Policy Statement of the World Hypertension League on Noninvasive Blood Pressure Measurement Devices and Blood Pressure Measurement in the Clinical or Community Setting

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Increased blood pressure (BP) is the leading risk factor for death and disability globally,[1] with more than 40% of the adult population older than 25 years having hypertension.[2] Although much of hypertension is preventable, especially by reducing the amount of salt added to foods, hypertension treatment can also prevent the adverse consequences of stroke, heart attack, and heart and kidney failure.[2] Unfortunately, about half of patients with hypertension remain undiagnosed.[3] Hence, the World Hypertension League has made the increase in regular BP assessments and encouragement of widespread BP screening programs linked to diagnosis and clinical management of hypertension to be among the highest of priorities.

Whether in low-, middle-, or high-resource settings, recommendations for BP assessment are consistent and include a standardized approach to pre-measurement preparation, patient positioning, appropriate cuff selection and placement, measurement technique, and use of accurate BP-measuring devices.[4–9] For BP-measuring devices, there is typically a choice between manual devices using the auscultatory technique and either semi-automated (manual inflation) or fully automated (automated inflation) devices using oscillometry.[4–8,10]

For decades, the foundation of BP measurement in the community has been manual measurement using the auscultatory technique.[4,5] However, in spite of numerous recommendations on how to perform manual BP measurement accurately, even with training, it is difficult to ensure quality measurements. Moreover, the recommendations are rarely followed outside of high-quality research trials. In fact, a large body of evidence indicates that BP assessments are frequently inaccurate, with a high potential to misdiagnose a large segment of the population.[4,11–19] In particular, manual measurement of BP requires good hearing and extensive training in interpreting Korotkoff sounds.[4,20,21] Even with training, the use of standardized manual techniques declines rapidly without regular retraining and accuracy testing.

The use of automated devices requires much less training and automates many features of the measurement. During the past decade, there have been many advances in technology that have reduced the costs of semi-automated and fully automated devices, improved their accuracy, and allowed them to be used in settings where there is limited access to replacement batteries and limited electricity for recharging (eg, solar panels and use of a cell phone charger for recharging).[4,9,22–25] Nevertheless, challenges remain. There is a need to select a proper cuff size, and several other technical aspects still rely on the observer's training and skill. In many people, automated devices produce readings that differ from readings with manual techniques and, in these settings, it is unclear which method is a better reflection of arterial BP.[26–29] Further, regardless of method used, arrhythmias cause BP to be highly variable and multiple readings are required in these patients to increase accuracy.

The use of ambulatory BP measurement during routine daily activity and home/self-measurement of BP have documented benefits in assessing patients with increased BP, and their use has been recommended in many different national and international hypertension guidelines.[5,7,30–32] The use of these methods, however,

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requires resources and expertise that are not broadly available throughout much of the globe and are not the focus of this policy statement. In addition, devices that measure BP without an observer present in a clinic environment (automated office BP [AOBP]) also have advantages, including a reduced white-coat effect.[33–36] However, these devices are more expensive and not globally accessible at this time, and their role in hypertension management is outside the focus of this policy.

The World Health Organization (WHO) has recommended the use of a validated semi-automated oscillometric device in the STEPS survey (http://www.who.int/chp/steps/manual/en/), and a WHO expert meeting also recommended these types of devices for clinics in low-resource settings "given serious inherent inaccuracy of the auscultatory technique."[2,4,15,25] Automated devices allow training to be shorter and to focus on fewer essential aspects of BP measurement. Critical, however, is the selection of devices that have been independently assessed and have passed international validation testing and the selection of a proper cuff size (refer to http://www.dableducational.org/ for an up-to-date listing of devices that have passed standards).

The World Hypertension League has developed this policy statement to stimulate health and scientific organizations to adopt the WHO recommendation broadly, not only in low- but also in middle- and high-resource settings, to work towards the use of these devices for training healthcare professionals and the public, to advocate that all clinical settings have and use these devices for routine BP assessment, and to better ensure that all communities have screening programs that use automated devices at a capacity to ensure that a majority of patients with hypertension are identified. Wherever mentioned in this policy statement, semi-automated and fully automated devices refer only to devices that have passed international standards for accuracy and that use an upper arm cuff. Devices that have not passed international accuracy standards and where the cuff is not positioned on the upper arm are not recommended for routine BP assessment and should not be used in the assessment of hypertension.[4,31]

RECOMMENDATIONS OF THE WORLD HYPERTENSION LEAGUE

The World Hypertension League recommends the following:

- That in community screening settings for noninvasive BP assessment, a semi-automated or fully automated oscillometric BP device that uses a range of upper arm cuffs be used wherever feasible.
- That in clinical settings for noninvasive BP assessment, a semi-automated or fully automated oscillometric BP device that uses a range of upper arm cuffs be used routinely and that manual BP measurement with a recently calibrated device, appropriate cuff size, and a recently trained observer be used to estimate BP only where automated measures are not feasible for technical reasons.
- That where resources allow, consideration be given to incorporate self-/home BP measurement, AOBP measurement, and ambulatory BP measurement in the diagnosis and management of hypertension.
- That training programs for healthcare professionals focus on the use of semi-automated or fully automated oscillometric BP devices that use a range of upper arm cuffs in conjunction with the importance of diagnosis and managing hypertension.
- That systematic approaches are put in place in all clinical settings to have routine BP assessment at all clinical encounters.
- That governmental and nongovernmental organizations work to ensure all communities around the globe have BP screening programs that use semi-automated or fully automated oscillometric BP devices and the programs have a capacity to ensure that the majority of patients with hypertension are both screened and appropriately referred for diagnosis and management. The expectation is that people identified with high BP readings will be referred to clinical settings for evaluation.
- That in clinical settings, the manual method be retained as a backup to automated measurements with the understanding that BP readings are likely to be inaccurate in the absence of a well-calibrated device, appropriate cuff size selection, regular training, and accuracy testing.
- Although use of the manual/auscultatory technique is not endorsed as the standard, it is recommended that when clinical settings and screening programs require the use of manual devices then there should be appropriate resources for ongoing training and testing for accuracy.
- That governments, health and scientific communities, and BP pressure device manufacturers work to ensure widespread availability of affordable validated automated BP devices and specifically include those that will operate in settings without a reliable electricity supply.

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