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Review

A New Algorithm for the Diagnosis of Hypertension in Canada

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See editorial by Spence, pages 580-582 of this issue.

ABSTRACT

Accurate blood pressure measurement is critical to properly identify and treat individuals with hypertension. In 2005, the Canadian Hypertension Education Program produced a revised algorithm to be used for the diagnosis of hypertension. Subsequent annual reviews of the literature have identified 2 major deficiencies in the current diagnostic process. First, auscultatory measurements performed in routine clinical settings have serious accuracy limitations that have not

RÉSUMÉ

L'exactitude de la mesure de la pression artérielle est essentielle pour identifier et traiter correctement les individus atteints d'hypertension artérielle. En 2005, le Programme éducatif canadien sur l'hypertension a produit un algorithme révisé à utiliser pour le diagnostic de l'hypertension. Les révisions annuelles subséquentes de la littérature ont identifié 2 lacunes importantes dans le processus actuel de diagnostic. Premièrement, les mesures auscultatoires réalisées

Hypertension affects an estimated 7.3 million Canadians[1,2] and is the most common modifiable risk factor for death or disability in the world.[3] If not identified and treated, hypertension will invariably lead to complications affecting numerous organ systems including the brain, heart, eyes, kidneys, and the peripheral vasculature. Control of hypertension in Canada has improved markedly in the past 15 years with a 5-fold increased rate of control observed, from 13.2% in 1992 to 64.6% in 2007.[4] However, one-third of the hypertensive population remains uncontrolled and 17% remain unaware that they have hypertension.

Accurate blood pressure (BP) measurement is essential to properly identify and treat individuals with hypertension. Office BP has been traditionally measured by nurses or doctors using auscultatory methods, with 4 to 5 visits required to

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been overcome despite great efforts to educate health care professionals over several years. Thus, alternatives to auscultatory measurements should be used. Second, recent data indicate that patients with white coat hypertension must be identified earlier in the process and in a systematic manner rather than on an ad hoc or voluntary basis so they are not unnecessarily treated with antihypertensive medications. The economic and health consequences of white coat hypertension are reviewed. In this article evidence for a revised algorithm to diagnose hypertension is presented. Protocols for home blood pressure measurement and ambulatory blood pressure monitoring are reviewed. The role of automated office blood pressure measurement is updated. The revised algorithm strongly encourages the use of validated electronic digital oscillometric devices and recommends that out-of-office blood pressure measurements, ambulatory blood pressure monitoring (preferred), or home blood pressure measurement, should be performed to confirm the diagnosis of hypertension.

dans le cadre de la pratique clinique courante montrent de sérieuses limites d'exactitude qui n'ont pas été surmontées en dépit de grands efforts depuis plusieurs années pour former les professionnels de la santé. Par conséquent, les solutions de rechange aux mesures auscultatoires soit des mesures électroniques oscillométriques devraient être utilisées. Deuxièmement, de récentes données montrent que les patients souffrant d'hypertension de sarrau blanc doivent être identifiés plus tôt au cours du processus et de manière systématique plutôt que sur une base ponctuelle ou volontaire afin d'éviter qu'ils ne soient pas traités inutilement par des antihypertenseurs. Les conséquences sur le plan économique et de la santé de l'hypertension de sarrau blanc sont décrites dans le texte. Dans le présent article, nous présentons les résultats probants concernant un algorithme révisé pour diagnostiquer l'hypertension artérielle. Nous révisons les protocoles de la mesure de la pression artérielle à domicile et du monitorage ambulatoire de la pression artérielle ambulatoire de la pression artérielle. Nous traitons du rôle des mesures de la pression artérielle en clinique - oscillométriques en série. L'algorithme révisé encourage fortement l'utilisation des appareils de mesure oscillométriques validés à capteur électronique et lecture numérique, et recommande que les mesures de la pression artérielle en ambulatoire, le monitorage ambulatoire de la pression artérielle (préférée) ou la mesure de la pression artérielle à domicile à domicile soient réalisées pour confirmer le diagnostic d'hypertension.

establish the diagnosis.[5] Standardized measurement methods were proposed to clinicians in 1984 by the Canadian Hypertension Society and in 1999 by the Canadian Hypertension Education Program (CHEP) to guide the performance of these measures.[6] In 2005, out-of-office measurements using ambulatory BP measurement (ABPM) or home BP measurement (HBPM) were added to the CHEP algorithm to complement OBPM.[7,8]

A reappraisal of the CHEP recommendations to diagnose hypertensive patients is imperative because of 2 main shortfalls in the current algorithm. First, office auscultatory measurements performed in routine clinical settings have serious limitations that have not been overcome despite great efforts to educate health care professionals over several years. Second, recent data indicate that patients with white coat hypertension (WCH; ie, not truly hypertensive) should be identified earlier in the process and in a systematic manner rather than on an ad hoc or voluntary basis so they are not unnecessarily treated with antihypertensive medications.

We present evidence for the need to de-emphasize the use of routine auscultatory OBPM and encourage use of electronic digital devices, and evidence for preferentially using more accurate and reproducible out-of-office methods for earlier and systematic detection of WCH. A revised algorithm (Fig. 1) for the diagnosis of hypertension is introduced. HBPM and ABPM protocols will be reviewed, and the role of automated office BP (AOBP) updated.

New Algorithm

In our new algorithm we strongly recommend performing out-of-office measurement (ABPM or HBPM) after the first visit, specifically to identify patients with WCH early in the process. Another important addition to the algorithm concerns AOBP, which has been shown to reduce the white-coat effect, and, thus the number of patients who will require further assessment with ABPM or HBPM.[9] AOBP implies multiple oscillometric measurements taken while the patient is alone in a quiet room. The mean of these measurements is used to make clinical decisions.

In patients who do not have severely increased BP on visit 1 ($\geq$180/110 mm Hg), serial standardized OBPMs have been retained as a potential pathway to arrive at the diagnosis of hypertension. However, this method is cumbersome because it requires 4 or 5 visits over 6 months to be truly certain that the BP level is increased.[5] We emphasize that out-of-office measurement is preferred to serial standardized office measurement—the latter should be used only when the resources (human, technical, or financial) to perform out-of-office measurement are not available.

Diagnosis of Hypertension in Canada From 1999 to 2005

The approach to the diagnosis of hypertension has evolved since the Canadian recommendations for the management of hypertension first proposed a systematic approach to diagnose hypertension based on clinic BP measurement in 1999.[10] These initial recommendations indicated that patients who present with hypertensive urgency ($\geq$180/105 mm Hg) could be diagnosed at the first visit, patients with increased BP readings and target organ damage (TOD) could be diagnosed at/after the third visit, and all other patients with clinic BP between 140/90 and 180/105 mm Hg would require at least 4 further visits over the next 6 months to be diagnosed with hypertension. This recommendation was supported by studies that showed that the number of visits at which clinic BP is assessed and the duration of the observation period are important because BP tends to decrease over the course of several visits.[11-15]