To the Editor:

The Systolic Blood Pressure Intervention Trial (SPRINT) is in the process of changing our approach to diagnosing and treating hypertension.1 This study was stopped early because of a clear benefit in terms of reduced cardiovascular morbidity and mortality in high-risk, older patients randomized to a target systolic blood pressure (BP) <120 mm Hg compared with the usual target of <140 mm Hg. Although it was not clearly stated when the results of SPRINT were initially published, it is now evident that office BP readings were taken using the automated office BP (AOBP) measurement technique. This method involves using a fully automated, oscillometric sphygmomanometer to record multiple BP readings with the patient resting quietly, without health professionals or research staff being present. In a subsequent commentary on the findings in SPRINT, Cushman et al2 mentioned some aspects of the BP measurement procedures followed in the study, but they did not say that the study personnel were not present during the readings. This point has now been clarified. In SPRINT, study staff were trained to program an Omron 907XL (Omron Healthcare Inc, Lake Forest, IL) to wait 5 minutes and then record 3 readings at 1-minute intervals. After the device was activated, research staff left the examining room, with the patient then being alone during the 5 minute rest period and while the 3 readings were recorded automatically (W.C. Cushman, personal communication, 2016).

Automated Office Blood Pressure

There is general agreement that AOBP readings are preferable to conventional BP measurement in routine clinical practice because AOBP is not subject to the white coat effect, with readings having a significantly stronger relationship to awake ambulatory and home BP. The improved accuracy of AOBP and its elimination of a white coat effect in routine clinical practice record BP in the same way as it is done in research studies, on which diagnosis and treatment guidelines are based. However, the belief that research BP and routine office BP are the same is unsupported by data and is clearly untrue.

History of Electronic BP Measurement in Canada

A major issue concerning the implementation of the results of SPRINT is that AOBP is not currently being used in clinical practice in many countries, including the United States. How can a method of BP measurement be recommended if it is not yet available for patient care? The Canadian experience with the use of electronic sphygmomanometers offers a possible solution to this problem. The Canadian Hypertension Education Program (CHEP) is responsible for creating and updating clinical practice guidelines on an annual basis. In 1999, CHEP3 recommended using 24-hour ambulatory BP monitoring (ABPM) and home BP for the diagnosis of hypertension. In 2005, ABPM became the preferred method for determining an individual’s BP status. At the time, ABPM was not widely available, making the decision to recommend it for diagnosing hypertension controversial. Nonetheless, CHEP made this recommendation based on scientific evidence, which showed ABPM to be a significantly better than office BP at predicting the risk of cardiovascular morbidity and mortality.4 As a consequence of this decision, ABPM went on to become widely available in most Canadian urban centers, even though the cost of the test (~$100 Canadian dollars) was not covered by government health insurance plans.

This experience was useful when it came time to consider the possible role for AOBP in routine clinical practice. Unlike ABPM in 2005, many primary care physicians were already using AOBP in 2011 when it was first included in the CHEP guidelines.5 The recommendations for diagnosing hypertension with AOBP have progressed since then, to the point where the 2016 CHEP guidelines6 now recommend AOBP as the preferred method for recording BP in the office setting.

Canadian recommendations for the diagnosis and management of hypertension have a long history of being evidence-based, dating from 1984. By following the evidence, it has been possible to guide health practitioners in diagnosing and treating hypertension in the best way possible, a process which has likely contributed to Canada having the best hypertension treatment and control rates in the world. Even national and regional Canadian hypertension surveys have used AOBP to obtain more standardized and accurate BP readings compared with conventional manual BP.5,6

Introducing AOBP Into Primary Care Practice

Primary care in Canada and the United States probably has more similarities than differences. Multispecialty group practice is common
in both countries, making it feasible for the relatively expensive AOBP devices to be shared among several practitioners. Large American healthcare centers such as the Mayo Clinic and Cleveland Clinic have been using AOBP for years. The United Nations has now banned mercury from the work place, including doctors’ offices, so that those physicians still performing manual BP measurement with a mercury sphygmomanometer should now be changing their method for recording BP, which is timely for the introduction of AOBP. American primary care physicians are already familiar with periodic clinical practice guidelines and practice updates. Upgrading from manual office BP to AOBP has not been a major problem in Canada and should be feasible for American physicians.

Most of the research into AOBP has been conducted in Canada using the BpTRU device (BpTRU Medical Devices Inc., Coquitlam, BC, Canada), which was developed in Vancouver. Initially, it was thought that AOBP had to be performed in an examining room, which led some critics to complain that the procedure was impractical and too time consuming. However, these individuals failed to recognize that it takes the same amount of time for office staff to record a proper BP because the patient must rest quietly for 5 minutes before BP is measured in duplicate. AOBP has the advantage that the 5 minutes of rest is not needed, provided that the BP is recorded in a quiet place, including the waiting area or in a pharmacy, with the patient left undisturbed.17,18

In SPRINT, the readings were taken at 2-minute intervals after a 5-minute rest. At the time SPRINT was initiated, it was not certain if readings needed to be recorded at 1- or 2-minute intervals. When the Omron 907XL was compared with the BpTRU,19 it became evident that readings taken at 1-minute intervals without any antecedent rest using the Omron device were similar to BpTRU readings recorded at 1-minute intervals. In adapting the results of SPRINT to clinical practice, 3 readings taken at 1-minute intervals without any rest should be as accurate as readings taken with the Omron 907XL set at 2-minute intervals with 5 minutes of rest, as performed in SPRINT. Reducing the time the patient rests alone from ≈11 minutes in SPRINT to <5 minutes using the 1 minute setting also decreases the likelihood of the patient being disturbed. For all of the devices, it is important for the office staff to leave the patient alone immediately after starting the readings or after the test reading with the BpTRU.

Another consideration concerning the use of AOBP in clinical practice is the cost of AOBP devices. In addition to the BpTRU and Omron 907XL, there is another device available for recording AOBP, the Microlife WatchBP Office (Microlife AG, Widnau, Switzerland), which is similar to the PRO BP2400 in the United States and Canada (Welch-Allyn Inc, Skaneateles Fall, NY). These latter devices can record AOBP at 1-minute intervals without antecedent rest, similar to the Omron 907XL.20 The cost of the AOBP devices ranges from 400 to 700 US dollars. Most of the research has been performed with the BpTRU but it is also the most expensive AOBP recorder. These costs cannot be compared with those of the mercury sphygmomanometer, which is no longer an option, nor to electronic devices designed for home BP, which are not suitable for the use and abuse encountered in the office setting. Moreover, when patient-activated, nonautomated devices have been used instead of AOBP, readings are ≈5/5 mm Hg higher than those with AOBP.58–10 It is also possible to mount an AOBP recorder on a stand with wheels so that it can be used in multiple locations in the office without having to carry it about. It should also be noted that the more expensive AOBP devices also provide more accurate BP measurements, fewer visits to assess BP, less over-treatment of hypertension, less use of ABPM to exclude white coat effect, and so on. Although primary care in countries outside of North America may be somewhat different, the advantages of AOBP over conventional office BP should offset any additional costs or inconvenience associated with its introduction.

Another consideration to avoid the need for AOBP would be to introduce a correction factor to adjust for the white coat effect associated with other, more conventional methods of BP measurement. As noted previously,1 BP recorded in doctor’s offices in the community is 15/10 mm Hg higher than that in AOBP. More importantly, they are not only higher but, unlike AOBP, correlate poorly with the mean awake ambulatory BP. This mean value represents subjects with a wide range of white coat effect, so that it is not possible to use a simple correction factor to translate routine BP readings into the more accurate AOBP.

Conclusions

The 2016, CHEP guidelines14 have recognized the importance of SPRINT by changing the target systolic BP for drug therapy to an AOBP of <120 mm Hg for patients with similar characteristics to those enrolled in this study.

AOBP is well on the way to becoming the standard method for office BP measurement in Canada. There is no reason why the same cannot be true for many other countries, especially now that there is both good evidence to support the use of AOBP in routine clinical practice and a high quality, randomized clinical trial showing that a lower systolic BP target significantly reduced cardiovascular morbidity and mortality.1 Any concern that AOBP should not be implemented into routine clinical practice because it produces lower BP readings by being more accurate and devoid of the white coat makes little sense and is scientifically unsound. Moreover, AOBP readings simplify the diagnosis of hypertension by having the same threshold (135/85 mm Hg) for defining hypertension as both awake ambulatory and home BP.1,6

Acknowledgments

We thank Dr William C. Cushman for giving permission to use his personal communication.

Disclosures

None.

References


Blood Pressure Measurement in the Post-SPRINT Era: A Canadian Perspective
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*Hypertension*. published online May 16, 2016;

*Hypertension* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2016 American Heart Association, Inc. All rights reserved.
Print ISSN: 0194-911X. Online ISSN: 1524-4563

The online version of this article, along with updated information and services, is located on the
World Wide Web at:
http://hyper.ahajournals.org/content/early/2016/05/13/HYPERTENSIONAHA.116.07598.citation

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