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EDITORIAL

A strategy to improve hypertension control: The Canadian experience

The extent of control of hypertension, one of the leading risk factor for cardiovascular disease across the world, varies widely between countries and regions [1,2]. Control of hypertension ranged from 1% to 38% in different countries in a review of studies published between 1980 and 2003 [1]. Subsequent publications continue to show regional disparities in hypertension control along with evidence of improvements in some countries (Table 1). Control of hypertension in Canada has improved dramatically from 13% in 1992 [3] to 66% recently [4,5]. Improved hypertension control from survey data is supported by and consistent with the data of declining Canadian standardized yearly mortality and hospitalization rates for the complications of hypertension – stroke, heart failure, and acute myocardial infarction [6]. The objective of this paper is to examine the strategies that were developed in Canada to improve hypertension control as they may be helpful to others focused on improving hypertension control.

Approaches used to improve hypertension prevention and management in Canada have been multifaceted and have spanned across individual, system and organizational levels. Each component of the system has played an important role in improving hypertension control. Each component integrated various stakeholders – individuals or organizations interested in the field of hypertension.

Guidelines for hypertension diagnosis and management – translating scientific evidence into clinical practice guidelines

In Canada, a national healthcare professional education program led by healthcare professional and scientific organizations and run by volunteers has been operating since the 1970s [7]. The traditional guideline process in Canada was based on a rigorous literature review by experts from academic institutions across the country leading to recommendations for practicing physicians. In order to improve hypertension awareness and management, the periodic updating process was changed to an annual one and incorpo-

rated within the new framework of the Canadian Hypertension Education Program (CHEP) which included structures to implement recommendations and to evaluate their public health impact. The vigorous annual systematic review was enhanced to ensure minimization of bias and an algorithm for assessing the literature and grading of review was established. Evidence-based medicine experts without any commercial conflict of interest were selected to oversee the translation of initial recommendations from subcommittees (consisting of content experts) to final recommendations. These initiatives ensured further scientific credibility of the recommendations. Each subcommittee performed an annual systematic review relying on their knowledge of the literature and importantly aided by a Cochrane-trained medical librarian's annual systematic literature review. Pharmacological recommendations had to be based on data from randomized control trials. After subcommittee debate, recommendations were forwarded to the central review committee for discussion, revision and subsequent presentation at a national consensus meeting. After presenting the recommendations at an open national cardiovascular meeting each year, the recommendations were finalized with the agreement of all members present plus other committed organizations. Recommendations were subject to a final closed vote.

The engagement of key national experts from multiple groups ensured that they provided their expertise into the process and had 'ownership' of the final recommendations. The presence of multiple stakeholders ensured a 'buy in' from different interest groups. Scientific manuscripts are published every year, co-authored by all participants, to form the scientific foundation of that year's annual recommendation process.

Implementation of guidelines to clinical practice

Guidelines alone, no matter how valid, do not necessarily translate into changes in practice behavior or patient

Table 1 Awareness, treatment and control (<140/90 mmHg) of hypertension in several different countries.

Country	Year	Prevalence (%)	Lack of awareness (%)	Treatment (%)	Control (%)	Reference
Canada	2009	20	17	80	66	[5]
China – Shandong Province	2007		26.2	22.2	3.9	[20]
Finland	2007		68	52	37	[21]
US	2007–2008		29		50.1	[22]
UK	2008		66	54	28	[23]

outcomes [8–10] Simple diffusion of research evidence or practice guidelines may have little impact on clinical behavior. Consequently, a formal Implementation Task Force (ITF) was formed to accelerate and enhance dissemination and implementation of hypertension recommendations [11]. The Implementation Task Force was drawn from different disciplines and interest groups encouraging their 'buy in' to the process. The group represents relevant specialties and primary care disciplines to facilitate development of implementation tools to be relevant to their disciplines as well as to undergraduate and postgraduate students and practicing professionals through national, provincial and regional organizations.

The ITF was assigned the task of accurately ensuring that the scientifically based guidelines were accurately translated into practice. Combination strategies were developed, based on the principle that many single-strategy interventions have modest or negligible practical effects when used alone, but that when multiple strategies are combined, the effects on changing health care professional behavior and improving health outcomes are significant [12].

The major goal of the implementation effort was to facilitate the delivery of consistent hypertension-related educational messages to health care providers. This goal was based on the appreciation that dissemination of conflicting recommendations by various expert interest groups undermines healthcare providers' confidence when instituting a treatment regime for their patients and increases the risk of therapeutic inertia [11]. Before the establishment of CHEP, there were many divergent messages on how to best manage hypertension with national opinion leaders and several organizations providing divergent opinions on the management of hypertension in educational sessions and publications. The use of scientifically rigorous rules of evidence and a process that encompassed many different individuals and organizations reduced arguments based on personal opinions with potential conflicts of interest, and provided opportunities to resolve differing opinions [11]. Consistent, coherent evidence-based educational messages from a large group of experts in the field were crucial means by which to convince clinicians to implement CHEP recommended approaches to improve the management of hypertension [11].

Five to eight key evidence-based recommendations are selected each year by the CHEP executive for special attention to sustain interest in the recommendations and draw attention to issues that are changing and those that are constant. The executive develops short summaries of the recommendations, a booklet for experts that concisely

outlines each recommendation with a scientific summary of the changes that have occurred, and a pocket booklet for primary care professionals that summarizes how to manage hypertension. In addition, a slide set on hypertension and the updated management recommendations are made available annually. The summaries are published annually in multidisciplinary journals and pocket booklets have been distributed annually over several years. Members of the Canadian Hypertension Society, Canadian Society of Nephrology, Canadian Cardiovascular Society, and Canadian Council of Cardiovascular Nurses have been notified over many years by their respective societies when the slide set and recommendations are posted on the Canadian Hypertension Education Programs website [11].

Traditionally, hypertension recommendation processes have largely been run by hypertension specialty organizations, involved largely hypertension specialists, published in specialty journals and disseminated to specialists. The initial CHEP program focused on physicians and included oversight by the national Family Medicine organization (College of Family Physicians of Canada) with engagement of family physicians in the process, creation of specific resources for family doctors and active dissemination to family doctors using a multitude of mechanisms (publications, slide sets, presentations, workshops, etc.). As CHEP evolved, nurses, dietitians and pharmacists were integrated into the initiative and interdisciplinary care and cooperation was increasingly advocated. More recent initiatives have trained community based experts in the CHEP recommendations and its process so they can train other health care professionals in their communities. To increase the dissemination of the recommendations a website has been developed to automatically notify health care professionals of new resources for them or their patients (www.htnupdate.ca) and a separate website (www.myBPsite.ca) has been developed to automatically notify people with hypertension of any new resources to help them control their hypertension.

The program to improve the self-efficacy of Canadians with hypertension was largely based on the CHEP recommendations and operated in conjunction with Blood Pressure Canada [13,14]. The health care professional recommendations were translated into several general educational resources (written, PowerPoint, website and video) at a public level by a Public Education Task Force of over 25 volunteer members. Specific resources were developed to help people measure their own blood pressure and for blood pressure management in people with diabetes. An educational slide set was developed for health care professionals to educate people. A national network of community

based programs to aid detection and control of hypertension was developed and a website was established that can automatically update people with hypertension when new resources become available. Training sessions are being held to train health care professionals in educating people with hypertension. The program has been broadly supported by widespread publication of the resources in both lay and professional journals. A hypertension patient association is under development.

Engagement of most national hypertension opinion leaders and the involvement of regional opinion leaders in the development or dissemination of CHEP recommendations led to a broad-based support amongst most Canadian experts in hypertension. This process was enhanced by support from national academic, government and non-governmental organizations. An extensive implementation and dissemination program coupled with the rigorous, evidence-based medical process for the development and implementation of hypertension recommendations supported key opinion leaders in promoting CHEP based optimum hypertension management guidelines. Taken together, the continuous updating process (ensuring up to date guidelines), a variety of dissemination tools suiting differing individual practitioner needs, widespread dissemination, adoption of the recommendations by key local, regional and national opinion leaders, adoption and support by multiple professional and commercial organizations, repetition of the same messages and endorsement by allied organizations and key opinion leaders, have been the major reasons for the success of improved hypertension control in Canada.

Interaction with the pharmaceutical industry

Early in the CHEP program the pharmaceutical industry was encouraged to use the recommendations and educational resources developed by CHEP and several partnerships were developed to create and disseminate new specific educational resources with different companies. Recognizing that industry has a profit motivation for its products, it also has a motivation to draw attention to the target disease for its products. While dissemination of the CHEP resources by the pharmaceutical industry was important in the early years of CHEP, the industry became less important with increasing government support.

The concern in regards to industry interactions primarily relates to concerns about the risk of conflicts of interest impacting adversely on guideline decision-making. A series of steps was developed to reduce the influence of financial conflicts of interest. Other initiatives ensured that all resources endorsed by CHEP minimized conflict of interest and were completely consistent with the CHEP scientific recommendations. Interestingly many clinicians across Canada refused to partake in industry-based education programs if they did not adhere to the CHEP recommendations and this resulted in revisions to several programs that had not been endorsed by CHEP to be more consistent with CHEP recommendations.

Governmental and public health support for improving blood pressure control in Canada

Initial federal government engagement in the area of hypertension began in a small way with the establishment of the Canadian Coalition for High Blood Pressure Prevention and Control in 1984. Health Canada and the Coalition developed a national strategy for high blood pressure prevention and control in the late 1990s. Government departments participated in the creation of the National Canadian Hypertension Education Program in 1999, whose goal was to improve the hypertension treatment and control rates reported in the National Population Health Survey, 1994–96. Since its inception, CHEP has been a vehicle to engage a variety of stakeholders in reaching set goals in a coordinated and focused manner.

Until 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. Through PHAC, the federal government has provided significant support to CHEP and community-based projects for hypertension screening and prevention, since hypertension is a key risk factor for cardiovascular diseases.

While leadership and advocacy were functions primarily undertaken by non-governmental organizations, the federal government's involvement was important in strengthening partnerships and coordinating the activities of different federal departments and provincial/territorial governments. Partnerships through CHEP encouraged the federal government to become more involved in disease detection and management as well as to take an active part in the development and dissemination of evidence-based clinical practice guidelines. Participation in the program also provided an opportunity to contribute to the development of self-management and self-assessment tools for Canadians.

In achieving the set goals, Canada took a system-wide approach that included changes in delivery practices as well as implementation of population-wide policies aimed at reducing the main cardiovascular risk factors. Besides supporting non-governmental programs such as CHEP, the federal government also initiated a number of health promotion and disease prevention initiatives such as the Heart Health Strategy and Action Plan and the Healthy Living Strategy that focuses on preventing smoking, improving nutritional practices, reducing excessive alcohol intake, and increasing physical activity. These initiatives also provided opportunities to establish more linkages with existing national and provincial/territorial healthy living and disease strategies and allow greater collaboration with provincial/territorial governments and relevant stakeholders in preventing and managing hypertension. The collaborative work 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 significant role in bringing together key stakeholders interested in hypertension to create Hypertension Canada, a new organization whose membership consists of all relevant national organizations working in the area of hypertension prevention and control.

Through partnerships with CHEP, Blood Pressure Canada, the Heart and Stroke Foundation and their stakeholders, the federal government has supported community initiatives and developed tools for the at-risk and vulnerable populations. By joining forces with the Canadian Hypertension Society and the pharmaceutical industry, the Canadian Institutes of Health Information funded the Canada Chair in Hypertension Prevention and Control, which has been instrumental in advancing the hypertension agenda and providing needed leadership and vision. As well, the Chair position has been crucial in building support for the development of a sodium reduction strategy for Canada.

The federal government has also played a key role in policy-related knowledge development through systematic literature reviews and establishing surveillance mechanisms for tracking the incidence, prevalence and treatment of hypertension. Today Canada is one of the unique countries in the world with a comprehensive surveillance system for hypertension – a system through which we can monitor hypertension and its impact on the health of Canadians using direct health measurement, self-reported surveys, and administrative data. Many components of this surveillance system were developed and/or analysed in partnership with the Outcomes Research Task Force, a monitoring arm of CHEP.

The power of partnerships

Individuals, health professionals, governments, community organizations, and non-health sectors have achieved significant success in working together to address the underlying causes of hypertension and respond to the health needs of individuals with high blood pressure. They continue to strengthen their collaborative efforts to improve hypertension prevention and control and reduce the burden of cardiovascular diseases in Canada.

Establishment of an outcome task force

The initial evaluation of the CHEP process was to determine if CHEP was sustainable. After the initial 3 years of annual reviews, the process was expanded and improved and at that time a separate Outcomes Research Task Force (ORTF) was created [15]. The ORTF was gradually expanded with experts in epidemiology, administrative database analysis, outcomes research and health policy as well as key individuals from the Public Health Agency of Canada (PHAC), Statistics Canada and provincial governments. Subgroups were formed to develop or revise surveys and develop analytic plans as well as conduct the analysis and publish and disseminate the results. The ORTF currently has over forty members in five subgroups working on specific projects that provide a comprehensive overview of blood pressure treatment and outcomes in Canada (Table 2).

The Canadian Health Measures national survey was reported in 2010. The second cycle of this survey is being conducted and currently it is planned to repeat the survey every 2 years. The initial survey found Canada had a stable prevalence

Table 2 CHEP Outcomes Research Projects.

Physical Measures (blood pressure) Survey representative of Canadians
Questionnaire surveys on diagnosis and treatment of hypertension, as well as knowledge attitudes and behaviors of hypertensive Canadians
Cardiovascular outcomes (hospitalizations and/or deaths for stroke, myocardial infarction, and heart failure) associated with hypertension
Prescriptions for antihypertensive medications
Linked provincial administrative data (diagnosis, treatment and outcomes of diagnosed hypertensive Canadians)
Physician billing claims and hospitalizations to identify incidence and prevalence of diagnosed hypertension (the Canadian Chronic Disease Surveillance System)

of hypertension over the last 20 years (21–20%), but that awareness of the diagnosis had improved (57–83%), treatment had improved (34% vs. 80%) and control rates increased markedly (13% vs. 66%) [3,5]. A joint Statistics Canada – PHAC – CHEP (ORTF) analytic team has been established and is further analysing the survey.

Collaboration between CHEP, PHAC and Statistics Canada was also established to develop a new survey to examine the knowledge, attitudes, and behaviors of hypertensive Canadians. Specific questions in the survey also examined how Canadians receive hypertension information and how they want to receive this information. The main Canadian population health questionnaires (Canadian Community Health Survey (CCHS), which unlike the Health Measures Survey does not include physical blood pressure measurements) have also been revised to obtain more information on hypertension and are also jointly analysed by collaborative teams with members from CHEP, PHAC and Statistics Canada. This latter questionnaire is also conducted every 2 years and tracks diagnosis and treatment of hypertension with a high degree of precision. Comparison of results between these self-reported surveys over time demonstrated marked increases in the rates of diagnosis of hypertension and treatment of hypertension after the CHEP program was developed. The questionnaire surveys have also been used to determine the characteristics of Canadians who are not having blood pressure measured, not being treated with medications or not following lifestyle changes. These studies have led to changes in educational resources for health care professionals and people with hypertension.

One of the ORTF subgroups developed methods to track national and provincial hospitalizations and deaths associated with high blood pressure. Notably they found that there has been a decline in rates of total, cardiovascular, stroke, heart failure and myocardial infarction mortality and a reduction in hospitalization for stroke and heart failure since the initiation of CHEP [6,13].

Another subcommittee developed methods for tracking commercial sales data for antihypertensive prescriptions, indications for antihypertensive drug prescriptions, and the main diagnoses for physician visits. Although details about other diagnoses for people being prescribed drugs are not available, this data source allows rapid assessment

of monthly changes in antihypertensive prescriptions rates and can be used to rapidly assess the overall impact of an educational intervention. This subgroup reported very large increases in antihypertensive prescriptions and physician visits for hypertension with the start of the CHEP program and showed a strong correlation between the large increase in prescriptions with reductions in stroke, heart failure and myocardial infarction deaths as well as reductions in hospitalization for stroke, heart failure and myocardial infarction [6,13].

The ORTF has established a sensitive and specific case definition for hypertension using administrative data [16]. The subgroup is obtaining the administrative data from nearly all regions of Canada in order to link the diagnosis of hypertension to its treatment and outcomes. This project will allow a cohort of nearly all diagnosed hypertensive Canadians to be developed. Preliminary analysis of provincial administrative data has shown large increases in the diagnosis of hypertension, its treatment and in changes in prescribing patterns with both increases for some medications and decreases for others that reflect CHEP recommendations [17–19].

The different surveillance mechanisms developed will provide close tracking of the epidemiology of hypertension in Canada and allow both the successes and failure of programs to prevent and control hypertension to be identified. The data are being used to develop and revise educational programs for health care professionals and people with hypertension where analyses indicate suboptimal management. Notably the data from the different databases indicate Canada now has the highest national rates of awareness, treatment and control of hypertension reported and that improvements in Canada have outstripped those in the United States in the same timeframe [22].

Establishment of a National Chair in Hypertension Detection and Control

Early after the formation of the national strategy to prevent and control hypertension it was recognized that there was a need for committed leadership to assist in the development and running of hypertension programs. Fundraising for the initial 5 year Chair took several years with support being obtained from the Canadian Hypertension Society, the pharmaceutical industry (Sanofi Aventis) and the Canadian Institute for Health Research. In 2006, the initial Chair was selected with a mandate to (1) lead the health sector to advocate for a national program to lower dietary sodium, (2) lead the development of programs to improve the self efficacy of Canadians to prevent and control hypertension, (3) increase and improve the interdisciplinary impact, financial viability and organizational capacity of the CHEP program and (4) lead the outcomes research effort to develop a national surveillance program for hypertension. The mandates to advocate for reduced dietary sodium and to improve public self efficacy were taken up as the major mandates of Blood Pressure Canada. The hypertension surveillance program and efforts to increase interdisciplinary health care professional education, financial viability and

organizational capacity were taken up as mandates for both Blood Pressure Canada and CHEP. The four mandates of the chair were broadly supported by all three Canadian hypertension organizations, federal and provincial government agencies, health care professional organizations and many other non-governmental organizations as well as over 150 individual volunteers.

Development of national policy for nutritional factors linked to hypertension

The nutritional strategy focused on reduction of dietary sodium and followed several tactics. In 2006 Canada's food guide was being revised and the initial versions provided little guidance to Canadians on dietary sodium. Ten major national organizations were successfully approached to advocate to Health Canada to increase the content of the food guide on dietary sodium and several meetings with Health Canada were held. The food guide was subsequently revised to feature dietary sodium at the same level as other unhealthy food additives (trans and saturated fats and simple sugars). The impact of high dietary sodium on hypertension and cardiovascular disease in Canada was estimated and published with major media releases. A committee of nine national organizations (Sodium Strategic Planning Committee) led by the Chair developed a policy statement for Blood Pressure Canada to indicate what industry, government and non government organization actions were required to reduce dietary sodium to recommended levels. There was a public media release of the policy statement (endorsed by 18 major national health organizations). A meeting of the Sodium Strategic Planning Committee with representatives of food processors was held and an agreement was obtained to seek Health Canada oversight and leadership in the development of a national program. A meeting with Health Canada officials and a representative of the major food companies (Food and Consumer Products of Canada) and the Hypertension Chair was followed shortly by the Federal Minister of Health announcing Health Canada would form a multisectoral Workgroup to oversee a process to reduce dietary sodium to recommended levels. The Inter-sector Workgroup has been meeting for over 2 years with the release of the report in July 2010. Several organizations have supported heavily the sodium reduction initiative. Statistics Canada analysed and published the results of a survey of sodium consumption in Canada as a priority. PHAC has assessed the knowledge attitudes and behaviors of Canadians to dietary sodium and conducted an environmental scan of programs to reduce dietary sodium in other countries and many Canadian companies have reduced sodium content of foods or committed to do so. Blood Pressure Canada and CHEP led by the Hypertension Chair with funding from the federal government formed a 20 member health care professional Task Force to develop standardized tools and resources for health care professionals and the public to aid awareness and reductions in dietary sodium. The Canadian Stroke Network adopted lowering dietary sodium as their focus for the prevention of stroke and the Heart and Stroke Foundation revised its nutritional labeling

program to be more rigorous regarding dietary sodium. Most of the organizations signing the Blood Pressure Canada policy statement have held symposia on dietary sodium at national and regional meetings and published material on sodium on their website or in their official journals.

Prior to 2006, CHEP largely focused on education of physicians using the administrative support of academic volunteers and funding relied heavily on donations from the pharmaceutical industry (predicted to decline with loss of drug patents). The Hypertension Chair led a process to integrate nurses, dietitians and pharmacists into the hypertension education programs. National nursing, dietitian and pharmacy organizations were recruited to join the national family medicine organization and represent primary care on the steering committees that provided oversight of the hypertension programs (Board of Blood Pressure Canada and Steering Committee of CHEP). CHEP developed discipline specific committees to ensure the educational resources were appropriate for Family Medicine, Pharmacy and Nursing and disseminated to those that needed them. Members of each primary care discipline were recruited to assist in development and revision of the content of educational resources. The role of the Chair in surveillance was to gather the different experts, organizations and resources together to advocate for, plan and develop a comprehensive hypertension surveillance system. The work done and often the leadership for specific functions within the mandate of the Hypertension Chair was by multiple individuals with the very strong support of government and non-governmental organizations as well as the Canadian pharmaceutical industry. The recent merger of the three hypertension organizations to create Hypertension Canada with a permanent office, Executive Director and support staff should further the efforts of hypertension detection and control in Canada.

In summary, a national program to detect, prevent and control hypertension in Canada has evolved over decades. It was started and sustained by a cadre of dedicated volunteers from academic institutions and has been joined by front-line primary care clinicians and allied health professionals. Recommendations for patient assessment and management were based on rigorous analysis of the most recent scientific evidence. Scientific study is indispensable for advancement. The assessment of the strength of evidence and its translation into guidelines are invaluable aids for the delivery of health care. Recognition that guidelines without implementation risk being hollow words, led to considerable attention being directed within CHEP to implementation of guideline recommendations. Enlisting the assistance and the co-operation of industry not only initially sustained the process but also minimized the potential for conflicting national messages on hypertension. Ultimately public policy through governmental agencies and the cooperation of the entire spectrum of groups interested in hypertension are necessary to effect and sustain change.

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