
22 Institute of Medicine. Strategies to Reduce Sodium Intake in the Unites States. Washington: National Academies Press. 2010. Accessed on December 21, 2010 at http://www.iom.edu/Reports/2010/Strategies-to-Reduce-Sodium-Intake-in-the-United-States.aspx
23 New York City Department of Health and Mental Hygiene. Cutting Salt, Improving Health. Accessed December 21, 2010 at http://nyc.gov/html/doh/html/cardio/cardio-salt-initiative.shtml
24 AWASH. Drop the Salt? Campaign. Accessed on December 21, 2010 at http://www.awash.org.au/dropthesaltcampaign.html
25 AWASH Stakeholder Research Report. 29th January 2010. Stakeholder Research for the George Institute for International Health. Accessed on December 21, 2010 at http://www.awash.org.au/documents/Stakeholder_report_2010.pdf
26 A New Perspective on the Health of Canadians (Lalonde Report) (1973-1974). Accessed on January 13, 2011 at http://www.hc-sc.gc.ca/hcs-sss/com/fed/lalonde-eng.php
27 Ottawa Charter for Health Promotion. Accessed on January 13, 2011 at http://www.who.int/hpr/NPH/docs/ottawa_charter_hp.pdf

Appendix 2:
An Historic Overview of Prevention, Detection, Treatment and Control of High Blood Pressure in Canada

Prior to 1990

In 1977, the Ontario Council of Health produced the first set of recommendations for hypertension management in Canada. The Canadian Cardiovascular Society and the Canadian Heart Foundation adapted these to be national recommendations. (1)

At about the same time, a group of hypertension experts and clinical scientists came together and in 1978 formed the Canadian Hypertension Society (CHS). In 1982 a CHS task force initiated a process that led to the 1984 publication – Report of the Canadian Hypertension Society's Consensus Conference on the Management of Mild Hypertension. (1) Subsequently, a series of CHS consensus conferences resulted in other sets of recommendations: in 1985 on hypertension in the elderly (2) and in 1988 the pharmacologic treatment of hypertension (3).

It was in 1986 that a working group of federal/provincial government representatives recommended for the first time a national framework for the prevention and control of high blood pressure in Canada with four basic strategies (4).

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

The framework called for the formation of a national coordinating body of non-government and government organizations and similar bodies in the provinces and territories to implement programs. It recommended that workplaces be a focus of activities, that research be enhanced and local implementation be resourced.

Several initiatives that followed helped address the challenge:

- Formation of the Canadian Coalition of High Blood Pressure Prevention and Control (the Coalition) with membership including national professional organizations, government, industry, and voluntary organizations;
- Workshop on the "Epidemiology of High Blood Pressure in Canada" in Montreal, 1989;

- The Heart Health Initiative that included:

  ➔ Canadian Heart Health Surveys (CHHS) in every province from 1989 to 1992 to determine the prevalence of high blood pressure, awareness of diagnosis, treatment and control;
  ➔ "Heart Health Demonstration Projects" in most provinces;

- 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; and

- the CHS hosting the International Hypertension Society meeting in 1990 in Montreal from which the proceeds were used to establish a fund to promote hypertension research and in particular research training.

Several achievements in hypertension prevention and control are attributed to the period prior to 1990:

- hypertension being recognized as a major public health issue in Canada through the development of a hypertension-specific report and strategy;

- formation of the Coalition as a mechanism to place hypertension on the agenda of major Canadian health organizations;

- formation of a hypertension specialty and research organization – the Canadian Hypertension Society – that developed evidence-based recommendations for the management of hypertension; and

- development of the Heart Health Initiative and CHHS that delineated the extent to which hypertension was a health risk in Canada and were the impetus for pilot programs at community levels with the potential to prevent and control hypertension.

1990-1999

In 1990 a partnership lead by the Coalition, with the Canadian Hypertension Society, Health Canada and the Heart and Stroke Foundation of Canada used an expert consensus approach to develop the first Canadian recommendations for non-pharmacological (lifestyle) management of hypertension (5). By 1993, the CHS was also developing recommendations independently having adopted a process where multiple topic committees focused on diagnosis of hypertension and pharmacological treatment (6). The CHS committees graded evidence based on uniform criteria and disseminated their recommendations along with a simplified guide to their implementation and an accompanying slide set.

Over 1994 and 1995, the Coalition updated recommendations for lifestyle management, the measurement of blood pressure and the follow-up of people with hypertension (7). It also published recommendations for home (self) measurement of blood pressure (8) that evolved to include specific tools to help healthcare professionals train people with hypertension to properly assess their blood pressure and a workshop using a

standardized slide set and other materials to assist with the training. The Coalition continued with recommendations in 1998 on how to improve adherence to lifestyle and pharmacological therapy (9). All of its processes relied on a multidisciplinary team, systematic review, and a consensus approach. The adherence recommendations used an evidence-grading scheme.

To address problems occurring with two national organizations producing hypertension recommendations and to increase the base of consensus for their respective recommendations, hence their impact, the Canadian Hypertension Society and the Coalition with Health Canada and the Heart and Stroke Foundation of Canada together produced recommendations in 1999 on prevention and control of hypertension through lifestyle modification using an evidence-based grading scheme (10). They also later updated the diagnostic and pharmacological recommendations (11). The latter evolved further with the assistance of an expert in evidence-based medicine participating at the consensus meeting who helped with interpretation and use of the grading scheme. Major national health care organizations were asked to review all the lifestyle, diagnostic and pharmacological recommendations of 1999 and to assist in dissemination. The recommendations were supported by standardized slide sets and use of the internet (10;11). Summaries of the lifestyle as well as the diagnostic and pharmacological recommendations were also produced for primary care professions and presentations were made in primary care settings (11-17).

In the meantime, the Canadian hypertension community was galvanized to take more aggressive and integrated action because of the comparison of findings from the CHHS (1985 to 1992) to data from the Third National Health and Nutrition Examination Survey (NHANES III) in the United States (1988-1994) (18): 50% of the American population had optimal blood pressure (< 120/80 mm Hg) compared to 43% of the people in Canada; 25% of hypertensives were under control in the US compared to 13% in Canada; and while about half of diabetic people between 18 and 74 years were hypertensive (140/90 mm Hg) in both countries, in the US 36% were under control (<140/90 mmHg) and only 9% in Canada despite frequent interactions with healthcare systems. (18) The CHHS also found that while over 70% of survey participants reported having their blood pressure measured in the previous year, 42% were found to have high blood pressure but were not aware of it. (19) Furthermore, a repeat blood pressure survey in 1995 of the Heart Health Survey in Nova Scotia, first administered in 1985, showed no appreciable improvement in blood pressure prevalence and deterioration in treatment and control rates (20;21).

From extensive discussions about the discrepancy between Canada's hypertension control rate and that in the United States and how to deal with it, the Coalition with support from Health Canada developed over the late 1990s a National High Blood Pressure Prevention and Control Strategy, released in 2000. (19) Its recommended steps, health goals and targets are shown below.

National High Blood Pressure Prevention and Control Strategy, 2000

Recommended steps to decrease morbidity and mortality associated with high blood pressure:

- Make high blood pressure prevention and control a priority for federal, provincial, and territorial governments.
- 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.
- Implement a public awareness campaign on the risk factors for, screening of, and benefits of the control of high blood pressure.
- 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.
- Provide ongoing education to health service providers through professional associations on clinical practice guidelines for high blood pressure prevention and control.
- Negotiation by the Health Protection Branch [of Health Canada] with the food industry to decrease salt in prepared food and to use a salt substitute with a lower sodium concentration.
- Promote physical activity and healthy nutrition for all age groups in the population to prevent obesity.
- Continue research on the causes of high blood pressure and effective treatments, and the evaluation of prevention and control programs.
- 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.

*The four health goals in the strategy have the same target – **a 10% reduction by 2005** (baselines are the results of the 1989-1992 CHHS):*

Health Goal

To reduce the prevalence of uncontrolled high blood pressure in Canada.

To reduce the incidence of high blood pressure among Canadians.

To reduce the proportion of Canadians who are unaware of their high blood pressure.

To reduce the prevalence of uncontrolled high blood pressure among those who have been diagnosed with it.

Because the recommendations and implementation tactics of the 1990s lacked impact (22;23) a committee representing Health Canada, the Heart and Stroke Foundation, the Coalition and the CHS formed to develop ideas on how to improve the hypertension recommendations process (23;24). In 1998/99 it started developing a proposal for a Canadian Hypertension Recommendations Working Group, a more rigorous regularly updated recommendations process closely linked to a separate and extensive implementation process, renamed the Canadian Hypertension Education Program

(CHEP) in 2003. At the time, its focus was primary care physicians. (See Appendix 3 for a separate elaboration of CHEP.)

Most important in Canada in the period 1990 to 1999 was that hypertension was still poorly controlled. While the Canadian hypertension management recommendations had become more comprehensive and evidence-based, with increasing (but short-lived) attempts to implement them through multiple formats, on their own they were not substantially influencing clinical practice (25). And while the Coalition's National Strategy called in part for an enhanced process for developing the recommendations and for overall a more comprehensive approach to hypertension prevention and control, it did not receive dedicated funding nor did the federal or provincial/territorial governments endorse it. Nevertheless it served as a template for action by the non-government national healthcare organizations under the leadership of the Coalition and the Canadian Hypertension Society.

2000 – 2010

Despite the lack of funding to operationalize the new National Strategy, the non-government sector and healthcare professionals already active at the national and provincial/territorial levels continued to lead the improvement of hypertension management, optimizing existing resources and partners in governments and the private sector, gradually expanding and consolidating the base of support. As a result, the last decade has witnessed a sustained growth in hypertension management initiatives, supported and undertaken by several agents at federal and provincial/territorial levels, along with notable advances with public health initiatives aiming to shift downward the blood pressure level of whole populations.

What has featured most prominently in the last decade is described below, apart from CHEP. While the non-government and government activities are presented separately, they overlap to a very large extent by virtue of the partnerships and collaborations that have evolved between the sectors, to be credited for contributing to the successes achieved to date in both management of high blood pressure and its prevention.

Non-government Initiatives

Blood Pressure Canada

Blood Pressure Canada (BPC), now merged into Hypertension Canada, has had a consistent and broad impact on hypertension management in Canada. It played an important role in developing the 2000 National High Blood Pressure Prevention and Control Strategy and in developing the proposal and subsequent partnerships for CHEP. It was also involved in developing the proposal for the Canada Chair in Hypertension Prevention and Control and in 2006, when the Chair was confirmed, it adopted the Chair's mandate for public education and for reducing dietary sodium.

In the early 2000s BPC also conducted an important pilot of an extensive social marketing campaign on awareness of hypertension, to test its impact. The initiative was expensive, its impact small and short lived, providing an early critical learning on the inability of such campaigns to positively influence the awareness and control of hypertension. (26)

As for reducing dietary sodium, BPC developed a national policy statement in collaboration with other national organizations and was active in the effort to revise Canada's Food Guide to increase the prominence of sodium. The policy statement was signed by 18 other national health organizations and formed the platform for NGO advocacy to reduce dietary sodium. Ten other national organizations joined the advocacy regarding the Guide, leading to appropriate revisions and content change. BPC also established a Sodium Task Force with over 30 healthcare professionals to develop tools and resources for the public and healthcare professionals to understand the health risks of high dietary sodium and how to reduce it. The materials, including standardized educational slide sets, were widely presented, published and disseminated on a specific website. The Task Force was later co-hosted by CHEP and then incorporated into CHEP. In addition to being a core organization on the Sodium Strategic Planning Committee, BPC was on the steering committee of the multi-stakeholder Sodium Working Group.

BPC also developed a process for implementing blood pressure management recommendations, parallel to CHEP but for the public, adjusting the recommendations for a public audience and providing a wide variety of resources to assist people to become more self-efficacious in preventing and managing high blood pressure e.g. materials were produced focusing on home assessment of blood pressure and healthy lifestyles. Additional resources were developed to facilitate interactions between people with hypertension and healthcare professionals and a patient blood pressure association was initiated. The resources were disseminated directly via partner organizations and by publishing them in both the lay press as well as inserting public resources into healthcare professional publications. An extensive network of individuals and organizations including healthcare professional training schools, that wanted the annual CHEP and BPC updates, was supplied the annual updates as they were developed.

Heart and Stroke Foundations

The Heart and Stroke Foundation of Canada (HSFC) has played a critical role in moving hypertension management forward in Canada. It has public education and awareness campaigns related to hypertension that include promotion of a consumer eHealth tool - My Heart & Stroke Blood Pressure Action Plan – freely available to the general public (described below), part of the Foundation's continued advocacy and education about healthy lifestyle. Each year, with a press release it supports the media roll out of the updated recommendations of CHEP and working with spokespeople, disseminates the key messages and updates. HSFC also helps CHEP to adapt and disseminate the professional guidelines for the general public and has assisted in the development and

ongoing review of tools and resources for healthcare professionals and the public addressing blood pressure measurement and control, some of which it has cobranded with CHEP.

In 2010, the HSFC partnered with the CIHR Institute of Circulatory and Respiratory Health to establish a permanent Canadian Chair in Hypertension Prevention and Control. In 2008, in collaboration with Blood Pressure Canada, the Heart and Stroke Foundation of Ontario (HSFO) and the Public Health Agency of Canada, HSFC conducted a national needs assessment of primary care nurses and community pharmacists, using a survey tool developed and applied by the HSFO for the Heart & Stroke Hypertension Management Program, adapted for bilingual telephone surveys. The results of this survey informed the CHEP Steering Committee.

The HSFC current hypertension-related activities include:

- Public awareness campaigns, with culturally-specific and inclusive campaigns needed in the future
- Hypertension screening of the general public
- Working with healthcare professionals to develop models improve hypertension management (primarily in Ontario)
- Interprofessional education for primary healthcare professionals, related to hypertension.
- Distribution of printed materials, including a hypertension toolkit for professionals and blood pressure awareness information for the public.

The HSFC has also played a critical role in the effort to reduce dietary sodium, one of the organizations advocating a greater visibility for sodium in Canada's Food Guide. It was a key member of the Sodium Strategic Planning Committee, the Canadian multi-stakeholder Sodium Working Group and the national Planning Committee for the WHO-Canada Platform II meeting on dietary salt in 2010 in Calgary. The HSFC specifically adjusted its Health Check Program to be more stringent with regard to the sodium content of foods and requires lower sodium limits in food categories over time to retain the Health Check.

Provincial Heart and Stroke Foundations have been and continue to be active, with some having made contributions beyond their provincial mandates. For example, in 2004, the Heart and Stroke Foundation of Ontario (HSFO) launched the High Blood Pressure Strategy, a major multi-year umbrella strategy that has had the following outcomes, some with national impact:

- Development of a nursing best practice guideline on hypertension in 2005 and updated in 2009– Nursing Management of Hypertension – in collaboration with the Registered Nurses' Association of Ontario. The guideline is consistent with CHEP recommendations and endorsed by CHEP.

- Completion of the 2006 Ontario Survey on the Prevalence and Control of Hypertension in partnership with the Ottawa Heart Institute and Statistics Canada, an update that includes the first-ever physical measures survey on hypertension for key ethnic groups in Canada.

- The creation of an interactive on-line eHealth tool – the My Heart & Stroke Blood Pressure Action Plan – that assists people with self-management by providing e-mail support, helping them to track/monitor their progress on blood pressure and lifestyle change and offering them the option to download and print a report for their healthcare provider.

- Development, implementation (across 11 primary care sites) and evaluation of a three-year evidence-informed primary care demonstration project – the Heart & Stroke Hypertension Management Program. It includes a toolkit for healthcare providers and for patients and has been shown to be successful (27)

- Development and piloting in two First Nations communities of a culturally appropriate Heart & Stroke Aboriginal Hypertension Management Program, now extended as a demonstration project in 14 First Nations communities in Ontario. (27)

- Focused investment in hypertension research.

From 2002 to 2011, the Heart and Stroke Foundation of Quebec (HSFQ)has:

- published from 2002 to 2011 a newsletter, "Les Actualités du Coeur" whose mission was to facilitate knowledge translation by disseminating clinical practice guidelines on diabetes and cardiovascular diseases, including CHEP's recommendations and summaries.

- disseminated information and posters to help healthcare professionals to educate patients (and healthcare professionals) at the proper technique for blood pressure measurement.

Canadian Stroke Network

Since 2006, the Canadian Stroke Network has supported dietary sodium reduction with an extensive media campaign to raise public awareness of the relationship between sodium consumption and blood pressure. Tools such as awards and surveys have been used to generate earned print, radio and television media. The Network sponsors talks on dietary sodium at its annual meetings and features articles on sodium in most of its newsletters.

Public opinion research indicates that the Network's campaign has in part contributed to raising awareness levels about sodium among people in Canada to around 90%. (28;29) This has created public pressure for change that has facilitated advocacy and strengthened consumer demand for lower sodium products. The Network has also developed public education resources, sodium consumption guides and a popular website (sodium101.ca).

Hypertension Canada

Hypertension Canada, formed in 2010, merged the resources and expertise in education, scholarship and research of three organizations – Blood Pressure Canada, the CHS and CHEP. Under its auspices, CHEP has expanded to using more effective and efficient standardized knowledge translation techniques and has integrated Blood Pressure Canada's public education and dietary sodium knowledge translation program. And it is actively promoting the integration of hypertension management recommendations with those for cardiovascular disease (CVD) prevention through the initiative. (, a project of CIHR, aims to address the need for a common set of clinical practice guidelines (CPG) for CVD by developing, disseminating, implementing and evaluating an integrated annual CPG targeted at healthcare providers, supplying the recommendations to mitigate the range of risk factors associated with CVD.)

Having assumed responsibility for the research programs of CHS, Blood Pressure Canada and CHEP, Hypertension Canada will be developing mechanisms to enhance and integrate the CIHR's four pillars of research (biomedical, clinical, health services and population based) around blood pressure.

Hypertension Canada is also continuing the public policy work formerly done by Blood Pressure Canada. A Public Policy Committee has sub-committees to address population health, health services, community programs, vulnerable populations and to evaluate policy. It expects to work with a wide variety of healthcare professional and non-government health organizations as well as all levels of government.

Canadian Chair in Hypertension Prevention and Control

The growing momentum since 2000 to address hypertension stimulated the piloting of a new academic leadership position – the Canadian Chair in Hypertension Prevention and Control (30). The Canadian Hypertension Society, CIHR and the pharmaceutical company Sanofi-Aventis (unrestricted grant) funded the pilot for the period July 2006 to June 2011. The Chair is to be competitively renewed through support from the Heart and Stroke Foundation of Canada and CIHR. (31)

The position has a mandate to lead and develop activities to prevent and control hypertension in collaboration with the hypertension and broader healthcare professional communities and government. The first Chair, Dr. Norman Campbell at the University of Calgary, was chair of CHEP and President of Blood Pressure Canada.

As of 2010, the Chair led the process of integrating the CHS, CHEP and Blood Pressure Canada into Hypertension Canada and made progress on the following goals (31):

- Sustain and enhance the current CHEP structure and activities to be more sustainable and efficient, and expand CHEP to enhance the translation of hypertension knowledge to support family physicians, nurses, pharmacists and other health care professionals.
- Develop a national surveillance (outcomes research) program to assess the prevalence, awareness, diagnosis, treatment and complications of hypertension in collaboration with

the PHAC, Statistics Canada, provincial ministries of health and the CHEP Outcomes Research Task Force.

- Increase public awareness of hypertension by leading collaborative efforts to develop and disseminate resources to aid self-efficacy in the prevention and management of hypertension by developing and leading the Public Education Task Force of Blood Pressure Canada.

- Reduce the prevalence of hypertension by advocating policies, research and educational programs to reduce salt intake through collaborative partnership of organizations and concerned health care professionals to lobby the federal government and food sector. The Chair organized a lobby of 10 national health organizations to have Canada's Food Guide include dietary sodium featured prominently and organized and chaired the Sodium Strategic Planning Committee which guided the Health Care Sector effort to develop a national program to reduce dietary sodium and was on the executive and all subcommittees of the Canada multi-stakeholder Sodium Working Group.

- Support and contribute to developing and advocating health policies to prevent and control hypertension.

- Increase Canada's international visibility through involvement in a variety of events and initiatives, focusing on high blood pressure and dietary salt e.g. with the World Health Organization, the Pan American Health Organization, the governments of other countries, and international non-government organizations. The activities including chairing the international and national organizing committees and funding in part the WHO- Canada Platform II meeting on dietary salt in 2010 in Calgary.

Dietary sodium reduction

While Canada's dietary sodium reduction initiative is now broadly intersectoral, it began in 2006 when a lobby of 10 national non-government organizations succeeded in increasing the visibility and improving the sodium related content of Canada's Food Guide as it was undergoing revision. At the core of the lobby was a national Sodium Strategic Planning Committee: Blood Pressure Canada, CHS, Canadian Cardiovascular Society, Canadian Stroke Network, Canadian Council of Cardiovascular Nurses, Canadian Society of Nephrology, Dietitians of Canada and the Heart and Stroke Foundation of Canada.

In 2006/7, the Committee developed a policy statement for Blood Pressure Canada to advocate population level reduction in dietary sodium to the government, the food sector and other non-government organizations, calling on Health Canada to lead an intersectoral working group for a national initiative. (32) Eighteen major national healthcare professional and non-government organizations endorsed the policy statement. A meeting with major food producers in Canada and the Committee resulted in an agreement to jointly approach Health Canada to request their engagement in developing and overseeing a national sodium reduction program. It was shortly after an extensive media release of the policy statement in 2007 that the

Government of Canada announced the formation of the Canadian multi-stakeholder Sodium Working Group. It was chaired by Health Canada with representatives from the sectors listed below.

Lead Organization

- Health Canada

Scientific and Health-Professional Community

- Canadian Institutes of Health Research
- Canadian Stroke Network
- Canadian Nutrition Society
- Dietitians of Canada
- Council of Chief Medical Officers of Health

Health-Focused and Consumer Non-Governmental Organizations (NGOs)

- Hypertension Canada
- Heart & Stroke Foundation of Canada
- Canadian Council of Cardiovascular Nurses
- The Canadian Council of Food and Nutrition
- Centre for Science in the Public Interest
- Extenso - Reference Centre for Human Nutrition

Food Manufacturing and Food-Service Industry

- Baking Association of Canada
- Canadian Meat Council
- Dairy Processors of Canada
- Food and Consumer Products of Canada
- Food Processors of Canada
- Canadian Council of Grocery Distributors
- Canadian Restaurant and Foodservices Association

Government

- Office of Nutrition Policy and Promotion,
- Health Canada
- Public Health Agency of Canada
- Food Directorate, Health Canada
- Federal Provincial Territorial Group on Nutrition
- Agriculture and Agri-Food Canada
- Canadian Food Inspection Agency (to November 2009)

In 2010, the Working Group submitted a comprehensive multipronged Sodium Reduction Strategy for Canada (33) dependent on food manufacturers and food service establishments reducing the sodium content of their products on a voluntary basis with close government oversight and monitoring, with research to aid the effort and broad based education of the public. Subsequently the federal and provincial Ministers of Health and Health Promotion/Healthy Living adopted the interim goal recommended by the Sodium Working Group – a population average sodium consumption target of 2,300

mg/day by 2016 – representing a 33% decrease from current average consumption. The F/P/T Ministers also agreed that regulation to limit the sodium content of foods remains an option in case the voluntary approach lacks substantive progress. On the eve of 2011, Prime Minister Harper indicated that the initiation of the sodium reduction program was one of two health-related priorities in 2010 of the federal government, the other being child obesity. (34).

Over the course of sodium strategy development, a sodium sub-group of the Public Education Task Force of Blood Pressure Canada and CHEP continued to produce educational resources on the health risks of dietary sodium and how to reduce its intake in Canada. The resources included standardized summaries and educational slide sets intended for healthcare professionals, patients with hypertension, the general public of all ages, the food sector and public health policymakers. Most Blood Pressure Canada partner organizations organized symposia at their national and regional meetings on sodium and published clinical and scientific summaries in their official journals.

Now part of Hypertension Canada, the Public Education Task Force is focused on the topic areas and goals below:

Education

- Educate healthcare professionals, patients and Canadians of all ages in becoming more sodium aware in terms of understanding the impact of sodium on health and increasing sodium-healthy behaviours.

Research

- Determine the impact of dietary sodium on hypertension, cardiovascular disease and the health of Canadians to support effective strategies to reduce sodium intake and to assess knowledge gaps on dietary sodium to guide future research.

Media and communication

- Work by the Canadian Stroke Network and Heart and Stroke Foundation with the media and other communication channels to increase and influence consumer awareness and behaviour in relation to dietary sodium.

Advocacy

- Inform key Canadian lawmakers and the food sector regarding the risks of high dietary sodium and strategies to reduce dietary sodium.

Canadian Institute for Health Research (CIHR)

In the last 10 years CIHR have invested over $100M per year in cardiovascular research including hypertension. Specific to national hypertension programs, CIHR have funded projects to develop the national hypertension surveillance program and meetings of CHEP; a process to integrate CHEP recommendations with other cardiovascular risk management recommendations (); participated in the Sodium Working Group including funding and hosting a meeting to define research needs related to dietary sodium followed be three priority calls for sodium based research; a media awareness meeting

on dietary sodium; and have funded in part the Canadian Chair in Hypertension Prevention and Control.

Government Initiatives

Government of Canada

Federal government engagement in the area of hypertension began in 1984 with its involvement in establishing the Coalition (Canadian Coalition of High Blood Pressure Prevention and Control) that with Health Canada developed the 2000 National Strategy for High Blood Pressure Prevention and Control. This led to the creation of CHEP in 1999.

Before the Public Health Agency of Canada (PHAC) was created in 2004, Health Canada (HC) was the lead federal government department in hypertension prevention and control. Now through PHAC, the federal government supports CHEP and community-based projects for hypertension screening and prevention.

While leadership and advocacy are functions primarily undertaken by non-government organizations, the federal government strengthens partnerships and coordinates the activities of various federal departments and provincial/territorial governments. Its partnership in CHEP enhanced its involvement in disease detection and management, development and dissemination of clinical practice guidelines and the preparation of self-management and self-assessment tools for the public. A Canadian Task Force on Preventive Health Care, established by PHAC, is now helping address practice gaps related to high blood pressure screening.

Along with supporting CHEP, the federal government has participated in a number of health promotion and disease prevention initiatives – the Heart Health Strategy and Action Plan (2010), the Sodium Reduction Strategy for Canada (2010), the Diabetes Strategy (renewed in 2005) and the Pan-Canadian Healthy Living Strategy (2005). These strategies are intended to be comprehensive with broad implications on policy, research, surveillance and disease management, and they address risk factors such as smoking, nutrition, alcohol intake, and physical activity, common to a number of chronic diseases. Most recently the F/P/T Ministers of Health and of Health Promotion/Healthy Living adopted the *Declaration on Prevention and Promotion* – a public statement of vision to work together and with others to make the promotion of health and the prevention of disease, disability and injury a priority for action. (35)

The federal government has invested in the “Eating Well with Canada’s Food Guide” program and by making mandatory the declaration of trans fats in the nutrition facts table on most packaged foods, has influenced trans fats being eliminated from many food products. To promote physical activity, it has implemented the Children’s Fitness Tax Credit, developed Canada’s Physical Activity Guides and has provided funding for ParticipACTION.

Development of new healthy living programs has led to greater collaboration by the Government of Canada with provincial/territorial governments and relevant stakeholders, and has strengthened linkages with existing national and provincial/territorial healthy living and disease strategies. Collaboration has encouraged consistent provision of information and helped raise public, professional and political awareness about the importance of hypertension. Most recently, the federal government played a role in bringing together the key stakeholders who formed Hypertension Canada.

Through partnerships with CHEP, Hypertension Canada, the Heart and Stroke Foundation and their stakeholders, the federal government has also supported community initiatives and developed tools for populations most at-risk e.g. through the First Nation's and Inuit Health Branch of Health Canada. Combined resources from the Government of Canada, CHS and Sanofi-Aventis, funneled through CIHR, funded the first Canada Chair in Hypertension Prevention and Control.

For policy-related knowledge development, the federal government has supported systematic literature reviews and through Statistics Canada, CIHR and PHAC, is building up the components of a comprehensive surveillance system that collects physical measurements, self-reported and administrative data.

Since the release of the Sodium Reduction Strategy for Canada in 2010, described earlier, the Government of Canada with other Strategy partners is working with industry to set targets for different food categories, is supporting activities to increase the public's knowledge about sodium and has committed to monitoring the intake of sodium and its levels in food.

Also relevant to hypertension is the Federal Tobacco Control Strategy – a comprehensive health promotion and protection strategy that integrates regulation, research, legislation, and programming to prevent smoking, encourage smoking cessation and control product supply.

Federal/Provincial/Territorial Collaboration and Coordination

Governments across Canada have committed to improving the health of the population and reducing chronic diseases, effectively building a collective response to the issues held in common, among them hypertension prevention and control. One of the most important initial F/P/T activities was organizing and leading the Canadian Heart Health Strategy (CHHS) starting in 1985. The CHHS provided comprehensive data on the vascular risks of people in Canada and launched a wide series of projects across Canada to reduce the risk.

In 2005, the F/P/T Ministers of Health and Health Promotion/Healthy Living adopted the Integrated Pan-Canadian Healthy Living Strategy with targets set for 2015. (36) The document pointed out that the rates of obesity and overweight were rising and that, for the majority of people in Canada, physical activity patterns were not optimal for health.

It identified risk factors that were common across multiple chronic diseases from heart disease to cancer. The document called for a comprehensive multi-sectoral approach that encompassed partnerships, policy and program development, public education, work with Aboriginal peoples, and research and surveillance.

A Healthy Living Issue Group, established in 2006 (reporting through the Population Health Promotion Expert Group of the Pan Canadian Public Health Network (PHN) Council to the Conference of Deputy Ministers of Health and the F/P/T Ministers of Health and Health Promotion/Healthy Living), in its 2008 progress report on the Strategy, pointed out that despite numerous initiatives across many jurisdictions in Canada, the rates of physical activity had decreased since the 2005 baseline; healthy eating had improved only slightly; and unhealthy weights had worsened. Should these trends continue, they concluded that the Strategy targets would not be reached by 2015. (37) The F/P/T Ministers of Health and/or Health Promotion/Healthy Living responded in 2010 with an invigorated commitment to disease prevention and health promotion in their Declaration on Prevention and Promotion. (38) They concluded that a large proportion of chronic disease and disabilities can be prevented or their onset delayed and that "to create healthier populations, and to sustain our publicly funded health system, a better balance between prevention and treatment must be achieved."

Earlier in 2009 the Ministers of Sport, Physical Activity and Recreation, and in January 2010, the Ministers of Health and of Health Promotion/Healthy Living endorsed the "Intersectoral Action on Children and Youth Physical Activity". Subsequently a F/P/T framework for action to promote healthy weights entitled "Curbing Childhood Obesity" was released in Canada. (39) Contributing factors identified included more sedentary time (screen time), inequities in access to physical activity opportunities, the marketing of unhealthy foods to children and increased food portion sizes. All agreed to work on the following areas:

- Making childhood overweight and obesity a collective priority
- Coordinating efforts – to create supportive environments; to identify weight problems early; to improve access to nutritious foods and decrease access to foods high in fat, sugar and /or sodium to children. The latter aspect includes reducing the exposure of children to marketing of these foods.
- Measuring and reporting on collective progress.

F/P/T Ministers of Health and/or Health Promotion /Healthy Living have committed to "engage youth and multi-sectoral leaders across the country to help shape actions to promotion healthy weights in children."

Horizontal Initiatives

The Health Council of Canada reported in 2010 on four countries that have adopted whole-of-government and/or intersectoral approaches to address determinants of health – the United Kingdom, Norway, Sweden and Australia. The same year it found that all jurisdictions in Canada are expressing commitment to strengthening health promotions efforts and decreasing health inequities. (40)

Three common themes emerged from the four countries studied:

- There is an explicit governmental commitment to promoting population health through the lens of determinants of health. This commitment is usually shared with the public through a defining document or set of documents that clearly communicates the rationale for such a commitment. In most countries, this has taken the form of a clear statement about the importance of promoting health equity or fairness.

- Any commitment to promoting and implementing the stated agenda involves a whole-of-government approach. Such commitments are typically contained within a government report or statement that clearly outlines goals and objectives, describes tactics for reaching them, and sets out a timetable.

- A unifying theme is a commitment to formally evaluate the initiatives. This involves recognizing that promoting population health via a reduction of health inequities is influenced by government action in a range of policy areas. Systematic attempts are made to ensure that initiatives in these spheres are assessed for their impact on health for example, through health impact assessment.

References

1 Logan AG. Report of the Canadian Hypertension Society's consensus conference on the management of mild hypertension. Can Med Assoc J. 1984;131:1053-57.

2 Larochelle P, Bass MJ, Birkett NJ, De Champlain J, Myers MG. Recommendations from the consensus conference on hypertension in the elderly. CMAJ. 1986;135:741-45.

3 Myers MG, Carruthers SG, Leenen FHH, Haynes RB. Recommendations from the Canadian Hypertension Society Consensus Conference on the Pharmacologic Treatment of Hypertension. CMAJ. 1989;140:1141-46.

4 Federal/Provincial Working Group. The Prevention and Control of High Blood Pressure in Canada. MacLeod, Ella B., Colburn, Harold N., MacLean, David R., and Sinclair, Gerald E. Federal/Provincial Advisory Committee, 1-82. 1986. Ottawa, ON, Minister of National Health and Welfare.
Ref Type: Report

5 Chockalingam A, Abbott D, Bass M, Battista R, Cameron R, de Champlain J et al. Recommendations of the Canadian Consensus Conference on Non-Pharmacological Approaches to the Management of High Blood Pressure. March 21-23, 1989 Halifax, Nova Scotia. CMAJ. 1990;142:1397-409.

6 Carruthers SG, Larochelle P, Haynes RB, Petrasovits A, Schiffrin EL. Report of the Canadian Hypertension Society Consensus Conference: 1. Introduction. Can Med Assoc J. 1993;149:289-93.

7 Abbott D, Campbell N, Carruthers-Czyzewski P, Chockalingam A, David M, Dunkley G et al. Guidelines for Measurement of Blood Pressure, Follow-up, and Lifestyle Counseling. Can J Public Health. 1994;85:S29-S35.

8 Campbell NRC, Abbott D, Bass M, Birkett NJ, Chockalingam A, Dagenais GR et al. Self-measurement of blood pressure: Recommendations of the Canadian Coalition for High Blood Pressure Prevention and Control. Can J Cardiol. 1995;11:5H-10H.

9 Chockalingam A, Bacher M, Campbell N, Cutler H, Drover A, Feldman R et al. Adherence to Management of High Blood Pressure: Recommendations of the Canadian Coalition for High Blood Pressure Prevention and Control. Can J Public Health. 1998;89:I-5-I-7.

10 Campbell NRC, Burgess E, Choi BCK, Taylor G, Wilson E, Cléroux J et al. Methods and an overview of the Canadian recommendations. CMAJ. 1999;160:S1-S6.

11 Feldman R, Campbell N, Larochelle P, Bolli P, Burgess ED, Carruthers SG et al. 1999 Canadian recommendations for the management of hypertension. CMAJ. 1999;161:S1-S17.

12 Campbell NRC, Taylor G. Healthier Lifestyles: Bringing Down Blood Pressure. Perspectives in Cardiology. 1999;15:47-53.

13 Feldman RD, Campbell NRC, Larochelle P. Clinical problem solving based on the 1999 Canadian recommendations for the management of hypertension. CMAJ. 1999;161:S18-S22.

14 Khan N, Campbell NRC. Management of Hypertension: Optimizing Therapy. Perspectives in Cardiology. 2000;15-16, 20-21, 23.

15 Campbell NRC. Hypertension management in clinical practice. Can J Cardiol. 2000;16:574-76.

16 Campbell N, Burgess E, Taylor G, Wilson E, Cleroux J, Fodor JG et al. Lifestyle changes to prevent and control hypertension: Do they work? A summary of the Canadian Consensus Conference. CMAJ. 1999;160:1341-43.

17 Khan N, Campbell NRC. Lifestyle Modifications for Prevention and Treatment of Hypertension: Canadian Recommendations. Perspectives in Cardiology. 2001;17:21-23, 26-27.

18 Joffres MR, Hamet P, MacLean DR, L'Italien GJ, Fodor G. Distribution of Blood Pressure and Hypertension in Canada and the United States. Am J Hypertens. 2001;14:1099-105.

19 Health Canada and the Canadian Coalition for High Blood Pressure Prevention and Control. National High Blood Pressure Prevention and Control Strategy, Report of the Expert Working Group. January 31, 2000.

20 Wolf HK, Andreou P, Bata IR, Comeau DG, Gregor RD, Kephart G et al. Trends in the prevalence and treatment of hypertension in Halifax County from 1985 to 1995. CMAJ. 1999;161:699-704.

21 Wyard K, Feldman R. The Impact of the Canadian Hypertension Education Program on Hypertension and Related Diseases in Canada. PHAC 2008 CHEP Impact Report.

22 Fassbender, K. and Pickard, S. A policy impact analysis of pharmaceutical cost containment strategies in alberta. Working paper #00-12. 2000. Edmonton, Institute of Health Economics.
Ref Type: Report

23 Huston P, Campbell NRC. Influencing prescribing patterns. Evidence-based recommendations are not enough. Can Fam Physician. 1998;44:221-23, 228-30.

24 Zarnke KB, Campbell NRC, McAlister FA, Levine M. A novel process for updating recommendations for managing hypertension: Rationale and methods. Can J Cardiol. 2000;16:1094-102.

25 McAlister FA, Campbell NRC, Zarnke K, Levine M, Graham ID. The management of hypertension in Canada: a review of current guidelines, their shortcomings and implications for the future. CMAJ. 2001;164:517-22.

26 Petrella RJ, Speechley M, Kleinstiver PW, Ruddy T. Impact of a Social Marketing Media Campaign on Public Awareness of Hypertension. Am J Hypertens. 2005;18:270–275.

27 Margaret Moy Lum-Kwong, Director, High Blood Pressure Strategy, Heart and Stroke Foundation of Ontario. Personal communication, January 2011. Aboriginal Hypertension Management Program. Accessed on February 12, 2011 at http://www.heartandstroke.on.ca/site/c.pvI3IeNWJwE/b.5339629/k.E94C/HCP__Aboriginal_Hypertension_Management_Program_Pilot.htm

28 Decima Research. Final Report - Canadian's and Health Care Professionals' Views on Sodium. Health Canada POR-08-21. December 16, 2009. Accessed on February 2, 2011 at http://epe.lac-bac.gc.ca/100/200/301/pwgsc-tpsgc/por-ef/public_health_agency_canada/2009/117-08/report.pdf

29 Papadakis S, Pipe AL, Moroz IA, Reid RD, Blanchard CM, Cote DF, Mark AE. Knowledge, attitudes and behaviours related to dietary sodium among 35- to 50-year-old Ontario residents. Can J Cardiol. 2010;26:e164-9.

30 Campbell NRC. Canada Chair in hypertension prevention and control: A pilot project. Can J Cardiol. 2007;23:557-60.

31 Campbell NRC. Canada Chair in Hypertension Prevention and Control. 2006-2010 Report.

32 Hypertension Canada. Sodium Policy Recommendations. Accessed November 27, 2010 at http://www.lowersodium.ca/en/public/about.

33 Health Canada. Sodium Reduction Strategy for Canada. Accessed on November 27, 2010 at http://www.hc-sc.gc.ca/fn-an/nutrition/sodium/strateg/index-eng.php.

34 Harper hails 2010 as a "momentous" year for Canada. Accessed on January 27, 2011 at http://www.theglobeandmail.com/news/politics/harper-hails-2010-as-a-momentous-year-for-canada/article1854504/

35 A Declaration on Prevention and Promotion from Canada's Ministers of Health and Health Promotion/Healthy Living. Accessed on January 26, 2011 at http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/declaration/index-eng.php

36 Secretariat for the Intersectoral Healthy Living Network The Integrated Pan-Canadian Healthy Living Strategy, 2005. Accessed on January 13, 2011 at http://www.phac-aspc.gc.ca/hl-vs-strat/pdf/hls_e.pdf

37 Public Health Agency of Canada. 2010. The 2008 Report on the Integrated Pan-Canadian Healthy Living Strategy. Accessed on January 13, 2011 at http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/ipchls-spimmvs/2008/pdf/ripchl-rspimmvs-2008-eng.pdf

38 Creating a Healthier Canada: Making Prevention a Priority – A declaration on Prevention and Promotion from Canada's Ministers of Health and Health Promotion/Healthy Living. 2010. Accessed on January 13, 2011 at http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/declaration/index-eng.php

39 Curbing Childhood Obesity – A federal, provincial and territorial framework for action to promote healthy weights. 2010. Accessed on January 13, 2011 at http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/framework-cadre/intro-eng.php

40 Health Council of Canada. Stepping It Up: Moving the Focus from Health Care in Canada to a Healthier Canada. Appendix A. Selected Provincial, Territorial and Federal Horizontal Initiatives: Intersectoral and Whole-of-Government Approaches to Improve Population Health and Reduce Inequities. Accessed on February 24, 2011 at http://www.healthcouncilcanada.ca/docs/rpts/2010/promo/HealthPromo_appendicesDec2010.pdf

Appendix 3:
The Canadian Hypertension Education Program (CHEP)

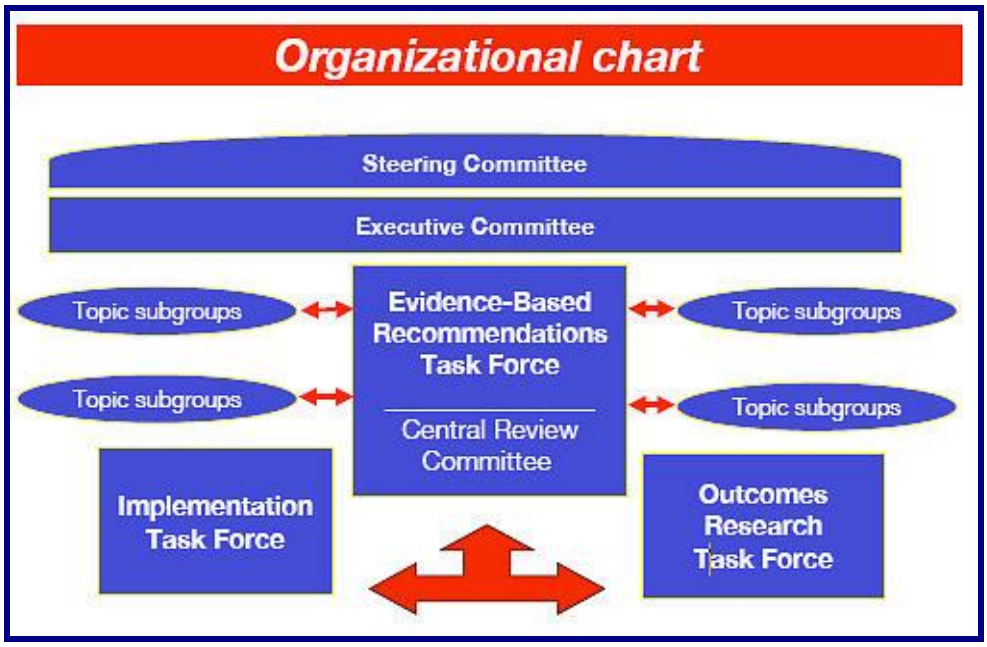
Extensive discussions in the late 1990s with the Canadian Coalition for High Blood Pressure Prevention and Control, the Canadian Hypertension Society, the Heart and Stroke Foundation and Health Canada resulted in a Canadian Hypertension Recommendations Working Group, renamed the Canadian Hypertension Education Program (CHEP) in 2003. There were two main results: an enhanced process as of 2000 to update hypertension management recommendations; and a separate implementation approach that involved the Canadian College of Family Physicians (1–7).

Crucial to the process was an evidence-based grading scheme. A one-day training program focused on how to develop recommendations and use the grading scheme, and a Cochrane librarian helped topic subgroups develop systematic literature search strategies (1). The process was also made more rigorous to reduce bias, in part by having a review committee of methodologists interact with each topic group to ensure the correct interpretation and application of evidence.

Recognizing that promoting implementation of the recommendations required different expertise, a new committee developed the concept of “key messages” and discipline-specific short summaries that featured what was most important to prevent and control hypertension (8;9).

By design, CHEP was intended to evolve and increase its impact. The CHEP steering, executive and central review committees operate now in conjunction with three task forces aligned to a strategic plan described below.

The CHEP Organizational Chart (10)



Evidenced-Based Recommendations Task Force: Critically reviews the evolving evidence base and develops detailed scientific documents to support the annual updating of diagnostic and treatment recommendations. The clinical topic areas covered are (11):

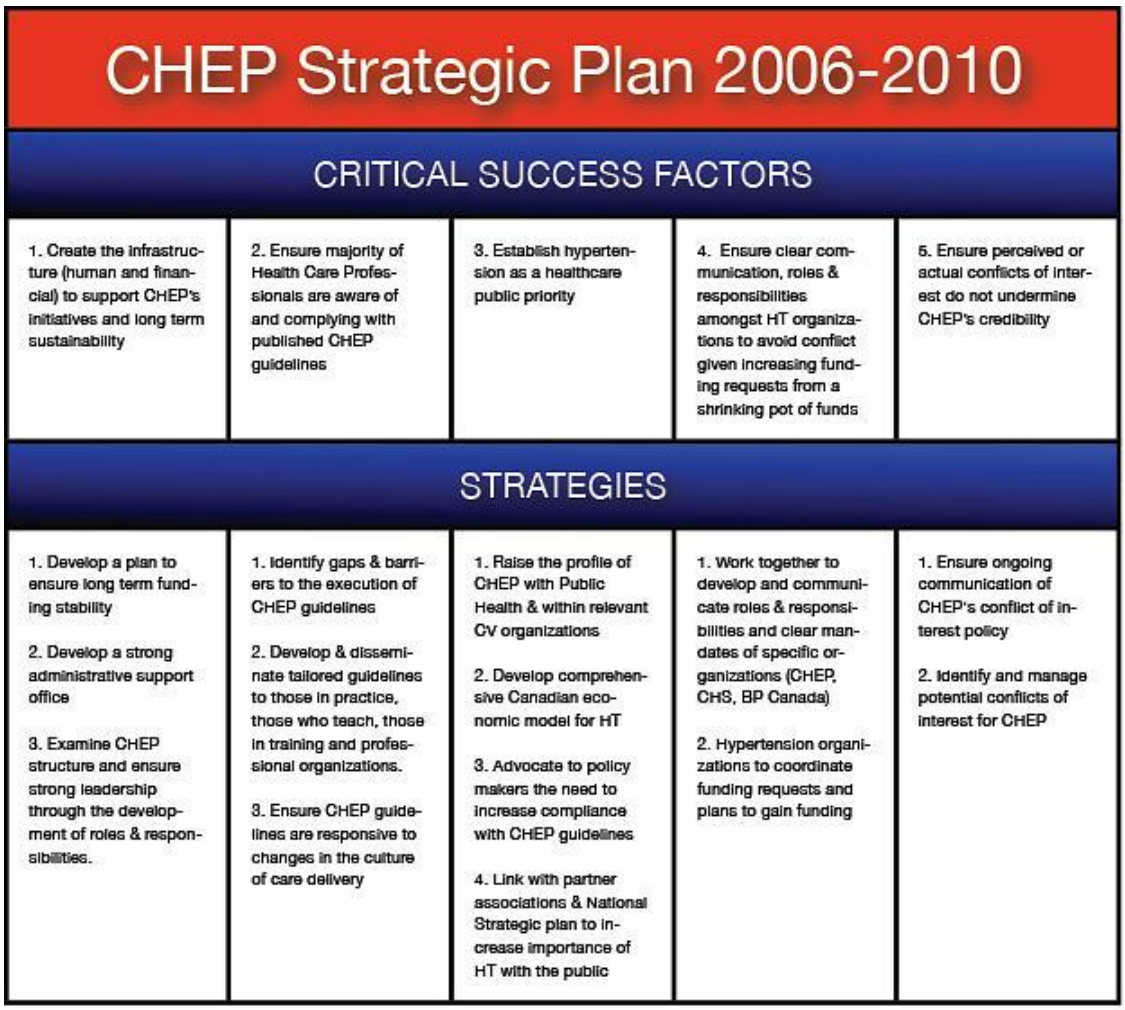
- Office measurement of blood pressure
- Self-measurement of blood pressure
- Ambulatory blood pressure monitoring
- Follow-up on patients with hypertension
- Routine laboratory tests
- Echocardiography
- Lifestyle modification in hypertension
- Adherence strategies for patients
- Global cardiovascular risk assessment
- Pharmacotherapy for hypertensive patients with cardiovascular disease (three subgroups: coronary disease, heart failure, and stroke)
- Pharmacotherapy for hypertensive patients without compelling indications
- Endocrinological forms of hypertension
- Renal and renovascular hypertension
- Hypertension and diabetes

Implementation Task Force: Implementation of recommendations is a lead priority for CHEP. T**he** CHEP executive develops and updates annually a set of five to eight key messages, a one page summary, a short five to six page clinical summary for primary care, a short scientific summary for specialty audiences, and pocket summary of recommendations. In addition six slide sets are produced to aid standardized education

sessions highlighting 1) the background on why control of blood pressure is important to health; 2) the methods CHEP uses to create, disseminate and evaluate recommendations; 3) diagnostic, vascular risk and laboratory assessment; 4) treatment of hypertension; 5) assessment of blood pressure using different techniques; and 6) outcomes assessment of hypertension in Canada. Emphasis is placed on tailoring resources to specific disciplines, with dissemination targeted to appropriate audiences and with the interests of the disciplines represented within the CHEP processes for recommendations development and their implementation. Recently the Implementation Task Force has been realigned into interdisciplinary teams to assist in updates and creating new resources.

Outcomes Research Task Force: Develops surveillance methodology, assesses the treatment and control of hypertension, identifies management gaps, and evaluates trends in the incidence and prevalence of hypertension and hypertension-related complications. In 2003, it contributed to a rapid expansion of the surveillance and monitoring efforts surrounding hypertension and hypertension related conditions, and also assessed CHEP processes. (11;12).

The CHEP Strategic Plan 2006-2010 (10)



Since CHEP started, widening the target audiences for its recommendations and implementation processes has been a goal. Nurses and pharmacists joined family physicians on the steering, recommendations, implementation and outcomes evaluations committees in 2006, ensuring that their needs are met and that the CHEP processes are increasingly free of bias and potential conflicts of interest. (4;8;13). Resources focus on a series of five to eight common messages on what is most important to control hypertension. Primary healthcare associations through their respective journals and annual meetings help disseminate standardized summaries of recommendations to their members. Health care professionals as well as key regional provincial and national organizations involved in healthcare and healthcare education are sent updated CHEP materials annually. Since 2000, community-based hypertension experts trained other educators in their midst at workshops about hypertension management using standardized resources. More recently healthcare professionals and people with hypertension have been able to register to receive automatic on-line updates of CHEP material. The implementation process is more systematic and extensive each year, using a range of dissemination media.

By 2006, two other parallel and mutually supportive programs had begun: targeting a new audience – people with or at risk of hypertension, providing them with the recommendations designed for healthcare professionals translated into lay language plus developing – and broadly disseminating a wide variety of other resources for the general public on how to prevent and control hypertension (14;15); and advocacy, knowledge translation and research to inform government, the food industry, the public and healthcare professionals on how to reduce dietary sodium (13). Supporting both initiatives was a broad base of 28 Canadian healthcare organizations and over 50 volunteer healthcare professionals involved with Blood Pressure Canada.

The public education program developed short and long audiovisual aids on prevention and management of hypertension and on home assessment of blood pressure. Resources (written material and standardized slide sets) are available to healthcare professionals for them to explain to the public the diagnosis and prognosis of hypertension, how to develop a lifestyle management program and how to properly measure blood pressure at home. Comprehensive and short summaries on hypertension management and summaries of how to assess blood pressure at home are now annually updated and a series of educational resources have been developed for people with diabetes and hypertension. The recommendations to the public were also culturally adapted and translated into four Indo-Asian languages, and could be adapted to other ethnic groups, particularly those identified as most at risk e.g. A communications and website committee oversees a broad dissemination of public-oriented resources through healthcare professionals, directly to people with hypertension, into lay journals and through a public website.

A national network of community-based interventions to prevent and control hypertension was developed and regional meetings were held for this network across

Canada (Blood Pressure Canada Knowledge Exchange Network www.bpcommunityexchange.net*)*. And in collaboration with the Public Health Agency of Canada and Statistics Canada, Blood Pressure Canada developed a national survey on the knowledge, attitudes and behaviours of Canadians diagnosed with hypertension that was administered in 2009.

Another important initiative to which the CHEP has contributed is the national dietary salt reduction initiative described in more detail in below.

Now in its 12th year, CHEP is a partnership of over 150 multidisciplinary hypertension experts – healthcare professionals and health scientist volunteers from governments, non-government organizations and health and scientific organizations. Organizations that have assisted in disseminating recommendations are the Canadian Cardiovascular Society, Canadian Council of Cardiovascular Nurses, Canadian Diabetes Association, Canadian Pharmacists Association, Canadian Public Health Association, Canadian Society of Internal Medicine, Canadian Society of Nephrology, College of Family Physicians of Canada, Dietitians of Canada, Heart and Stroke Foundation of Canada (and provincial Heart and Stroke Foundations), Kidney Foundation of Canada, Canadian Association Cardiac Rehabilitation, Canadian Heart Failure Network, Canadian Medical Association, Canadian Nurses Association, Canadian Stroke Network as well a the Public Health Agency of Canada and several provincial government programs. The Canadian Institute for Health Research (for circulatory and respiratory health), the Public Health Agency of Canada, the Heart and Stroke Foundation of Canada and the pharmaceutical industry have provided unrestricted grants and funding.

> "CHEP remains the premiere example of Knowledge to Action as it takes new evidence from inquiry to synthesis to a full set of implementable recommendations each year. Further, these recommendations are adapted into tools for patients and providers with feedback sought to improve the process in the following year's cycle. Finally, the impact of CHEP is monitored with the Outcomes Research Task Force, integrating national and provincial administrative databases with methodological and statistical expertise."
>
> *CHEP Program Report 2010* (16)

Key success factors of the CHEP have been summarized as follows:

- Focus on primary health care professionals
- Well organized hypertension organizations.
- Annual review of the program function with resulting evolution of the program.
- Gradual annual expansion of the program.
- A funded leadership position – Canada Chair in Hypertension Prevention and Control.
- A large and increasing group of committed healthcare professional volunteers and health care organizations.
- Paid professional support staff for the program.

- Increasing government and non-governmental organization financial and policy support.
- Use of outcomes assessment to guide the development of education interventions and to facilitate policy change and resource allocation.

Lessons Learned

Address the important care gaps identified by surveys

In 2000 when the annual hypertension recommendations process started, several key messages were emphasized based on the most important clinical care gaps found through the Canadian Heart Health Survey (17;18) . Lack of awareness of the diagnosis of hypertension in the CCHS resulted in CHEP's first main message to healthcare professionals – 1) – assess blood pressure in all visits. The observation that 90% of adult Canadians had other cardiovascular risks led to main message 2) – assess fasting lipids and glucose and 3) – emphasize lifestyle change in all hypertensive people (17). Treatment recommendations were simplified to emphasize 4) – target blood pressures and 5) – the need to combine antihypertensive drugs to achieve the targets to address the observation that over 1/3rd of those diagnosed with hypertension were not treated with drugs and that 2/3rds of those treated with drugs had uncontrolled blood pressures. Subsequently, addressing non-adherence to therapy became a key message.

The largest gap seemed to be in knowledge translation, hence a focused and systematic approach began to get the hypertension recommendations into usable formats to healthcare professionals (1;8;19). These same messages have been repeated each year in all dissemination resources while surveillance data have simultaneously tracked improvements in these parameters.

Develop themes to close the care gaps

Themes were developed each year to emphasize a specific and important care gap identified by hypertension surveillance and/or for new recommendations to address previously identified care gaps. Working on a theme fostered a more complete discussion of its importance to clinical care in a given year and in later years, included developing specific tools and resources to improve uptake of messages. Often media releases were used to enhance uptake of a theme. The themes selected over the last decade are listed below:

- 2000 – the new hypertension recommendations development and implementation process was emphasized.
- 2001 – the need to combine medications to achieve blood pressure targets and to discourage the switching of first line therapies, based on the Nova Scotia survey that demonstrated that a reduction in blood pressure control was associated with an increasing reliance on single drug therapies (20).
- the combined years 2002 and 2003 – diuretics as a key first line therapy among therapies proven to reduce vascular events.

- 2004 – global risk assessment and lifestyle change recognizing surveys showing a very high proportion of Canadians with hypertension were at high cardiovascular risk (21–24).
- 2005 – expedite the diagnosis of hypertension using home and ambulatory blood pressure monitoring to make diagnosis simpler and improve the awareness of the diagnosis (25;26).
- 2006 – improving adherence to therapy (27) addressing the gap in hypertension control. (Survey data have been used to document improvements in adherence (28–30).)
- 2007 – high dietary sodium in Canadians based on the fact that 20% of adult Canadians had hypertension and that the vast majority of Canadians consume excess sodium (31;32).
- 2008 – home assessment of blood pressure to improve awareness and control of hypertension and the 2007 dietary sodium theme extended (33).
- 2009 – controlling blood pressure in people with diabetes based on the 2008 Ontario blood pressure survey that demonstrated that people with diabetes who are at high cardiovascular risk had substantially lower rates of hypertension control (34;35).
- 2010 – knowledge translation and how to access hypertension recommendations in response to a knowledge assessment survey of primary care providers (unpublished) that showed many were not aware of key messages and the CHEP recommendations (36).

Disseminate knowledge

Below are the resources that CHEP provides for healthcare professionals and people with hypertension for them to stay informed of the current recommendations to prevent and control high blood pressure (37):

Table 1: Healthcare Professional Resources*

Documents

- CHEP primary care booklet. Brief outline of hypertension management recommendations in a pocket booklet form
- Key messages. The major 5 actions required by health care professionals to prevent and control cardiovascular disease in people with hypertension.
- One page summary. A one page summary of the CHEP theme, key messages and new recommendations.
- Short clinical summary. A brief narrative clinical summary of the current CHEP theme and recommendations with an emphasis on what is new and what is important. Tables summarize key aspects of hypertension care.
- Short scientific summary. A brief narrative summary of what is new and what is important with an emphasis on the scientific basis for the recommendations. Tables summarize key aspects of hypertension care.
- CHEP specialist booklet. Contains the short scientific summary and the exact CHEP recommendations in a pocket booklet format
- Full scientific manuscripts. Detailed manuscripts that indicate the exact CHEP scientific recommendations for the management of hypertension with their scientific rationale.

Power Point® Slide sets

- Public education slide set: A slide set that is intended to be used to develop a general talk on hypertension to a public and/or patient audience.
- Background slide set. A slide set that contains information on the health risks of hypertension and key therapeutic interventions.
- Methodology Slide set. A slide set that outlines the methods CHEP uses to develop it recommendations as well as the key messages and theme for 2011.
- Diagnostic Slide set. A slide set that outlines the diagnostic recommendations of CHEP as well as the key messages and theme for 2011.
- Treatment Slide Set. A slide set that outlines the treatment recommendations of CHEP as well as the key messages and theme for 2011.
- Blood Pressure Measurement. A slide set that outlines the measurement recommendations for blood pressure and includes advice on office, home and ambulatory blood pressure.
- Outcomes Slide set. A slide set that outlines the various surveillance methods used by CHEP as well as key outcomes associated with CHEP. Ongoing hypertension management gaps are featured.
- Hypertension resources. A new slide set that outlines what Canadian hypertension resources are available
- What new slide set: A slide set that focuses on what is new for this year and what is old but still important.

Website resources

- www.hypertension.ca: to download current resources for health care professional and patients and to sign up to be regularly updated on new and updated resources for health care professional and patients and educational opportunities for health care professionals
- www.lowersodium.ca: for educational resources for health care professionals and patients on dietary sodium

Dietary Sodium Resources

- A short scientific summary of the importance of reducing dietary sodium with advice on how to reduce dietary sodium
- A scientific summary of the evidence for lowering dietary sodium
- Key messages on the importance of lowering dietary sodium with brief intervention advice

Dietary Sodium Power Point® Slide Sets

- Scientific and clinical slide set: A slide set intended to be used to develop a talk for a clinical or scientific audience
- Public sodium Slide set: A slide set that is intended to be used to develop a talk on dietary sodium to a public and patient audience on hypertension
- Sodium Quiz

Health care professional resources can be downloaded from www.hypertension.ca and www.lowersodium.ca and people who sign up at www.hypertension.ca will be automatically notified when resources are updated or newly developed.

Table 2: Resources for Canadians who have hypertension

Documents, Powerpoint® slides and DVDs

- Brief public hypertension recommendations. A 3 panel one page brochure that summaries hypertension and its management to people who have hypertension or are at risk. The summary is based on the 2011 CHEP health care professional management recommendations.
- Public hypertension recommendations. A 4 page pamphlet of hypertension and its management to people who have hypertension or are at risk. The summary is based on the 2011 CHEP health care professional management recommendations. The 2007 recommendations are available in 4 Indo Asian languages and cultural translations.
- Hypertension in Diabetes. A 4 page pamphlet of hypertension and its management for people who have hypertension and diabetes. The summary is based on the CHEP health care professional management recommendations.
- How to Measure your Blood Pressure at Home. A 1 page summary of how to purchase and use a home measurement device.
- Home Measurement of Blood Pressure. A more detailed 4 page summary of how to purchase and use a home measurement device.
- Measuring blood pressure the right way. A poster and small card that visually outlines the key steps to measuring blood pressure properly at home.
- Home measurement DVD. A DVD that has a short and longer summary of how to measure your blood pressure at home as well as how to purchase and use a home blood pressure measuring devices.
- Public Education DVD ('Hypertension: the Silent Killer'). A short and longer summary of hypertension on DVD for the public or those with or at risk of having hypertension.
- Brief Action Tool. A set of 3 tools to be used by a health care professional educator to engage a patient more fully in his/her care. Action tool 1 takes about 4 minutes to complete. It defines BP, why a patient needs to be concerned if s/he has High BP, and the risks of hypertension. Action Tool 2 takes 10 minutes and basically motivates a patient to think about changing his/her lifestyle. Action Tool 3 takes 7 minutes to complete. It talks about home measurement & recording of BP, as well as information on BP medication.
- Public Education Hypertension Slide set. A slide set that is intended to be used by a knowledgeable health care professional in developing a presentation on hypertension to the public or people with hypertension.

Dietary Sodium

- Slides set for Public Education. A slide set that is intended to be used by a knowledgeable health care professional in developing a presentation on dietary sodium to the public or people with hypertension.
- Get the facts on sodium Brochure. A one page summary of the importance of reducing dietary sodium and the key messages to reduce dietary sodium.
- A Short Summary about dietary sodium for public awareness. A very short summary of why reducing dietary sodium is important and how to reduce dietary summary.

- Healthy Eating for your Blood Pressure: A more detailed summary of why it is important to reduce dietary sodium and how to reduce dietary sodium for the more interested consumer.
- Quiz: A short series of questions and answers for people to use to test their sodium knowledge. It is in Power Point® format for use in talks.

Websites

- www.myBPsite.ca: To join a hypertension association and be regularly updated on hypertension resources and material that is available.
- http://hypertension.ca/bpc/resource-center/educational-tools-for-health-care-professionals/: To download patient related resources
- http://hypertension.ca/chs/deviceendorsements/devices-endorsed-by-chs/: To examine the different home blood pressure measurement devices that have passed international accuracy standards, are available in Canada and been approved by Hypertension Canada
- www.lowersodium.ca: Patient, public and health care professional information on dietary sodium.
- www.sodium101.ca: Public information on dietary sodium.
- www.heartandstroke.ca/bp: For an individualized action plan for lifestyle change and monitoring of blood pressure.
- www.nhlbi.nih.gov/hbp/prevent/h_eating/h_eating.htm: For detailed information on eating the DASH diet.
- A critical aspect of CHEP is the commitment to disseminate knowledge via publications in scientific literature. Below is the compilation of CHEP citations from 1999 to 2010.

CHEP Citations 2011:

On behalf of CHEP: Drouin, D. et al.: 2011 Update of the Canadian Hypertension Education Program. Heart & Stroke Foundation.
- The Newsletter of l'Alliance québécoise pour la Santé du Coeur. Vol 14, No 2, Summer 2011. Booklet 8p.
- Summary of the recommendations, Vol 14, No 2, Summer 2011. Special Insert 2p.
At:
http://www.santeducoeur.org/lesactualitesducoeur.php

Pour le PECH: Drouin, D. et al.: Mise à jour du Programme Éducatif Canadien sur l'Hypertension. Fondation des Maladies du Coeur. Les actualités du Coeur,

- Le Bulletin de l'Alliance québécoise pour la Santé du Coeur. Vol 14, No 2, 2011. Été 2011. Livret 8p.
- Résumé des recommandations. Encart spécial. Vol 14, No 2, 2011. Été 2011. 2p.

CHEP Citations 2010:

Quinn RR, Hemmelgarn BR, Padwal RS, Myers MG, Cloutier L, Bolli P, McKay DW, Khan NA, Hill MD, Mahon J, Hackam D, Grover S, Wilson T, Penner B, Burgess E, McAlister FA, Lamarre-Cliché M, Mclean D, Schiffrin EL, Honos G, Mann K, Tremblay G, Milot A, Chockalingam A, Rabkin SW, Dawes M, Touyz RM, Burns KD, Ruzicka M, Campbell NRC, Vallée M, Prasad R, Lebel M, Tobe SW MD, for the Canadian Hypertension Education Program. The 2010 Canadian Hypertension Education Program recommendations for the management of hypertension: Part 1--blood pressure measurement, diagnosis and assessment of risk. Can J Cardiol. May 2010;26(5):241-248.

Hackam DG, Khan NA, Hemmelgarn BR, Rabkin SW, Touyz RM, Campbell NRC, Padwal R, Campbell TS, Lindsay MP, Hill MD, Quinn RR, Mahon JL, Herman RJ, Schiffrin EL, Ruzicka M, Larochelle P, Feldman RD, Lebel M, Poirier L, Arnold JMO, Moe GW, Howlett JG, Trudeau L, Bacon SL, Petrella RJ, Milot A, Stone JA, Drouin D, Boulanger J-M, Sharma M, Hamet P, Fodor G, Dresser GK, Carruthers SG, Pylypchuk G, Burgess ED, Burns KD, Vallée MD, Prasad GVR, Gilbert RE, Leiter LA, Jones C, Ogilvie RI, Woo V, McFarlane PA, Hegele RA, Tobe SW. The 2010 Canadian Hypertension Education Program recommendations for the management of hypertension: Part 2--therapy. Can J Cardiol. May 2010;26(5):249-258.

Campbell NRC, Kaczorowski J, Lewanczuk RZ, Feldman R, Poirier L, Kwong MML, Lebel M, McAlister FA, Tobe SW, on behalf of the Canadian Hypertension Education Program. 2010 Canadian Hypertension Education Program (CHEP) recommendations: The scientific summary -- an update of the 2010 theme and the science behind new CHEP recommendations. Can J Cardiol. May 2010;26(5):236-240.

Campbell N.On behalf of CHEP. 2010 Canadian Hypertension Education Program Recommendations - An Annual Update. Canadian Family Physician. July 2010;56(7):649-653.

Omar Allu S, Bellerive J, Walker RL, Campbell NRC. Hypertension: Are you and your patients up to date? Can J Cardiol. 2010 May;26(5):261-4. Review.

Thompson A, Semchuk B, Campbell NRC, Kaczorowski J, Tsuyuki RT; for the Canadian Hypertension Education Program. Hypertension guidelines for pharmacists: 2009 update. Can Pharm J. January/February 2010;143(1);20-27.

Klarenbach SW, McAlister FA, Johansen H, Tu K, Hazel M Walker R, Zarnke KB Campbell NRC. Identification of factors driving differences in cost effectiveness of first-line pharmacological therapy for uncomplicated hypertension. Can J Cardiol. May 2010;26(5):e158-e163.

Campbell N.On behalf of CHEP. 2010 Canadian Hypertension Education Program Recommendations: A Short Summary. Canadian Journal of General Internal Medicine. August 2010;5(2):81-82.

Walker R, Chen G, Campbell N, McAlister FA, Quan H, Tu K, Khan N, Hemmelgarn B; for the Canadian Hypertension Education Program Outcomes Research Task Force. Canadian provincial trends in antihypertensive drug prescriptions between 1996 and 2006. Can J Cardiol. In press.

On behalf of CHEP (Campbell NR primary author). 2010 Canadian Hypertension Education Program: An Annual Recommendations Update. The Canadian Journal of Diagnosis. In press.

On behalf of CHEP. 2010 Canadian Hypertension Education Program: An Annual Recommendations Update. Le Clinicien. In press.

Publications about CHEP or mention CHEP:

Bancej CM, Campbell N, McKay DW, Nichol M, Walker RL, Kaczorowski J. Home blood pressure monitoring: Results from the 2009 Survey on Living with Chronic Diseases in Canada. Can J Cardiol. 2010 May;26(5):e152-e157.

Kawecka-Jaszcz K, Klima L, Stolarz-Skrzypek K. [Canadian guidelines for the management of essential hypertension – Canadian Hypertension Education Program (CHEP). Are they really better

than European guidelines?] [Article in Polish]. Kardiol Pol 2010;68(4):461-466.

Campbell NRC, Chen G. Canadian Efforts to Prevent and Control Hypertension. Can J Cardiol. In press.

Friedman O, McAlister FA, Yun L, Campbell NRC, Tu K, for the CHEP Outcomes Research Taskforce. Antihypertensive drug persistence and compliance among incident elderly hypertensives In Ontario. Am J Med. 2010;123:173-8.

Wilkins K, Campbell NRC, Joffres MR, Johansen HL, McAlister FA, Nichol M, Quach S, Tremblay MS, Blood pressure in Canadian adults. Health Reports. 2010:21:1-10.

Houle S, Campbell NRC, Ross T. Tsuyuki. Home Blood Pressure Monitoring Plays a Key Role in Hypertension Management – Implications for Pharmacists. Can Pharmacy J. In press.

McAlister FA, Herman R, Khan NA, Rabkin SW, Campbell N for the Canadian Hypertension Education Program. Putting ACCOMPLISH into context: Hypertension management in 2010. CMAJ. In press.

Neutel CI, Campbell NR, Morrison HI. Trends in diabetes treatment in Canadians, 1994–2004. Chronic Disease in Canada. In press.

Campbell NRC, Tobe SW. The Canadian Effort to Prevent and Control Hypertension. Can Other Countries adopt Canadian Strategies? Current Opin Cardiol. 2010 Jul;25(4):366-72.

Public Health Agency of Canada. Report from the Canadian Chronic Disease Surveillance System: Hypertension in Canada, 2010; 26p. Available from: http://www.phac-aspc.gc.ca/cd-mc/cvd-mcv/ccdss-snsmc-2010/pdf/CCDSS_HTN_Report_FINAL_EN_20100513.pdf

Tobe SW. Management of hypertension: Regional variations in a greatly improved landscape. Can J Cardiol. [Editorial]. In press.

Mohan S, Chen G, Campbell NRC, Hemmelgarn BR. Regional variations in not treating diagnosed hypertension in Canada. Can J Cardiol. In press.

CHEP Citations 2009:

Campbell NR, Brant R, Johansen H, et al. Increases in antihypertensive prescriptions and reductions in cardiovascular events in Canada. Hypertension. Feb 2009;53(2):128-134.

On behalf of CHEP. 2009 Canadian Hypertension Education Program Recommendations: An Annual Update. The Canadian Journal of Diagnosis. August 2009:64-73.

Khan NA, Hemmelgarn B, Herman RJ, Leiter LA, Mahon JL, Bell CM, Rabkin SW, Hill MD, Touyz RM, Padwal R, Larochelle P, Feldman RD, Schiffrin EL, Campbell NRC, Arnold MO, Moe G, Campbell TS, Milot A, Stone JA, Jones C, Ogilvie RI, Hamet P, Fodor JG, Carruthers G, Burns KD, Prasad R, Ruzicka M, deChamplain J, Pylypchuk G, Petrella R, Boulanger J-M, Trudeau L, Hegele RA, Woo V, McFarlane P, Vallée M, Howlett J, Katzmarzyk P, Lewanczuk RZ, Tobe S for the Canadian Hypertension Education Program. The 2009 Canadian Hypertension Education Program recommendations for the management of hypertension: Part 2--therapy. Can J Cardiol. May 2009;25(5):287-298.

On behalf of CHEP. The 2008 Canadian Hypertension Education Program recommendations: An annual update. Perspectives in Cardiology.

On behalf of CHEP: Drouin, D. et al.: 2010 Update of the Canadian Hypertension

Education Program. Heart & Stroke Foundation.

- The Newsletter of l'Alliance québécoise pour la Santé du Coeur. Vol 13, No 2, Summer 2010. Booklet 8p.
- Summary of the recommendations, Vol 13, No 2, Summer 2010. Special Insert 2p.
Pour le PECH: Drouin, D. et al.: Mise à jour du Programme Éducatif Canadien de 2010 sur l'Hypertension. Fondation des Maladies du Coeur. Les actualités du Coeur,

- Le Bulletin de l'Alliance québécoise pour la Santé du Coeur. Vol 13, No 2. Été 2010. Livret 8p.
- Résumé des recommandations. Encart spécial. Vol 13, No 2 Été 2010. 2p.
Disponible à:
http://www.santeducoeur.org/lesactualitesducoeur.php

Campbell NRC, Khan NA, Hill MD, Tremblay G, Lebel M, Kaczorowski J, McAlister FA, Lewanczuk RZ, Tobe S, on behalf of the Canadian Hypertension Education Program. 2009 Canadian Hypertension Education Program recommendations: the scientific summary -- an annual update. Can J Cardiol. May 2009;25(5):271-277.

Raj S Padwal, Brenda R Hemmelgarn, Nadia A Khan, Steven Grover, Finlay A McAlister, Donald W McKay, Thomas Wilson, Brian Penner, Ellen Burgess, Peter Bolli, Michael D. Hill, Jeff Mahon, Martin G Myers, Carl Abbott, Ernesto L Schiffrin, George Honos, Karen Mann, Guy Tremblay, Alain Milot, Lyne Cloutier, Arun Chockalingam, Simon W Rabkin, Martin Dawes, Rhian M Touyz, Chaim Bell, Kevin D Burns, Marcel Ruzicka, Norman RC Campbell, Marcel Lebel and Sheldon W Tobe, for the Canadian Hypertension Education Program. The 2009 Canadian Hypertension Education Program recommendations for the management of hypertension: Part 1--blood pressure measurement, diagnosis and assessment of risk. Can J Cardiol. May 2009;25(5):279-286.

Campbell N, McKay DW, Tremblay G. On behalf of CHEP. 2009 Canadian Hypertension Education Program Recommendations - An Annual Update. Canadian Family Physician. July 2009;55(7):697-700.

CHEP. Recommandations 2009 du PECH: Mise à jour annuelle. Le Clinicien. In press 2009.

Stankus V, Hemmelgarn B, Campbell NRC, Chen G, McAlister FA, Tsuyuki R. Improving hypertension management and reducing costs. Can J Clin Pharmacol. 2009;16:e151-155.

Thompson A, Campbell NR, Lewanczuk RZ, Semchuk W, Tsuyuki RT, Kaczorowski J, Dawes M, Hickey J, Costello JA, Cloutier L for the Canadian Hypertension Education Program Implementation Task Force. Tackling the Burden of Hypertension in Canada – Encouraging Collaborative Care. Canadian Family Physician. 2008;54:1659-62.

Campbell NRC, Tsuyuki R. Hypertension in Diabetes: A call to action. Can Pharm J. [Editorial] 2009;142;52-53.

Campbell NRC, Leiter LA, Larochelle P, Tobe S, Chockalingam A, Ward R, Morris D, Tsuyuki R. Hypertension in diabetes: A call to action. Can J Cardiol. May 2009;25(5):299-302.

Publications with CHEP recommendations or about CHEP:

Califf RM. A virtuous cycle to improve hypertension outcomes at a national level: linking public health and individualized medicine. Hypertension. Feb 2009;53(2):105-107.

Gupta A. L'importance d'abaisser la tension artérielle rapidement et efficacementchez les patients hypertendus. Le Clinicien. June/July 2009;24(6):33-40.

Kermode-Scott B. More use of antihypertensives has cut cardiovascular events in Canada. BMJ. 2009;338:b536.

Muckerheide S. Improved drug management of hypertension leads to drop in related hospitalizations, deaths on a national level, results show. Thought Leader Connect: Cardiology Edition. March 19 2009:1-2.

Stankus V, Hemmelgarn B, Campbell NR, Chen G, McAlister FA, Tsuyuki RT. Reducing costs and improving hypertension management. Can J Clin Pharmacol. Winter 2009;16(1):e151-155.

Tu K. Hypertension management by family physicians – Is it time to pat ourselves on the back? Canadian Family Physician. July 2009;55(7):684-685.

Mathavan A, Chockalingam A, Chockalingam S, Bilchik B, Saini V. Madurai Area Physicians Cardiovascular Health Evaluation Survey (MAPCHES) – an alarming status. Can J Cardiol. May 2009;25(5):303-308.

Prasad GVR, Ruzicka M, Burns KD, Tobe SW, Lebel M. Hypertension in dialysis and kidney transplant patients. Can J Cardiol. May 2009;25(5):309-314.

Tobe SW, Lewanczuk R. Resistant hypertension. Can J Cardiol. May 2009;25(5):315-317.

Mohan S, Campbell NRC. Hypertension management: time to shift gears and scale up national efforts. (Commentary). Hypertension. 2009;53:450-1.

Campbell NRC, Tsuyuki R. Hypertension in Therapeutic Choices. Ottawa: Canadian Pharmacy Association; 2009.

Campbell NRC, Omar S. Canada Chair in Hypertension Prevention and Control. 1: Initiatives to Improve Public and Patient Education on Hypertension and to Prevent Hypertension by Reducing Dietary Sodium. Hypertension Canada. September 2008;Bulletin 96:3-7.

Campbell NRC, Omar S. Canada Chair in Hypertension Prevention and Control. 2: Initiatives to Enhance the Canadian Hypertension Education Program and to Develop a National Hypertension Surveillance Program. Hypertension Canada. January 2009;Bulletin 97:3-8.

Canadian Hypertension Education Program (CHEP) – a Unique Model for Hypertension Guidelines. Hypertension News. September 2009 – Opus 20;13.

The Canadian Hypertension Education Program Provides a Variety of Resources to Help You in Your Practice. CVHNS Bulletin. Jul 2009;6(2):6.

Feldman RD, McAlister FA. Postgame Wrap of the Ultimate Blood Pressure Megatrial. Did It Score an ALLHAT Trick or Was It "Three Strikes and You're Out?". Hypertension. 2009;53:595-597.

Five Ways You Can Help Reduce Hypertension. Alberta RN. Jan 2009;65(1):26-27.

Kelly N. Hypertension Awareness: An Alberta Initiative. Libin Life. 2009:1:3.

Kelly N, Thompson A., Campbell N. What do you know about Hypertension? Alberta Pharmacists Association. www.rxa.ca.

Kelly N, Wiebe J, Campbell N. Alberta Hypertension Initiative: A Pilot Project on Hypertension Management. care. Fall 2009:26-27.

Kelly N, Thompson A, Tsuyuki R. Most Common Hypertension Questions Answered. The Link. May 5, 2009.

Poirier L, Drouin D. Knowledge transfer and implementation of clinical practice guidelines. Experience of the Canadian Hypertension Education Program. Néphrologie & Thérapeutiques (2009) 5, Suppl. 4, S246-S249.

McAlister FA, Feldman RD, Wyard K, Brant R, Campbell NR; CHEP Outcomes Research Task Force. The impact of the Canadian Hypertension Education Programme in its first decade. Eur Heart J. 2009 Jun;30(12):1434-9. Epub 2009 May 19.

On behalf of CHEP: Drouin, D. et al.: 2009 Update of the Canadian Hypertension Education Program. Heart & Stroke Foundation.

- The Newsletter of l'Alliance québécoise pour la Santé du Coeur. Vol 12, No 1, Spring 2009. Booklet 8p.
- Summary of the recommendations, Vol 14, No 2, Spring 2009. Special Insert 2p.
Pour le PECH: Drouin, D. et al.: Mise à jour du Programme Éducatif Canadien de 2009 sur l'Hypertension. Fondation des Maladies du Coeur. Les actualités du Coeur,

- Le Bulletin de l'Alliance québécoise pour la Santé du Coeur. Vol 12, No 1. Printemps 2009. Livret 8p.
- Résumé des recommandations. Encart spécial. Vol 12, No 1. Printemps 2009. 2p.
Disponible à:
http://www.santeducoeur.org/lesactualitesducoeur.php

CHEP Citations 2008:

CHEP. Canadian Hypertension Education Program Recommendations: A Summary of the 2008 Update. Hypertension Canada. March 2008;Bulletin 94:1-4.

CHEP. Recommandations 2008 du PECH: Mise à jour annuelle. Le Clinicien. March 2008:83-91. É

C.Health. High Blood Pressure: What's new? - What are the CHEP recommendations and why are they made? Website] http://chealth.canoe.ca/channel_health_features_details.asp?health_feature_id=208&article_id=678&channel_id=2049&relation_id=37805. Accessed September 17, 2008.

Hypertension 2008 Public Recommendations - Special Supplement from Blood Pressure Canada, Heart and Stroke Foundation of Canada, Canadian Hypertension Education Program (CHEP), Canadian Hypertension Society, and Société Québécoise d'hypertension artérielle. Canadian Health Magazine. March/April 2008:55-58.

On behalf of CHEP. The 2008 Canadian Hypertension Education Program recommendations: An annual update. Perspectives in Cardiology. April 2008:20-28.

On behalf of CHEP. 2008 Canadian Hypertension Education Program Recommendations: An Annual Update. The Canadian Journal of Diagnosis. April 2008:103-109.

The 2008 Canadian Hypertension Education Program recommendations: the scientific summary -- an annual update. Can J Cardiol. Jun 2008;24(6):447-452.

2008 Recommendations of the Canadian Hypertension Education Program: Short Clinical Summary (Annual Update). Canadian Journal of General Internal Medicine..

Campbell NR, So L, Amankwah E, Quan H, Maxwell C. Characteristics of hypertensive Canadians not receiving

drug therapy. Can J Cardiol. Jun 2008;24(6):485-490.

Campbell N, Tremblay G. 2008 Canadian Hypertension Education Program - An Annual Recommendations Update. Stroke Nursing News. Spring 2008;2(3):3-4. Soins infirmiers de l'AVC. Printemps 2008;2(3):3-4.

Campbell N, McKay DW, Tremblay G. 2008 Canadian Hypertension Education Program Recommendations - An Annual Update. Canadian Family Physician. In Press 2008.

Drouin D, Kaczorowski J, Campbell NR, Lewanczuk RR. Implementing guidelines. It is working in Canada! Report on behalf of the Canadian Hypertension Education Program. J Hypertens. 2008;26(S1):14.

Feldman RD, Campbell NR, Wyard K. Canadian Hypertension Education Program: the evolution of hypertension management guidelines in Canada. Can J Cardiol. Jun 2008;24(6):477-481.

NA Khan, B Hemmelgarn, R Padwal, P Larochelle, JL Mahon, RZ Lewanczuk, FA McAlister, SA Rabkin, MD Hill, RD Feldman, EL Schiffrin, NR Campbell, AG Logan, M Arnold, G Moe, TS Campbell, A Milot, JA Stone, C Jones, LA Leiter, RI Ogilvie, RJ Herman, P Hamet, G Fodor, G Carruthers, B Culleton, KD Burns, M Ruzicka, J deChamplain, G Pylypchuk, N Gledhill, R Petrella, J Boulanger, L Trudeau, RA Hegele, V Woo, P McFarlane, RM Touyz, SW Tobe, for the Canadian Hypertension Education Program. The 2008 Canadian Hypertension Education Program recommendations for the management of hypertension: Part 2 - therapy. Can J Cardiol. Jun 2008;24(6):465-475.

Padwal R, B Hemmelgarn, NA Khan, Grover S, McAlister FA, McKay DW, Wilson T, Penner B, Burgess E, Bolli P, Hill MD, Mahon J, Myers MG, Abbott C, Schiffrin EL, Honos G, Mann K, Tremblay G, Milot A, Cloutier L, Chockalingam A, Rabkin SW, Dawes M, Touyz R, Bell C, Burns KD, Ruzika M, Campbell NRC, Lebel M, SW Tobe, for the Canadian Hypertension Education Program. The 2008 Canadian Hypertension Education Program recommendations for the management of hypertension: Part 1 - blood pressure measurement, diagnosis and assessment of risk. Can J Cardiol. Jun 2008;24(6):455-463.

Tu K, Chen Z, Lipscombe LL. Prevalence and incidence of hypertension from 1995 to 2005: a population-based study. CMAJ. May 20 2008;178(11):1429-1435.

Tu K, Chen Z, Lipscombe LL. Mortality among patients with hypertension from 1995 to 2005: a population-based study. CMAJ. May 20 2008;178(11):1436-1440.

Vardy L, Campbell N, Johansen H, et al. for the Canadian Hypertension Education Program. Increases in anti-hypertensive prescriptions and reductions in cardiovascular events in Canada. J Hypertens. 2008;26(S1):51.

2008 Publications with CHEP recommendations or about CHEP:

Campbell N, Tsuyuki RT, Jarvis B. It's time to reduce sodium additives in food Canadian Pharmacists Journal. Jan-Feb 2008;141(1):8-9.

Campbell N, Omar AS. Hypertension questions and answers. Wellness Options. Globe and Mail. May, 2008;Supplement.

Campbell NR, Mohan S. Hypertension Medication: Selections for Treatment. Perspectives in Cardiology. June/July 2008:27-31.

Campbell NR, Spence JD. Stroke prevention and sodium restriction. Can J Neurol Sci. Jul 2008;35(3):278-279.

Campbell NRC. Hypertension prevention and control in Canada. J Am Soc Hypertens. March 2008;2(2):97-105.

Campbell NRC. Hypertension in Therapeutic Choices. Ottawa: Canadian Pharmacy Association; 2008.

Chockalingam A. World Hypertension Day and global awareness. Can J Cardiol. Jun 2008;24(6):441-444.

Drouin D, Milot A, eds. Hypertension Clinical Companion 3rd edition: Canadian and Quebec Hypertension Society; 2008.

Fodor JG, Leenen FH, Helis E, Turton P. 2006 Ontario Survey on the Prevalence and Control of Hypertension (ON-BP): Rationale and design of a community-based cross-sectional survey. Can J Cardiol. Jun 2008;24(6):503-505.

Harrison P. Keep tabs on your blood pressure; Hypertension - the silent killer you can avoid or control. Canadian Health; 2008:31-34.

Hemmelgarn BR, Chen G, Walker R, McAlister FA, Quan H, Tu K, Khan N , Campbell N. Trends in antihypertensive drug prescriptions and physician visits in Canada between 1996 and 2006. Can J Cardiol. Jun 2008;24(6):507-512.

Jones C, Simpson SH, Mitchell D, Haggarty S, Campbell N, Then K, Lewanczuk RZ, Sebaldt R, Farrell B, Dolovich L, Kaczorowski J, Chambers L. Enhancing hypertension awareness and management in the elderly: lessons learned from the Airdrie Community Hypertension Awareness and Management Program (A-CHAMP). Can J Cardiol. Jul 2008;24(7):561-567.

Lewanczuk R. Hypertension as a chronic disease: What can be done at a regional level? Can J Cardiol. Jun 2008;24(6):483-484.

Mohan S, Campbell NR. Hypertension management in Canada: good news, but important challenges remain. CMAJ. May 20 2008;178(11):1458-1460.

Neutel CI, Campbell NR. Changes in lifestyle after hypertension diagnosis in Canada. Can J Cardiol. Mar 2008;24(3):199-204.

Penz ED, Joffres MR, Campbell NR. Reducing dietary sodium and decreases in cardiovascular disease in Canada. Can J Cardiol. Jun 2008;24(6):497-491.

Rabi DM, Khan N, Vallee M, Hladunewich MA, Tobe SW, Pilote L. Reporting on sex-based analysis in clinical trials of angiotensin-converting enzyme inhibitor and angiotensin receptor blocker efficacy. Can J Cardiol. Jun 2008;24(6):491-496.

Skelly A. Cardiology: Hypertension guidelines stress home monitoring. The Medical Post. June 25, 2008.

Trudeau L. Hypertension in the elderly. Perspectives in Cardiology. May 2008;24(5):24-26.

On behalf of CHEP: Drouin, D. et al.: 2008 Update of the Canadian Hypertension Education Program. Heart & Stroke Foundation.
Pour le PECH: Drouin, D. et al.: Mise à jour du Programme Éducatif Canadien de 2008 sur l'Hypertension. Fondation des Maladies du Coeur. Les actualités du Coeur,

- Le Bulletin de l'Alliance québécoise pour la Santé du Coeur. Vol 13, No 2. Printemps 2008. Livret 8p.
- Résumé des recommandations. Encart spécial.ol 13, No 2. Printemps 2008. 2p.
Disponible à:
http://www.santeducoeur.org/lesactualitesducoeur.php

- The Newsletter of l'Alliance québécoise pour la Santé du Coeur. Vol 11, No 3, Spring 2008. Booklet 8p.
- Summary of the recommendations, Vol 11, No 3, Spring 2008. Special Insert 2p.

CHEP Citations 2007:

Abbott C, Bolli P. There is more to HT than High BP. Perspectives in Cardiology. June/July 2007:32-35.

Bolli P, Hemmelgarn B, Myers MG, McKay D, Tremblay G, Tobe S., for the Canadian Hypertension Education Program. High Normal blood pressure and prehypertension: The debate continues. Canadian Journal of Cardiology. May 2007; 23(7):581-583.

On behalf of CHEP. 2007 Canadian Hypertension Education Program Guidelines: An Annual Update. The Canadian Journal of Diagnosis. May 2007:77-81.

CHEP. Canadian Hypertension Education Program Recommendations. Hypertension Canada. 2007; Bulletin 90:1-4.

CHEP. The 2007 Canadian Hypertension Education Program Recommendations: The Scientific Summary- an annual update. Canadian Journal of Cardiology May 2007;(23):521- 527.

CHEP. Recommandations 2007 du PECH: Mise à jour annuelle. Le Clinicien. May 2007:80-85.

Campbell NR, on behalf of CHEP. Pass the Salt? Sodium Recommendations. Perspectives in Cardiology. March 2007:24-26.

Khan NA, Hemmelgarn B, Padwal R, Larochelle P, Mahon JL, Lewanczuk RZ, McAlister FA, Rabkin SW, Hill MD, Feldman RD, Schiffrin EL, Campbell NRC, et al for the Canadian Hypertension Education Program. The 2007 Canadian Hypertension Education program Recommendations for the management of Hypertension: Part 2- therapy. Canadian Journal of Cardiology May 2007;23(7):539-550.

Lewanczuk R, on behalf of CHEP. Treatment of Uncomplicated Hypertension in 2007. Perspectives in Cardiology. February 2007:25-27.

McLean D, Kingsbury K, Costello J, Cloutier L, Matheson S. The 2007 Canadian Hypertension Education Program (CHEP) Recommendations: Management of Hypertension by Nurses. Canadian Journal of Cardiovascular Nursing. 2007;17(2): 10-16.

Cloutier L, Costello J, Kingsbury K, Matheson S, McLean D. Canadian Hypertension Education Program (CHEP) Recommendations-2007. Canadian Journal of Cardiovascular Nurses. 2007;17 (1):39.

Padwal RS, Hemmelgarn BR, McAlister FA, et al.; for the Canadian Hypertension Education Program. The 2007 Canadian Hypertension Education program Recommendations for the management of Hypertension: Part 1- blood pressure measurement, diagnosis and assessment of risk. Canadian Journal of Cardiology May 2007;(23):529-538.

Ruzicka M, Burns KD, Culleton B, Tobe S; for the Canadian Hypertension Education Program. Treatment of hypertension in patients with nondiabetic chronic kidney disease. Canadian Journal of Cardiology. May 2007;23(7):595-601.

Tobe S, Touyz RM, Campbell N; for the Canadian Hypertension Education Program. The Canadian Hypertension Education Program- a unique Canadian knowledge translation program. Canadian Journal of Cardiology. May 2007;23(7):551-555.

Touyz RM, for the Canadian Hypertension Education Program. 2007 CHEP Recommendations: Perspectives in Cardiology. May 2007:31-40.

Campbell NR, Dawes, M., for the Canadian Hypertension Education. Adherence to Therapy. mdPassport Hypertension eNewsletter. August 2007. (Also in French)

2007 Recommendations of the Canadian Hypertension Education Program: Short Clinical Summary (Annual Update). Canadian Journal of General Internal Medicine. September 2007;(2(3):27-33.

Tsuyuki RT, Campbell NR. 2007 CHEP-CPhA guidelines for the management of hypertension by pharmacists. Canadian Pharmacists Journal. July/August 2007; (140)4:238-239.

Campbell NR, Dawes, M., for the Canadian Hypertension Education Program. What's new in Monitoring Recommendations for 2007? mdPassport Hypertension eNewsletter April 2007. (Also in French)

2007 Recommendations of the Canadian Hypertension Education Program: Short Clinical Summary (Annual Update). Canadian Journal of Hospital Pharmacist. June 2007;(60)3:153-216.

Eledrisi MS. First line therapy for hypertension. Annals of Internal Medicine. 2007; 146:615 [letter].

McLean D, Cloutier L, Costello J for CHEP. The role of the nurse in educating patients and the public about hypertension. Canadian Nurse. April 2007;(103)4:15-18. (Also in French)

CHEP ITF nursing group. Nurses have a role to play in public education on hypertension. Canadian Nurse. April 2007;(103)4:10 [editorial].

Rabkin S, on behalf of CHEP. Treatment of Hypertension in Stroke Patients. Perspectives in Cardiology. April 2007:23-24.

Tobe S; for the Canadian Hypertension Education Program. A Close Look: Renal Artery Stenosis. Perspectives in Cardiology. September 2007;(23)8:27-31.

Touyz RM, for the Canadian Hypertension Education Program. Lifestyle and BP: Making a Healthy Change. Perspectives in Cardiology. August 2007;(23)7:27-30.

On behalf of the CHEP Implementation Task Force. Things to know about high blood pressure: 'White coat' and 'masked' hypertension. Family Health. November 2007.

Campbell NR., for the Canadian Hypertension Education Program. White coat hypertension and masked hypertension. mdPassport Hypertension eNewsletter September 2007. (Also in French).

2007 Publications with CHEP recommendations or about CHEP:

Campbell NR. Cardiovascular Disorders: Hypertension. Therapeutic Choices. June 2007:1-29.

Lewanczuk R, Tobe S. More medications, fewer pills: Combination medications for the treatment of hypertension. Canadian Journal of Cardiology. May 2007;23(7):573- 576.

McKay D, Godwin M, Chockalingam A. Practical advice for home blood pressure measurement. Canadian Journal of Cardiology. May 2007;23(7):577-580.

McFarlane PA, Tobe S, Culleton B. Improving outcomes in diabetes and chronic kidney disease: The basis for Canadian guidelines. Canadian Journal of Cardiology. May 2007;23(7):585-590.

Neutel CI, Campbell N. Antihypertensive medication use by recently diagnosed hypertensive Canadians. Canadian Journal of Cardiology. May 2007;23(7):561-565.

Penner SB, Campbell N, Chockalingam A, Zarnke K, Van Vliet B. Dietary sodium and cardiovascular outcomes: A rational approach. Canadian Journal of Cardiology. May 2007;23(7):567-572.

Dyer, O. Older BP meds up diabetes risk. National Review of Medicine. Feb 2007.

Stroke Nursing News. February 2007;(1)2:1-8.

Picard, A. 1 in 4 patients prescribed unproven drug mix. The Globe and Mail. August 21 2007.

Issa, J. "No evidence" for HBP beta blocker use. National Review of Medicine. August 30 2007;(4)14.

Stroke Nursing News. Summer 2007;(1)7:6.

Khan N, McAlister F. Do beta blockers have a role in treating hypertension? Canadian Family Physician. April 2007;(53):614-617.

2007 CHEP Recommendations highlight "high-normal" BP risks, dietary sodium. Heart & Stroke Hypertension Monitor. Spring 2007;(2)1:8-9.

Lewanczuk R. Comprehensive management of patients with cardiovascular risk factors. Canadian Journal of Diagnosis. 2007 Special edition April:3-5.

Bennett M, Gin K. Hypertension: What's new in 2007? Canadian J CME. June 2007:53-57.

Campbell NRC, Tu K, Duong-Hua M, McAlister FA. Polytherapy with two or more antihypertensive drugs to lower blood pressure in elderly Ontarians. Room for Improvement. Canadian Journal of Cardiology. August 2007;(23):783-787.

McAlister FA, Tu K, Majumdar SR, Padwal R, Chen Z, Campbell NRC. Laboratory

testing in newly treated elderly hypertensives without co-morbidities: a population-based cohort study. Open Medicine. September 2007;(1)2:60-67.

Tu K, Campbell NRC, Chen Z, McAlister FA. Initiation of therapy for uncomplicated hypertension with a beta blocker in the elderly. A cause for concern. Journal of Human Hypertension. April 2007;(21):271-275.

Silzer J, Shah W, Campbell NRC. Sodium, BP, and Hypertension. Perspectives in Cardiology. September 2007;(23)8:33-36.

Amankwah E, Campbell NRC, Maxwell C, Onysko J, Quan H. Adult Canadians who do not have blood pressure measured. Journal of Clinical Hypertension. IN PRESS.

Kaczorowski J, Smith M, Campbell N. High Quality Hypertension Resources for your Patients. Perspectives in Cardiology. 2007;(23):32-38.

Neutel IC, Campbell NRC. Changes in Lifestyle after Hypertension Diagnosis in Canada. Canadian Journal of Cardiology. IN PRESS.

Campbell NRC. Canada Chair in Hypertension Prevention and Control. A pilot project. Canadian Journal of Cardiology. 2007;(23):557-560.

Joffres MR, Campbell NRC, Manns B, Tu K. Estimate of the benefits of a population-based reduction in dietary sodium additives on hypertension and its related health costs in Canada. Canadian Journal of Cardiology. 2007;(23):437-443.

McAlister FA, Campbell NRC, Duong-Hua M, Chen Z, Tu K. Antihypertensive prescribing in 27 822 elderly Canadians with diabetes mellitus over the past decade. Diabetes Care. 2007;(29):836-841.

Smith E. Musings regarding Hypertension. Canadian Journal of Cardiology. 2007;(23):603-4 [editorial].

La Collaboration Infirmière-Infirmière Auxillaire. Perspective Infirmière. Septembre/Octobre 2007;(5)1:46.

On behalf of CHEP: Drouin, D. et al.: 2007 Update of the Canadian Hypertension Education Program. Heart & Stroke Foundation.

- The Newsletter of l'Alliance québécoise pour la Santé du Coeur. Vol 10, No 2, Spring 2007. Booklet 8p.
- Summary of the recommendations, Vol 10, No 2, Spring 2007. Special Insert 2p.

Pour le PECH: Drouin, D. et al.: Mise à jour du Programme Éducatif Canadien de 2007 sur l'Hypertension. Fondation des Maladies du Coeur. Les actualités du Coeur,

- Le Bulletin de l'Alliance québécoise pour la Santé du Coeur. Vol 10, No 2. Printemps 2007. Livret 8p.
- Résumé des recommandations. Encart spécial. Vol 10, No 2. Printemps 2007. 2p. Disponible à: http://www.santeducoeur.org/lesactualitesducoeur.php

CHEP Citations 2006:

Touyz RM, for the Canadian Hypertension Education Program. 2006 CHEP Recommendations: What are the New Messages? Perspectives in Cardiology March 2006;28-35.

Touyz RM, with the assistance of the CHEP executive: Canadian Hypertension Education Program Recommendations: A New Key Message and Some Old But Still Important Considerations. Hypertension Canada March 2006;(86): 2-8.

Myers MG, Tobe SW, McKay DW, Bolli P, Hemmelgarn BR, McAlister FA, on behalf of the Canadian Hypertension Education Program. New Algorithm for the Diagnosis of Hypertension – Canadian Hypertension Education Programme Recommendations (2005). AJH October 2005;Vol. 18 (10) 1369-1374.

Jamnik V, Gledhill N, Touyz RM, Campbell NRC, Petrella R, Logan A. Lifestyle Modifications to Prevent and Manage Hypertension; for Exercise Physiologists and Fitness Professionals. Canadian Journal of Applied Physiology December 2005;30 (6).

Boulanger JM, Hill MD, on behalf of the Canadian Hypertension Education Program. Hypertension and stroke: 2005 Canadian Hypertension Education Program recommendations. Canadian Journal of Neurological Sciences November 2005;Vol. 32(4) 403-408.

Campbell NRC, Fodor JG, Herman R, Hamet P, for the Canadian Hypertension Education Program. Hypertension in the Elderly An update on Canadian Hypertension Education Program recommendations and Hypertension in the Elderly. Geriatrics and Aging Nov/Dec 2005;Volume 8 (10) Pages 35, 36.

Tsuyuki RT, Poirier L, McAlister FA, Drouin D, for the Canadian Hypertension Education Program. 2006 Canadian Hypertension Education Program Guidelines for the management of hypertension by pharmacists. CPJ/RPC May/June 2006;Vol. 139 (3) SUPPL 1. Pages S11-S13.

Campbell NR, Onysko J, for the Canadian Hypertension Education Program and the Outcomes Research Task Force. The Outcomes Research Task Force and the Canadian Hypertension Education Program. The Canadian Journal of Cardiology May 15, 2006;Vol. 22 (7) 556-558.

McAlister FA. The Canadian Hypertension Education Program – A Unique Canadian Initiative. The Canadian Journal of Cardiology May 15, 2006;Vol. 22 (7) 559-564.

Touyz RM. Highlights and Summary of the 2006 Canadian Hypertension Education Program Recommendations. The Canadian Journal of Cardiology May 15, 2006;Vol. 22 (7) 565-571.

Hemmelgarn BR, McAlister FA, Grover S, et al; for the Canadian Hypertension Education Program. The 2006 Canadian Hypertension Education Program recommendations for the management of hypertension: Part I – Blood pressure measurement, diagnosis and assessment of risk. The Canadian Journal of Cardiology May 15, 2006;Vol. 22 (7) 573-581.

Khan NA, McAlister FA, Rabkin SW, Padwal R, Feldman RD, Campbell NRC, et al for the Canadian Hypertension Education Program. The 2006 Canadian Hypertension Education Program recommendations for the management of hypertension : Part II – Therapy. The Canadian Journal of Cardiology May 15, 2006;Vol. 22 (7) 583-593.

Drouin D, Campbell NR, Kaczorowski J; for the Canadian Hypertension Education Program and the Implementation Task Force. The Implementation of recommendations on hypertension: The Canadian Hypertension Program. The Canadian Journal of Cardiology May 15, 2006;Vol. 22 (7) 595-598.

Campbell NR, Petrella R, Kaczorowski. Public Education on hypertension: A new initiative to improve the prevention, treatment and control of

hypertension in Canada. The Canadian Journal of Cardiology May 15, 2006;Vol. 22 (7) 599-603.

Grover SA, Hemmelgarn B, Joseph L, Milot A, Tremblay G. The role of global risk assessment in hypertension therapy. The Canadian Journal of Cardiology May 15, 2006;Vol. 22 (7) 606-613.

Touyz R, Feldman R, Tremblay G, Milot A. 2006 Canadian Hypertension Education Program Recommendations: What Are The New Messages? The Canadian Journal of Diagnosis July 2006.

Adherence to Antihypertensive Therapy: 2006 CHEP Recommendations. Canadian Nurse 2006;102(5):36.

Touyz RM, for the Canadian Hypertension Education Program. 2006 CHEP Recommendations. Can Fam Physician.

Onysko J, Maxwell C, Eliasziw M, Zhang JX, Johansen H, Campbell NRC, for the Canadian Hypertension Education Program. Increases in the Diagnosis and Treatment of Hypertension in Canada. Hypertension In press.

Campbell NRC, Tu K, Brant R, Duong-Hua M, McAlister FA. for the Canadian Hypertension Education Program Outcomes Research Task Force. The Impact of The Canadian Hypertension Education Program On Antihypertensive Prescribing Trends. Hypertension 2006; 47: 22-28.

Publications with CHEP recommendations or about CHEP:

Lewanczuk R. Multidisciplinary management of hypertension. CPJ/RPC May/June 2006;Vol. 139 (3) SUPPL 1. S4.

Campbell N, Semchuk W, Lewanczuk R. Pharmacotherapy of hypertension. CPJ/RPC May/June 2006;Vol. 139 (3) SUPPL 1. S5-S9, S19.

Poirier L. Learning to be indispensable. CPJ/RPC May/June 2006;Vol. 139 (3) SUPPL 1. S14.

Killeen RM. If Hypertension is a puzzle, are pharmacists the missing piece? CPJ/RPC May/June 2006; Vol. 139 (3) SUPPL 1. S2.

McKay DW, Myers MG, Bolli P, Chokalingham, A. Masked Hypertension: A common but insidious presentation of hypertension. The Canadian Journal of Cardiology May 15, 2006; Vol. 22(7) 617-620.

Chockalingham A, Campbell NR, Fodor JG. Worldwide epidemic of hypertension. The Canadian Journal of Cardiology May 15, 2006;Vol. 22 (7) 553-555.

Lewanczuk R. Innovations in primary care: Implications for hypertension detection and treatment. The Canadian Journal of Cardiology May 15, 2006;Vol. 22 (7) 614-616.

Tobe SW, Burgess E, Lebel M. Atherosclerotic renovascular disease. The Canadian Journal of Cardiology May 15, 2006;Vol. 22 (7) 623-628.

Tobe SW, Larochelle P. Diabetes, Hypertension and Renal Disease: A Focus on Therapy. Canadian Diabetes Summer 2006;2-6.

Khan N, McAlister FA. Re-examining the efficacy of (beta) – blockers for the treatment of hypertension: a meta-analysis. CMAJ 2006;174(12) 1737-1742.

CCC 2005 – CHS/CHEP Joint Symposium. Adherence: A Key Component of Optimal Hypertension Control. Perspectives in Cardiology January 2006;35-40.

Improving Outcomes Through Improved Adherence. McMaster University Cardiology Bulletin May 2006;4(1):3.

Lewanczuk R. Are Canadian Hypertensive Patients Adequately Controlled? McMaster University Cardiology Bulletin. May 2006;4(1):6-7.

Meltzer S. Hypertension and Diabetes: A Frequent and Dangerous Co-existence. Canadian Diabetes Summer 2006;19(2):6-8.

Baillie H. Guidelines For Hypertension and Peripheral Arterial Disease 2006. CSIM

Campbell NRC, Tu K, Duong-Hua M, McAlister FA. Polytherapy with two or more antihypertensive drugs to lower blood pressure in elderly Ontarians. Room for improvement. Can J Cardiol In press.

Campbell NRC, Khan NA, Grover SA. Barriers and remaining questions on assessment of absolute cardiovascular risk as a starting point for interventions to reduce cardiovascular risk. J Hypertension [editorial] In press.

McAlister FA, Campbell NRC, Duong-Hua, M, Chen Z, Tu K. Antihypertensive prescribing in 27 822 elderly Canadians with diabetes mellitus over the past decade. Diabetes Care In press.

Thiazide Diuretics for Hypertension: Prescribing Practices and Predictors of Use in 194,761 Elderly Hypertensives. American Journal of Geriatric Pharmacotherapy In press.

Mohan S, Campbell NRC, Chockalingam A. Management of hypertension in low and middle income countries: challenges and opportunities. Prevention and Control 2006.

Chockalingam A, Campbell N. Management of Hypertension: Diagnosis and lifestyle modification. Indian Heart Journal 2005;57:639-43.

Chockalingam A, Campbell N. Management of hypertension: Pharmacotherapy. Indian Heart Journal 2005;57:644-47.

Campbell NRC, Onysko J, Johansen H, Gao R-N. Changes in cardiovascular deaths and hospitalization in Canada. Can J Cardiol [editorial]. 2006;22:425-27.

Campbell NRC, McAlister FA. Not all the guidelines are created equal. CMAJ [letter] 2006;174:814-5.

Campbell NRC, The Canadian Hypertension Education Program (CHEP). A Therapeutic Knowledge Translation Program". Can J Clin Pharmac 2006;13(1):e65-68

On behalf of CHEP: Drouin, D. et al.: 2006 Update of the Canadian Hypertension Education Program. Heart & Stroke Foundation.

- The Newsletter of l'Alliance québécoise pour la Santé du Coeur. Vol 10, No 1, Summer 2006. Booklet 8p.
- Summary of the recommendations, Vol 10, No 1, Summer 2006. Special Insert 2p.

Pour le PECH: Drouin, D. et al.: Mise à jour du Programme Éducatif Canadien de 2006 sur l'Hypertension. Fondation des Maladies du Coeur. Les actualités du Coeur,

- Le Bulletin de l'Alliance québécoise pour la Santé du Coeur. Vol 10, No 1. Été 2006. Livret 8p.
- Résumé des recommandations. Encart spécial. Vol 10, No 1. Été 2006. 2p.
Disponible à:
http://www.santeducoeur.org/lesactualitesducoeur.php

CHEP Citations 2005: Those in bold are CHEP publications and those not in bold are publications about CHEP or its recommendations.

Hemmelgarn BR, McAlister FA, Myers MG, et al, for the Canadian Hypertension Education Program. The 2005 Canadian Hypertension Education Program recommendations for the management of hypertension: Part 1 – Blood pressure measurement, diagnosis and assessment of risk. Can J Cardiol 2005;21(8):645-656.

Khan NA, McAlister FA, Lewanczuk RZ, et al, for the Canadian Hypertension Education Program. The 2005 Canadian Hypertension Education Program recommendations for the management of hypertension: Part II – Therapy. Can J Cardiol 2005;21(8):657-672.

Feldman RD, for the Canadian Hypertension Education Program. 2005 CHEP Recommendations: What are the New Messages? Perspectives in Cardiology. 2005;21(1):30-36.

Drouin D, pour le groupe de travail sur les recommendations fondées sur des données probantes du Programme éducatif canadien sur l'hypertension. Recommendations du Programme éducatif canadien sur l'hypertension pour l'année 2005. Quels sont les nouveaux messages? Le Clinicien. 2005;20(3) :1-6.

Feldman R, for the Canadian Hypertension Education Program, 2005 Canadian Hypertension Education Program Recommendations: 2005 Update. Hypertension Canada. 2005;(82): 1-5.

Campbell NRC, Drouin D, Feldman R. A Brief History of Canadian Hypertension Recommendations. Hypertension Canada. 2005;(82): 1-8.

Campbell NRC, Drouin D, McAlister F, Onysko J, Tobe S and Touyz RM, for the Canadian Hypertension Education Program CHEP: A national program to improve the treatment and control of hypertension. Hypertension Canada 2005;(84): 3-6.

Drouin D. Nouvelles recommendations sur l'hypertension poser plus rapidement le diagnostic. Le Médecin du Québec. 2005;40(3):18-20.

On behalf of the Canadian Hypertension Education Program. 2005 Canadian Hypertension Education Program Recommendations. New and important aspects of the sixth annual Canadian Hypertension Education Program's recommendations for management of hypertension. Can Fam Physician. 2005;May;51:702-705.

Feldman R, for the Canadian Hypertension Education Program. 2005 Canadian Hypertension Education Program Recommendations: What are the New Messages? The Canadian Journal of Diagnosis. March 2005:75-80.

Campbell NRC, Drouin D, McAlister F, Onysko J, Tobe S, Touyz RM, for the Canadian Hypertension Education Program. The Canadian Hypertension Education Program (CHEP): A national program to improve the treatment and control of hypertension. Hypertension News – an Electronic Newsletter. International Society of Hypertension. Opus 7, May 2005.

Management of Hypertension – A Summary of the new and important aspects of the 2005 Canadian Hypertension Education Program recommendations for the management of hypertension. Canadian Nurse. 2005;101(5):25.

Feldman RD, for the Canadian Hypertension Education Program. 2005 CHEP Recommendations: What are the New Messages? Perspectives in Cardiology. 2005;21(6):32-38.

McAlister FA, Wooltorton E, Campbell NRC, for the Canadian Hypertension

Education Program. The Canadian Hypertension Education Program (CHEP) recommendations: launching a new series. CMAJ.2005;173(5):508-9.

Bolli P, Myers M, McKay D, for the Canadian Hypertension Education Program. Applying the 2005 Canadian Hypertension Education Program recommendations: 1. Diagnosis of hypertension. CMAJ.2005;173(5):480-3.

Hemmelgarn B, Grover S, Feldman RD, for the Canadian Hypertension Education Program. Applying the 2005 Canadian Hypertension Education Program recommendations: 2. Assessing and reducing global atherosclerotic risk among hypertensive patients. CMAJ.2005;173(6):593-5.

Padwal R, Campbell N, Touyz RM, for the Canadian Hypertension Education Program. Applying the 2005 Canadian Hypertension Education Program recommendations: 3. Lifestyle modifications to prevent and treat hypertension. CMAJ.2005:173(7):749-751.

Khan NA, Hamet P, Lewanczuk RZ, for the Canadian Hypertension Education Program. Applying the 2005 Canadian Hypertension Education Program recommendations: 4. Managing uncomplicated hypertension. CMAJ.2005:173(8):865-867.

2005 Recommendations of the Canadian Hypertension Education Program: The 60-Second Version. Evidence-Based Recommendations Task Force of the Canadian Hypertension Education Program. CJHP. 2005;58(3):156-161.

Drouin D, Campbell N, Tobe S, Touyz R, for the Canadian Hypertension Education Program. Knowledge translation efforts by the Canadian Hypertension Education Program. J Hypertens. [abstract] 2005;23:s298.

Myers MG, Tobe SW, McKay DW, Bolli P, Hemmelgarn BR, McAlister FA, on behalf of the Canadian Hypertension Education Program. New Algorithm for the Diagnosis of Hypertension – Canadian Hypertension Education Programme Recommendations (2005). AJH (in press).

Jamnik V, Gledhill N, Touyz RM, Campbell NRC, Petrella R, Logan A. Lifestyle Modifications to Prevent and Manage Hypertension; for Exercise Physiologists and Fitness Professionals. Canadian Journal of Applied Physiology (in press).

Boulanger JM, Hill MD, on behalf of the Canadian Hypertension Education Program. Hypertension and stroke: 2005 Canadian Hypertension Education Program recommendations. Canadian Journal of Neurological Sciences (in press)

Campbell NRC, McAlister F, Tu K, for the Canadian Hypertension Education Program. Time trends in initiation of antihypertensive therapy in Elderly Hypertensive Diabetic and Non Diabetic Ontarians (1994-2002). Can J Cardiol. [abstract]. In press.

Onysko J, Maxwell C, Eliasziw M, Zhang JX, Campbell NRC, for the Canadian Hypertension Education Program. Increases In The Diagnosis And Drug Treatment Of Hypertensive Canadians. Can J Cardiol [abstract] in press

Campbell NRC, Fodor JG, Herman R, Hamet P, for the Canadian Hypertension Education Program. Hypertension in the Elderly An update on Canadian Hypertension Education Program recommendations and Hypertension in the Elderly. Geriatrics and Aging. In press.

On behalf of CHEP: Drouin, D. et al.: 2005 Update of the Canadian Hypertension

Education Program. Heart & Stroke Foundation.

- The Newsletter of l'Alliance québécoise pour la Santé du Coeur. Vol 9, No 1, Summer 2005. Booklet 8p.
- Summary of the recommendations, Vol 9, No 1, Summer 2005. Special Insert 2p.

Pour le PECH: Drouin, D. et al.: Mise à jour du Programme Éducatif Canadien de 2004 sur l'Hypertension. Fondation des Maladies du Coeur. Les actualités du Coeur,

- Le Bulletin de l'Alliance québécoise pour la Santé du Coeur. Vol 9, No 1. Été 2005. Livret 8p.
- Résumé des recommandations. Encart spécial. Vol 9, No 1. Été 2005. 2p.
Disponible à:
http://www.santeducoeur.org/lesactualitesducoeur.php

Websites with CHEP material or material about CHEP:

Hickey J. 2005 Canadian Hypertension Education Program Recommendations. www.theberries.ca Winter 2005.

Hickey J. Anyone can take a blood pressure. Right? www.theberries.ca Winter 2005.

Nursing Best Practice Guideline on the Management of Hypertension. www.rnao.org October 2005.

www.doctorsns.com

www.cma.ca

www.mdbriefcase.com

www.phac-aspc.gc.ca

www.ccohta.ca/compus

www.strokeconsortium.ca

www.cccn.ca

Publications with CHEP recommendations or about CHEP:

Cyboran J. 2005 What to Tell Your Patients About Hypertension. National Review of Medicine. 2005;2(5).

Sibbald B. Hypertension - Feeling the Pressure. CMAJ. 2005;172(6): 735.

Brookes L. The Bad News About Prevalence, the Good News About Treatments – But Pay Attention to the Details. Medscape Cardiology. 2005;9(1).

Doctors fast track high blood pressure diagnosis. Macleans Feb 3 2005.

Seniors Get More Blood Pressure Treatment. Macleans June 22, 2005.

Taggart K, Ontario MDs prescribing seniors more anti-hypertension meds. Medical Post. 2005;41(21).

Myers MG. Ambulatory Blood Pressure Monitoring for Routine Clinical Practice. Hypertension. [Editorial Commentary]2005;45:483-484

Campbell NRC. Hypertension. In Therapeutic Choices. Editor Gray J. Canadian Pharmacy Association. Ottawa. 2005.

Fields LE. US and Canadian Guidelines. In Hypertension: A Companion Text Book to Braunwald's Heart Disease. Editors Henry R. Black, MD and William J. Elliott, MD, PhD. 2005.

Poirier L. Hypertension: Lowering Barbara's BP. The Canadian Journal of CME August 2005:45-47.

Campbell NRC. What is the significance and the management of a 70-year-old non-diabetic male with hypertension and microalbuminuria of 700? Question in Perspectives in Cardiology 2005;21:17.

Gardner L, Tu K, McAlister A, Campbell NRC. Use of two or more antihypertensive drugs to treat hypertension in elderly Ontarians. Can J Clin Pharmacol 2005:12:e123.

Campbell NRC, The Canadian Hypertension Education Program (CHEP). A Therapeutic Knowledge Translation Program". Canadian Journal of Clinical Pharmacology. In Press.

Tu K, Campbell NRC, Duong-Hua M, McAlister FA. Hypertension management in the elderly has improved: Ontario prescribing trends, 1994 - 2002. Hypertension. 2005; 45:1-6.

CHEP Citations 1999 to October 2004: Those in bold are CHEP publications. Those not in bold are publications about CHEP or its recommendations.

2004

Campbell N, on behalf of the Canadian Hypertension Education Program. Canadian Hypertension Education Program. Brief overview of 2004 recommendations. Can Fam Physician 2004 Oct;50:1411-1412

Petrella R. 2003 Recommendations. It's not all old HAT. Canadian Family Physician. 2004;50:589-90.

Campbell N for the CHEP program. 2004 CHEP Hypertension recommendations: What's new, what's old but still important in 2004? Perspectives in Cardiology. 2004;20:26-33

Hypertension guidelines revisited. B Rose. Perspectives in Cardiology. 2004;20:21-25.

Feldman RD. 2004 Canadian Hypertension Education Program Recommendations: The Bottom-line Version. Hypertension Canada 2004; (78): 1-5.

Hemmelgarn B, Zarnke KB, Campbell NRC, Feldman RD, McKay DW, McAlister FA, Khan NA, Schiffrin EL, Myers MG, Bolli P, Honos G, Lebel M, Levine M, Padwal R, for the Canadian Hypertension Education Program. The 2004 Canadian Hypertension Education Program recommendations for the management of hypertension: Part I: Blood pressure measurement, diagnosis and assessment of risk. Can J Cardiol 2004;20(1):31-40.

Khan NA, McAlister FA, Campbell NRC, Feldman RD, Rabkin S, Mahon J, Lewanczuk R, Zarnke KB, Hemmelgarn B, Lebel M, Levine M, Herbert C, for the Canadian Hypertension Education Program. The 2004 Canadian recommendations for the management of hypertension: Part II: Therapy. Can J Cardiol 2004;20(1):41-54.

Touyz R, Campbell N, Logan A, Gledhill N, Petrella R, Padwal R. for the Canadian Hypertension Education Program. The 2004 Canadian Recommendations for the management of hypertension. Part III- Lifestyle modifications to prevent and control hypertension Therapy. Can J Cardiol 2004;20(1):55-60.

Drouin D pour le Groupe de travail sur les recommendations fondees sur des donnees probantes du Programme educatif canadien sur l'hypertension. Les recommendations du Programme educatif canadien sur l'hypertension 2004. Quels sont les nouveaux qui importants? Le Clinicien 2004;1-9.

Canadian Hypertension Education Program. What's new, what's old but still important in 2004? The General Internist. 2004;Spring:16-20.

Canadian Hypertension Education Program. What's old but important and what's new. Canadian Nurse. 2004;100:26-27.

Ho C. Therapeutic Options. Focus on Hypertension. Therapeutic Options. 2004;3:23-27

Canadian Hypertension Education Program. 2004 recommendations 2004 Can J Hosp Pharm 2004;57:173-5

2003

Feldman R. on behalf of the Canadian Hypertension Education Program. What's New in the 2003 Hypertension Guidelines? The Canadian Journal of Diagnosis 2003;(20):81-84.

Feldman R. on behalf of the Canadian Hypertension Education Program. What's New in the 2003 Hypertension Guidelines? Perspectives in Cardiology 2003;(19):44-51.

Feldman R. on behalf of the Canadian Hypertension Education Program. What's New in the 2003 Hypertension Guidelines? Hypertension Canada 2003;(75):1,2,4-6

Feldman R. Statement from the CHEP 2002 Recommendations Committee. Hypertension Canada 2003;(74):8

Canadian Hypertension Recommendations Working Group. The 2003 Canadian Hypertension Recommendations. What' new and what's old but still important Les Actualités du Coeur S1-S8 Spring 2003

Evidence-based recommendations Task Force. CHEP. Hypertension Guidelines: what's new, what's old….but still important in 2003. Canadian Pharmaceutical Journal 136:39-44.

Canadian Hypertension Education Program. The Canadian recommendations for the management of hypertension. Canadian Pharmaceutical Journal 2003 136:45-52.

Campbell NRC, McAlister F, Brant R, Levine M, Drouin D, Feldman R, Herman R, Zarnke K for the Canadian Hypertension Education Process and Evaluation Committee. Temporal trends in antihypertensive drug prescriptions in Canada before and after introduction of the Canadian Hypertension Education Program. J Hypertens. 2003;21(8):1591-1597

Campbell NRC. Hypertension. in Therapeutic Choices (4th edition). Editor Gray J. Canadian Pharmacy Association Ottawa 2003 pg216-38.

Campbell NRC, Feldman RD, Drouin D. Hypertension guidelines. Criteria that might make them more clinically useful. Am J Hypertens. [letter] 2003;16:698-9.

Campbell NRC for the Canadian Hypertension recommendations working group. Hypertension prevention and control. Compendium of Pharmaceuticals and Specialities 2003:L52-53

Pour le PECH: Drouin, D. et al.: Mise à jour du Programme Éducatif Canadien de 2003 sur l'Hypertension. Fondation des Maladies du Coeur. Les actualités du Coeur,

- Le Bulletin de l'Alliance québécoise pour la Santé du Coeur. Vol 8, No 1. Hiver 2003. Livret 8p.
- Résumé des recommandations. Encart spécial. Vol 8, No 1. Hiver 2003. 2p.
Disponible à:
http://www.santeducoeur.org/lesactualitesducoeur.php

2002

Canadian Hypertension Recommendations Working Group. 2001 Canadian hypertension recommendations. What has changed? Can Fam Physician 2002 Oct;48:1662-5

Canadian Hypertension Recommendations Working Group. The 2001 Canadian Hypertension Recommendations: A

summary. Perspectives in Cardiology 2002 Feb;38-46.

McKay DW, Parsons E. Improving home BP measurement. Perspectives in Cardiology. 2002; 18(4): 21 - 24 .

Canadian Hypertension Working Group. The 2001 Canadian Hypertension Recommendations: What's new and what's old but still important. Hypertension Canada 2002;71:1,2,6,7,8

Zarnke KB, McAlister FA, Campbell NR, Levine M, Schiffrin EL, Grover S, McKay DW, Myers MG, Wilson TW, Rabkin SW, Feldman RD, Burgess E, Bolli P, Honos G, Lebel M, Mann K, Abbott C, Tobe S, Petrella R, Touyz RM. The 2001 Canadian recommendations for the management of hypertension: Part one--Assessment for diagnosis, cardiovascular risk, causes and lifestyle modification. Can J Cardiol. 2002 Jun;18(6):604-24.

McAlister FA, Zarnke KB, Campbell NR, Feldman RD, Levine M, Mahon J, Grover SA, Lewanczuk R, Leenen F, Tobe S, Lebel M, Stone J, Schiffrin EL, Rabkin SW, Ogilvie RI, Larochelle P, Jones C, Honos G, Fodor G, Burgess E, Hamet P, Herman R, Irvine J, Culleton B, Wright JM. The 2001 Canadian recommendations for the management of hypertension: Part two--Therapy. Can J Cardiol. 2002 Jun;18(6):625-41.

Campbell NR. The 2001 Canadian Hypertension Recommendations--What is new and what is old but still important. Can J Cardiol. 2002 Jun;18(6):591-603.

Campbell NR, Drouin D, and Feldman RD. The 2001 Canadian hypertension recommendations: take-home messages CMAJ 2002 167: 661-668.

Par le groupe de travail sur les recommendations canadiennes sur l'hypertension. Presente par Denis Drouin MD et Alain Milot MD MSc. Les recommendations canadiennes de 2001 sur l'hypertension. Le Clinicien 2002 April ; Vol 17 No 4:125-134.

Campbell NRC, Update on Hypertension Recommendations and Trials. The General Internist. Fall, 2002

Canadian Hypertension Recommendations Working Group Cardiac Care. 2001 Canadian hypertension recommendations. Can Nurse 2002 Jun;98(6):17-21

Canadian Hypertension Recommendations Working Group. The 2001 Canadian hypertension recommendations: What's new and what's old but still important. Canadian Journal of Cardiovascular Nursing 2002;12:4-9.

Canadian Hypertension Recommendations Working Group. The 2001 Canadian hypertension recommendations: What's new and what's old but still important. Can J Hosp Pharm 2002;55:46-51.

Canadian Hypertension Recommendations Working Group. The 2001 Canadian hypertension recommendations: What's new and what's old but still important. Canadian Pharmaceutical Journal 2002. March 135:26-32.

Hypertension Arterielle 2002 (Hypertension Therapeutic Guide 2002). Eds Drouin D, Milot A. Imprimerie Canada-Commercial., Quebec City 2002.

Campbell NRC. Risk management in systolic hypertension. Drouin D, Liu P eds. Excerpta Medica Canada 2002

Campbell NRC for the Canadian Hypertension recommendations working group. Hypertension prevention and control. Compendium of Pharmaceuticals and Specialities 2002:L44-45.

On behalf of CHEP: Drouin, D. et al.: 2001-2002 Update of the Canadian Hypertension Education Program. Heart & Stroke Foundation.

- The Newsletter of l'Alliance québécoise pour la Santé du Coeur. Vol 7, No 1, Winter 2002. Booklet 8p.
- Summary of the recommendations, Vol 11, No 1, Winter 2002. Special Insert 2p.
Pour le PECH: Drouin, D. et al.: Mise à jour du Programme Éducatif Canadien de 2001-2002 sur l'Hypertension. Fondation des Maladies du Coeur. Les actualités du Coeur,

- Le Bulletin de l'Alliance québécoise pour la Santé du Coeur. Vol 7, No 1. Hiver 2002. Livret 8p.
- Résumé des recommandations. Encart spécial. Vol 7, No 1. Hiver 2002. 2p.
Disponible à:
http://www.santeducoeur.org/lesactualitesducoeur.php

2001

2000 Canadian hypertension recommendations. Summary of recommendations affecting family physicians. Can Fam Physician. 2001 Apr;47:793-4, (French 802-4).

Canadian Hypertension Recommendations Working Group. The 2000 Canadian Hypertension Recommendations: A summary. Perspectives in Cardiology 2001 Feb;17-25.

Chockalingam A, Repchinsky C, Feldman RD, Irvine J. Adherence to Management of High Blood Pressure. Perspectives in Cardiology 2001 Jan; 17(1):14-20.

Khan N, Campbell NRC. Lifestyle modification for prevention and treatment of hypertension. Canadian Recommendations. Perspectives in Cardiology 2001;17(4):21-27

McKay D.W. and Petrella R.J. Modern methods for BP measurement and screening. Perspectives in Cardiology, 2001; 17: 30-34

Campbell NR. The 2000 Canadian Hypertension Recommendations: A summary. Hypertension Canada 2001;(67):4,7.

Schabas W. 2001 BP recommendations. Risk assessment, diabetes and endocrine forms of hypertension are added to a "Work in Progress". Hypertension Canada 2001:70:1,2,6.

Campbell NR, Nagpal S, Drouin D. Implementing hypertension recommendations. Can J Cardiol. 2001 Aug;17(8):851-6. Review.

The 2000 Canadian Hypertension Recommendations: a summary. Can J Cardiol. 2001 May;17(5):535-38. (French 539-42)

Campbell NR. An ongoing systematic update of hypertension recommendations. Can J Cardiol. 2001 May;17(5):521-2.

McAlister FA, Campbell NR, Zarnke K, Levine M, Graham I. The management of hypertension in Canada: a review of current guidelines, their shortcomings and implications for the future. CMAJ 2001; Feb164(4):517-522.

Canadian Hypertension Recommendations Working Group. Summary of the 2000 Canadian Hypertension Recommendations. L'Omnipraticien special edition on CVD Feb 22, 2001.

Canadian Hypertension Recommendations Working Group. Summary of the 2000 Canadian Hypertension Recommendations. Actualite Medical May 9, May 23, June 6, July 25, 2001.

Canadian Recommendations Working Group. The 2000 Canadian Hypertension Recommendations. A summary. Actualities du Coeur Spring 2001; 11-13.

Campbell NRC, Fodor JG, Chockalingam A for the Canadian Hypertension Recommendations Group. Hypertension recommendations. Are they relevant to public health? Can J Public Health. 2001;92:245-6 (French 246-7).

The 2000 Canadian hypertension recommendations: A summary: Canadian Journal of Cardiovascular Nursing 2001;Vol 11 No 4:4-6.

Campbell NRC. Nonpharmacological therapy of hypertension. Compendium of Pharmaceuticals and Specialties. 2001:L34-35.

McAlister FA, Levine M, Zarnke KB, Campbell N, Lewanczuk R, Leenen F, Rabkin S, Wright JM, Stone J, Feldman RD, Lebel M, Honos G, Fodor G, Burgess E, Tobe S, Hamet P, Herman R, Irvine J, Culleton B, Petrella R, Touyz R. The 2000 Canadian recommendations for the management of hypertension: Part one--therapy. Can J Cardiol. 2001 May;17(5):543-59.

Zarnke KB, Levine M, McAlister FA, Campbell NR, Myers MG, McKay DW, Bolli P, Honos G, Lebel M, Mann K, Wilson TW, Abbott C, Tobe S, Burgess E, Rabkin S. The 2000 Canadian recommendations for the management of hypertension: part two--diagnosis and assessment of people with high blood pressure. Can J Cardiol. 2001 Dec;17(12):1249-63.

Canadian Hypertension Recommendations Working Group. Summary of the 2000 Canadian Hypertension Recommendations. Canadian Pharmaceutical Journal. March 2001. 134:30-3.

2000

Campbell NR. New Canadian hypertension recommendations. So what? Can Fam Physician. 2000 Jul;46:1413-6, 1418-21.

Petrella RJ. Diagnosis and treatment of high blood pressure. New directions and new approaches: 1999 Canadian recommendations for management of hypertension. Can Fam Physician. 2000 Jul;46:1479-84.

Campbell NRC, Khan N. Hypertension in the elderly: Challenges and treatment recommendations. Perspectives in Cardiol. 2000;16: (supl) 1-10

Khan N, Campbell NRC. Alcohol and Blood Pressure. Perspectives in Cardiol. 2000;16:15-18.

Khan N, Campbell NRC. Diagnosing Hypertension. Perspectives in Cardiology. 2000;16:15-17.

Zarnke, K.B. and McKay D.W. Self-measurement of blood pressure: Practical suggestions for use. Perspectives in Cardiology 2000; 16: 15-19.

Zarnke KB, Campbell NR, McAlister FA, Levine M. A novel process for updating recommendations for managing hypertension: rationale and methods. Can J Cardiol. 2000 Sep;16(9):1094-102.

Chockalingam A, Campbell NRC, Ruddy T, Taylor G, Stewart P. National High Blood Pressure Prevention and Control Strategy. Can J Cardiol. 2000:16:1087-1093.

Myers MG. Haynes RB. Rabkin SW. Canadian hypertension society guidelines for ambulatory blood pressure monitoring.[erratum appears in Am J Hypertens 2000 Feb;13(2):219].

Campbell NRC . Nonpharmacological therapy of hypertension. Compendium

of Pharmaceuticals and Specialties. 2000

Chockalingam A, Campbell NRC, Ruddy T, Taylor G, Stewart P. National High Blood Pressure Prevention and Control Strategy. Can J Cardiol. 2000:16:1087-1093.

1999

Petrella RJ. Lifestyle approaches to managing high blood pressure. New Canadian guidelines. Canadian Family Physician. 1999;45:1750-5.

Campbell NRC. Will lifestyle modification reduce blood pressure? Canadian Family Physician. 1999;45:1640-2.

Feldman R. 1999 Canadian recommendations for management of hypertension. Hypertension Canada 1999;63:1,4,7

Feldman RD. The 1999 Canadian recommendations for the management of hypertension. On behalf of the Task Force for the Development of the1999 Canadian Recommendations for the Management of Hypertension. Can J Cardiol.1999 Dec;15Suppl G:57G-64G (review)

Ross D. Feldman, Norman Campbell, Pierre Larochelle, Peter Bolli, Ellen D. Burgess, S. George Carruthers, John S. Floras, R. Brian Haynes, George Honos, Frans H.H. Leenen, Larry A. Leiter, Alexander G. Logan, Martin G. Myers, J. David Spence, and Kelly B. Zarnke 1999 Canadian recommendations for the management of hypertension CMAJ 1999 161: 1S-17S.

Ross D. Feldman, Norman R.C. Campbell, and Pierre Larochelle Clinical problem solving based on the 1999 Canadian recommendations for the management of hypertension CMAJ 1999 161: 18S-22S

Campbell NRC, Ashley MJ, Carruthers SG, Lacourciere Y, McKay DW. Lifestyle intervention to prevent and control hypertension. Recommendations on alcohol consumption. CMAJ 1999;160(suppl 9):13-20.

Leiter LA, Abbott D, Campbell NRC, Mendelson R, Ogilvie RI, Chockalingam A. Lifestyle Modification to Prevent and Control Hypertension: 2. Recommendations on obesity and weight loss. CMAJ. 1999;160(suppl 9):7-12.

Campbell NRC, Burgess E, Choi BCK, Taylor G, Wilson E, Cleroux J, Fodor JG, Leiter L, Spence D, Lifestyle intervention to prevent and control hypertension. Methods and an overview of Canadian Recommendations. CMAJ. 1999;160(suppl 9):1-6.

Campbell NRC, Burgess E, Taylor G, Wilson E, Cleroux J, Fodor JG, Leiter L, Spence D, Lifestyle changes to prevent and control hypertension. CMAJ 1999;160:1341-43

Cleroux J, Feldman R, Petrella R. Lifestyle intervention to prevent and control hypertension. Recommendations on physical exercise training. CMAJ 1999;160(suppl 9):21-28.

Fodor JG, Whitemore B, Leenan F, Larochelle P. Lifestyle intervention to prevent and control hypertension. Recommendations on dietary salt. CMAJ 1999;160(suppl 9):29-34.

Burgess E, Lewanczuk R, Bolli P, Chockalingam A, Cutler H, Taylor G, Hamet P. Lifestyle intervention to prevent and control hypertension. Recommendations on potassium, magnesium and calcium. CMAJ 1999;160(suppl 9):35-45.

Spence JD, Barnett PA, Linden W, Ramsden V, Taenzer P. Lifestyle intervention to

prevent and control hypertension. Recommendations on stress management. CMAJ 1999;160(suppl 9):46-50.

References

1 Zarnke KB, Campbell NRC, McAlister FA, Levine M. A novel process for updating recommendations for managing hypertension: Rationale and methods. Can J Cardiol. 2000;16:1094-102.

2 Tobe SW, Touyz RM, Campbell NRC. The Canadian Hypertension Education Program - a unique Canadian knowledge translation program. Can J Cardiol. 2007;23:551-55.

3 Feldman RD, Campbell NR, Wyard K. Canadian Hypertension Education Program: the evolution of hypertension management guidelines in Canada. Can J Cardiol. 2008;24:477-81.

4 Campbell NR, Sheldon T. The Canadian effort to prevent and control hypertension: can other countries adopt Canadian strategies? Curr Opin Cardiol. 2010;25:366-72.

5 Campbell N.R.C. Hypertension prevention and control in Canada. J Am Soc Hypertens. 2008;2:97-105.

6 McAlister FA, Padwal R. Implementation of Guidelines for Diagnosing and Treating Hypertension. Dis Manage Health Outcomes. 2001;9:361-69.

7 McAlister F. The Canadian Hypertension Education Program - A unique Canadian initiative. Can J Cardiol. 2006;22:559-64.

8 Campbell NRC, Nagpal S, Drouin D. Implementing hypertension recommendations. Can J Cardiol. 2001;17:851-56.

8 Campbell NRC, Nagpal S, Drouin D. Implementing hypertension recommendations. Can J Cardiol. 2001;17:851-56.

9 Drouin D, Campbell NR, Kaczorowski J. Implementation of recommendations on hypertension: The Canadian Hypertension Education Program. Can J Cardiol. 2006;22:595-98.

10 Wyard K, Feldman R. The Impact of the Canadian Hypertension Education Program on Hypertension and Related Diseases in Canada. PHAC 2008 CHEP Impact Report.

11 McAlister FA, Feldman RD, Wyard K, Brant R, Campbell NR. The impact of the CHEP in its first decade. Eur Heart J. 2009;30:1434-39.

12 Campbell NR, Onysko J. The Outcomes Research Task Force and the Canadian Hypertension Education Program. Can J Cardiol. 2006;22:556-58.

13 Campbell NRC. Canada Chair in hypertension prevention and control: A pilot project. Can J Cardiol. 2007;23:557-60.

14 Allu SO, Bellerive J, Walker RL, Campbell NR. Hypertension: are you and your patients up to date? Can J Cardiol. 2010;26:261-64.

15 Campbell NR, Petrella R, Kaczorowski J. Public education on hypertension: A new initiative to improve the prevention, treatment and control of hypertension in Canada. Can J Cardiol. 2006;22:599-603.

16 Canadian Hypertension Education Program Report 2010.

17 Canadian Hypertension Recommendations Working Group. 2001 Canadian hypertension recommendations. What has changed? Can Fam Physician. 2002;48:1662-64.

18 Joffres MR, Hamet P, Rabkin SW, Gelskey D, Hogan K, Fodor G. Prevalence, control and awareness of high blood pressure among Canadian adults. CMAJ. 1992;146:1997-2005.

19 Campbell NRC. An ongoing systematic update of hypertension recommendations. Can J Cardiol. 2001;17:521-22.

20 Wolf HK, Andreou P, Bata IR, Comeau DG, Gregor RD, Kephart G et al. Trends in the prevalence and treatment of hypertension in Halifax County from 1985 to 1995. CMAJ. 1999;161:699-704.

21 Khan NA, Wardman D, Campbell NRC. Differences in need for antihypertensive drugs among those aware and unaware of their hypertensive status: a cross sectional survey. BMC Cardiovascular Disorders. 2005;5:4-6.

22 Khan N, Chockalingam A, Campbell NRC. Lack of control of high blood pressure and treatment recommendations in Canada. Can J Cardiol. 2002;18:657-61.

23 Touyz RM, Campbell N, Logan A, Gledhill N, Petrella R, Padwal R et al. The 2004 Canadian recommendations for the management of hypertension: Part III - Lifestyle modifications to prevent and control hypertension. Can J Cardiol. 2004;20:55-59.

24 Campbell NRC. The Canadian Hypertension Education Program Recommendations: What's new, what's old but still important in 2004. The General Internist. 2004;16-20.

25 Feldman R. 2005 Canadian Hypertension Education Program Recommendations. What are the new messages? Perspectives in Cardiology. 2005;6-7:32-36.

26 Bolli P, Myers M, McKay D. Applying the 2005 Canadian Hypertension Education Program recommendations: 1. Diagnosis of Hypertension. CMAJ. 2005;173:480-483.

27 Touyz RM. Highlights and summary of the 2006 Canadian Hypertension Education Program recommendations. Can J Cardiol. 2006;22:565-71.

28 Neutel CI, Campbell NRC. Antihypertensive medication use by recently diagnosed hypertensive Canadians. Can J Cardiol. 2007;23:561-65.

29 Tu K, Campbell NRC, Durong-Hua M, McAlister FA. Hypertension Management in the Elderly Has Improved: Ontario Prescribing Trends, 1994 to 2002. Hypertension. 2005;45:1113-18.

30 Friedman O, McAlister F, Yun L, Campbell N, Tu K, Canadian Hypertension Education Program Outcomes Research Taskforce. Antihypertensive drug persistence and compliance among newly treated elderly hypertensives in ontario. Am J Med. 2010;123:173-82.

31 Garriguet D. Sodium consumption at all ages. Health Reports. 2007;18:47-52. http://www.statcan.gc.ca/pub/82-003-x/2006004/article/sodium/9608-eng.pdf

32 Canadian Hypertension Education Program (CHEP). 2007 CHEP Recommendations. Perspectives in Cardiology. 2007;23:31-40.

33 Campbell N. 2008 CHEP Recommendations: An Annual Update. Perspectives in Cardiology. 2008;24:20-28.

34 McInnis NH, Fodor G, Lum-Kwong MM, Leenen FH. Antihypertensive medication use and blood pressure control: a community-based cross-sectional survey (ON-BP). Am J Hypertens. 2008;21:1210-1215.

35 Campbell NR, Khan NA, Hill MD, Tremblay G, Lebel M, Kaczorowski J et al. 2009 Canadian Hypertension Education Program recommendations: the scientific summary--an annual update. Can J Cardiol. 2009;25:271-77.

36 Campbell NR, Kaczorowski J, Lewanczuk RZ, Feldman R, Poirier L, Kwong MM et al. 2010 Canadian Hypertension Education Program (CHEP) recommendations: the scientific summary - an update of the 2010 theme and the science behind new CHEP recommendations. Can J Cardiol. 2010;26:236-40.

37 2011 Canadian Hypertension Education Program Recommendations: The Short Clinical Summary - An Annual Update.