Brief Rapid Report

The 2017 American College of Cardiology/American Heart Association vs Hypertension Canada High Blood Pressure Guidelines and Potential Implications

Rémi Goupil, MD, MSc,[a] Maxime Lamarre-Cliche, MD, MSc,[b] and Michel Vallée, MD, PhD[c]

[a] Hôpital du Sacré-Cœur de Montréal, Montréal, Quebec, Canada

[b] Institut de recherches cliniques de Montréal, Montréal, Quebec, Canada

[c] Hôpital Maisonneuve-Rosemont, Montréal, Quebec, Canada

See editorial by Feldman, pages 543−545, and article by Leung et al., pages 670−675 of this issue.

ABSTRACT

In this report we examine the differences between the 2017 Hypertension Canada and 2017 American College of Cardiology and American Heart Association (ACC/AHA) blood pressure (BP) guidelines regarding the proportions of individuals with a diagnosis of hypertension, BP above thresholds for treatment initiation, and BP below targets using the CARTaGENE cohort. Compared with the 2017 Canadian guidelines, the 2017 ACC/AHA guidelines would result in increases of 8.7% in hypertension diagnosis and 3.4% of individuals needing treatment, with 17.2% having a different BP target. In conclusion, implementing the 2017 ACC/AHA hypertension guidelines in Canada could result in major effects for millions of Canadians.

RÉSUMÉ

Dans ce rapport, nous analysons les différences entre les lignes directrices de 2017 d'Hypertension Canada et celles de l'American College of Cardiology et de l'American Heart Association (ACC/AHA) en matière de pression artérielle (PA) pour déterminer les proportions d'individus ayant reçu un diagnostic d'hypertension et présentant une PA supérieure aux seuils d'instauration d'un traitement et une PA inférieure aux valeurs cibles dans la cohorte du projet CARTaGENE. Comparativement aux lignes directrices canadiennes de 2017, l'application des lignes directrices de l'ACC/AHA se traduirait par une augmentation de 8,7 % du nombre de diagnostics d'hypertension et de 3,4 % du nombre de personnes nécessitant un traitement, dont 17,2 % auraient une PA cible différente. En conclusion, la mise en œuvre au Canada des lignes directrices de 2017 de l'ACC/AHA sur l'hypertension pourrait avoir des répercussions majeures pour des millions de Canadiens.

The American College of Cardiology and American Heart Association (ACC/AHA) recently published a clinical practice guideline regarding the prevention, detection, evaluation, and management of high blood pressure (BP) in adults,[1] aimed at replacing the 2003 Joint National Committee guideline in the United States.[2] Importantly, the 2017 ACC/AHA guideline presents a paradigm shift in the definition of high BP, while updating treatment initiation thresholds and BP targets. These recommendations are expected to have a major effect on patient care in the United States, but also on a global international scale.[3]

Since 1999, Hypertension Canada (HC; previously Canadian Hypertension Education Program or CHEP)

provides yearly updated clinical practice guidelines to guide the diagnosis, assessment, prevention, and treatment of hypertension.[4,5] Every year, the multidisciplinary expert panel of the HC Guidelines Committee updates its recommendations after a systematic appraisal of newly available evidence regarding all aspects of hypertension.[6] Over the years, implementation of these recommendations has resulted in great improvements in the diagnosis, treatment, and control of hypertension in Canada.[7]

The aim of this study was to contrast the differences in the HC and ACC/AHA hypertension guidelines, and to evaluate the potential Canadian effects. We accomplish this through analysis of data from the CARTaGENE cohort.

Methods

Study population

CARTaGENE is a population-based cohort designed to study demographic, clinical, and genetic determinants of

Table 1. Blood pressure thresholds for diagnosis and treatment of hypertension, and blood pressure targets according to the 2009 CHEP, 2017 HC, and 2017 ACC/AHA guidelines

	2009 CHEP	2017 HC	2017 ACC/AHA
Diagnosis of hypertension	1. ≥ 180/110	1. ≥ 180/110	1. ≥ 130/80[‡]
	2. ≥ 140/90 if TOD or DM or CKD	2. ≥ 130/80 if DM[†]	
	3. ≥ 160/100 at visit 3*	3. ≥ 135/85[†]	
	4. ≥ 140/90 at visits 4 or later		
Threshold for antihypertensive treatment	1. ≥ 160/100	1. ≥ 160/100	1. ≥ 130/80 if CVD or 10-year CVD risk ≥ 10% or DM or CKD
	2. Diastolic BP ≥ 90 if TOD or other independent CVD risk factors	2. ≥ 140/90 if TOD or other independent CVD risk factors	2. ≥ 140/90 if no CVD and 10-year CVD < 10% or secondary stroke prevention[§]
	3. Systolic BP ≥ 140 if TOD		
Treatment goals	1. < 130/80 if DM or CKD	1. < 130/80 if DM	1. < 130/80 for all
	2. < 140/90 all others	2. Systolic BP < 120 if high CVD risk[‖]	
		3. < 140/90 all others	

For diagnosis of hypertension, either systolic or diastolic BP thresholds can be surpassed. For BP goals, systolic as well as diastolic BP goals must be met. All individuals receiving antihypertensive medication were considered to have hypertension and to meet the threshold for treatment.

ACC/AHA, American College of Cardiology/American Heart Association; BP, blood pressure; CHEP, Canadian Hypertension Education Program; CKD, chronic kidney disease; CVD, cardiovascular disease; DM, diabetes mellitus; HC, Hypertension Canada; SPRINT, Systolic Blood Pressure Intervention Trial; TOD, target organ damage.

*Or ≥ 135/85 at home, or ≥ 130/80 24-hour average ambulatory BP.

[†] Measured using automated office BP monitors. Thresholds for nonautomated office BP monitors are ≥ 130/80 if DM and ≥ 140/90 all others. Needs to be confirmed out-of-office.

[‡] Average of ≥ 2 readings on ≥ 2 occasions.

[§] If lacunar stroke, threshold is ≥ 130/80.

[‖] High risk as defined in SPRINT: clinical of subclinical CVD or CKD (estimated glomerular filtration rate 20-59 mL/min/1.73 m² with proteinuria < 1 g/d) or Framingham risk score > 15% or age ≥ 75 years (criteria not applicable to CARTaGENE). Individuals with diabetes and previous stroke, among others, were excluded from SPRINT.

chronic diseases.[8] Individuals from the province of Quebec were randomly selected on the basis of provincial health registries, to be broadly representative of the general population. In total, 20,004 individuals aged 40-69 years old were selected in 4 distinct urban areas (Greater Montreal, Quebec City, Sherbrooke, and Saguenay). As described before, all participants were enrolled between July 2009 and October 2010 and underwent thorough health, lifestyle, and nutritional questionnaires and anthropometric measurements.[9] Overall, the CARTaGENE cohort is considered highly representative of the general population of the province of Quebec, with a strong concordance of sociodemographic characteristics.[8] All participants provided written informed consent and the study adhered to the Declaration of Helsinki and was approved by appropriate ethics committees.

Measures and definitions

Data were collected during a single visit at designated sites. Brachial BP was recorded 3 times at 2-minute intervals (then averaged) after a 10-minute seated rest in an isolated room using an automated oscillometric device (Omron 907L; Omron, Lake Forest, IL) and proper cuff size. Presence of cardiovascular (CV) disease was self-reported. Presence of diabetes was defined as use of hypoglycemic agents, glycosylated hemoglobin A1c ≥ 6.5%, fasting glucose ≥ 7.0 mmol/L, or nonfasting glucose ≥ 11.1 mmol/L.[10] Chronic kidney disease was defined as an estimated glomerular filtration rate < 60 mL/min/1.73 m² using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation.[11] The 10-year predicted atherosclerotic CV disease (ASCVD) risk was calculated using the pooled cohort risk equation as used in the 2017 ACC/AHA guideline.[12] All

medications were reported by the participants and reviewed by the interviewing nurse.

Hypertension diagnostic criteria, BP treatment thresholds, and BP targets according to the 2017 HC[5] and 2017 ACC/AHA[1] guidelines are listed in Table 1. Because CARTaGENE enrollment took place in 2009-2010, definitions from the 2009 CHEP guidelines[13] are also stated for reference. For this study, CARTaGENE participants with missing elements required to calculate the 10-year ASCVD risk were excluded.

Statistical analysis

Proportions of participants were calculated for each definition of hypertension diagnosis and pharmacological therapy indication. Individuals with antihypertensive drugs were considered to have hypertension and requiring treatment. In these, the proportions of individuals for which BP target goals were attained in accordance with each guideline were also determined.

Continuous data are presented as mean ± SD and compared using Student t tests, or as median (25th and 75th percentiles) and compared using Mann-Whitney U tests as appropriate. Categorical data were compared using Pearson χ^2. P values < 0.05 were considered significant and analyses were performed with IBM SPSS Statistics software, version 25.0 (IBM Corp, Armonk, NY).

Results

Of the 20,004 CARTaGENE participants, 2519 were excluding because of missing data for determination of the 10-year ASCVD risk. Of the 17,485 participants included in this study, 48% were male, with a median age of 53.1 (47.7-60.5) years old, and mean BP of 124 ± 15 over 74 ± 10 mm Hg, with 3840 individuals receiving antihypertensive treatment. At time