Ambulatory Blood Pressure Monitoring

A Complementary Strategy for Hypertension Diagnosis and Management in Low-Income and Middle-Income Countries

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KEYWORDS

- Ambulatory blood pressure monitoring • Resource-constrained
- Low-income and middle-income countries

KEY POINTS

- The burden of hypertension is increasing worldwide.
- Out-of-clinic blood pressure (BP) assessments, including ambulatory BP monitoring (ABPM), are recommended by several international guidelines.
- Ambulatory BP provides a better prediction of several cardiovascular (CV) outcomes compared with clinic BP.
- ABPM can be used as part of a comprehensive health care strategy to address the double burden of communicable and noncommunicable diseases and as part of task-shifting strategies in the management of hypertension within low-income and middle-income countries (LMICs).

INTRODUCTION

Worldwide, the burden of hypertension is increasing especially within LMICs.[1] Although the prevalence of hypertension within LMICs is high, awareness and control are often low.[2–5] The current burden of hypertension is greatest in populations within LMICs where approximately 1 of every 3 adults is affected by hypertension.[4] Furthermore, it is projected that LMICs will continue to bear a higher burden of the disease compared with the global average, and by 2025, 75% of individuals with hypertension will be living in LMICs.[6] Clearly, hypertension is an important public health problem within LMICs and effective strategies to diagnose and treat hypertension are needed. The reduction of hypertension by 25% by the year 2025 is now a World Health Organization (WHO) priority.[7]

Although the diagnosis and treatment of hypertension historically have been based on the measurement of BP via automated oscillometric or manual readings taken within the clinic setting, more recently the WHO recommends that BP be recorded for several days, ideally with 2 measurements made, in the morning and evening, with additional BP measurements done outside the clinic setting to properly diagnosis hypertension.[8] Because BP is characterized by a circadian pattern over a 24-hour period with levels that are

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normally highest while awake and that fall during sleep, clinic BP readings may not accurately reflect BP taken outside of the clinic setting. Although both ABPM and home BP monitoring can assess BP outside of the clinic setting,[9] ABPM is more commonly recommended within several international guidelines.[10–13] Additionally, studies have shown that ambulatory BP provides a better prediction of several CV outcomes compared with clinic BP.[13–17]

OVERVIEW OF AMBULATORY BLOOD PRESSURE MONITORING

Ambulatory BP monitors are compact automated oscillometric devices worn on a belt or pouch and connected to a sphygmomanometer cuff on the upper arm by a tube (Fig. 1). These monitors are typically worn for a 24-hour period and are set to obtain readings every 15 to 30 minutes throughout the day and night. During the 24-hour monitoring period, individuals are also encouraged to fill out a diary to document times of meal and medication ingestion, sleep and awakening, exercise, and any symptoms. After the 24-hour period, the monitor is returned and readings are downloaded into a computer for processing.[9]

Because ABPM can provide multiple BP measurements throughout a 24-hour period, average BP readings can be assessed over several discrete time periods, including daytime, nighttime, and 24-hour periods.[18] The daytime and nighttime periods can be defined using several different approaches, including an individual's self-report of awakening and sleeping times, fixed time periods, or actigraphy.[9,19–21] Accordingly, daytime, nighttime, and 24-hour hypertension may be diagnosed by obtaining elevated BP readings during any of these time periods. Daytime hypertension is defined as mean daytime systolic BP greater than or equal to 135 mm Hg or mean daytime diastolic BP greater than or equal to 85 mm Hg; nighttime hypertension is defined as mean nighttime systolic BP greater than or equal to 120 mm Hg or mean nighttime diastolic BP greater than or equal to 70 mm Hg; and 24-hour hypertension is defined as mean systolic BP greater than or equal to 130 mm Hg or mean diastolic BP greater than or equal to 80 mm Hg.[21]

ABPM can be used to diagnose hypertension as well as manage antihypertensive therapy among individuals with hypertension. When ambulatory BP readings are cross-classified with clinic BP readings, there are 4 BP phenotypes that can be defined (Fig. 2). Sustained normotension and sustained hypertension represent agreement between clinic BP and ambulatory BP readings. White coat hypertension is defined as elevated clinic BP with nonelevated ambulatory BP readings[21,22] whereas masked hypertension is defined as nonelevated clinic BP with elevated ambulatory BP readings (either in the daytime, nighttime, or throughout the 24-hour period).[21,23] Whether white coat hypertension is linked to increased CV risk and mortality has been controversial within the literature.[24–26] In contrast, several studies have shown that masked hypertension is associated with subclinical target

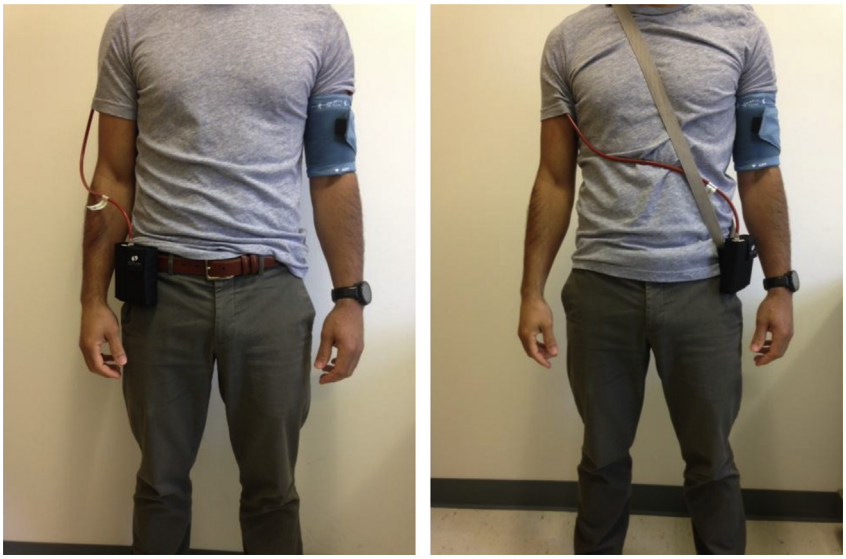

Fig. 1. The ABPM can be worn on a belt (left) or pouch (right) and is connected to a sphygmomanometer cuff on the upper arm. (*Courtesy of* Marwah Abdalla, MD, MPH, New York.)