Letters to the Editor

Ambulatory Blood Pressure Monitoring and Resistant Hypertension

To the Editor: The comprehensive review of the evaluation and treatment of resistant hypertension in adults by Haley and colleagues provides an exceptional evidence-based algorithm for primary care clinicians.[1] The authors correctly emphasize the necessity of out-of-office blood pressure (BP) confirmation—using home or ambulatory BP monitoring—to definitively exclude white coat hypertension before escalating therapy.[2,3] However, in the subset of primary care patients with concurrent chronic kidney disease (CKD), the literature indicates that 24-hour ambulatory BP monitoring should be prioritized over home BP monitoring when feasible.

Although automated home BP monitoring provides excellent diagnostic utility for daytime hemodynamics, it cannot capture nocturnal BP variations when patients are sleeping. Normally, nocturnal BP declines by 10% to 20% (the dipping phenomenon) due to sympathetic withdrawal during sleep. In patients with advanced CKD (stages 3-5), this nocturnal dip is frequently blunted or entirely reversed due to volume expansion and altered pressure natriuresis.[4]

The absence of nocturnal dipping is not a benign physiologic quirk; it is a powerful independent predictor of accelerated kidney function decline, left ventricular hypertrophy, and all-cause cardiovascular mortality.[5] Crucially, the nighttime BP burden routinely outperforms daytime clinic or home measurements in overall risk prediction.

Furthermore, patients with resistant hypertension frequently have masked nocturnal hypertension. Identifying this high-risk "nondipper" phenotype via ambulatory BP monitoring empowers clinicians to optimize therapy beyond dose increases. It guides the strategic application of chronotherapy by shifting antihypertensive administration to the evening and allows for the precise evaluation of long-acting agents, such as mineralocorticoid receptor antagonists, across the 24-hour circadian cycle.

Given the cardiovascular risks inherent to patients with CKD, relying exclusively on daytime home BP monitoring may engender a false sense of security. Integrating 24-hour ambulatory BP monitoring as the standard evaluative tool for resistant hypertension in patients with kidney impairment will more accurately stratify risk in this vulnerable cohort and direct appropriate therapeutic interventions.

Anand Ravindran, MD
Toledo, Ohio
amravindran@aol.com

Author Disclosure: No relevant financial relationships.

Disclaimer: The views expressed in this letter are those of the author and do not necessarily reflect the official policy or position of the Department of Veterans Affairs, the Veterans Health Administration, or the US government. The author reports no external funding.

In Reply: We appreciate the issue raised by the authors of this letter to the editor, who prioritize ambulatory BP monitoring over home BP monitoring in patients with CKD. Using ambulatory BP monitoring in several other populations (eg, patients with obstructive sleep apnea or diabetes, those who identify as Black) may also be considered because they are more likely to demonstrate this nondipping pattern than the general population.[6]

Although ambulatory BP monitoring may offer some advantages, it also has disadvantages, including limited availability, higher costs, and the potential for sleep disturbance and discomfort.[6] Barriers to its implementation in primary care include the need for extra staff training, access to specialized equipment, and thorough patient counseling. Monitors often cost more than $2,000, and insurance coverage of ambulatory BP monitoring is not bundled and typically reimburses at a low level. This type of BP monitoring can cause bruising in approximately 7% of patients and sleep disturbance in 55% to 70% of patients, which may lead to discontinuation.[7]

Many of the conditions associated with nocturnal hypertension are often identified through processes outside of ambulatory BP monitoring during a secondary hypertension workup. These include kidney disease, obstructive sleep apnea, thyroid disorders, and adrenal disorders.

Caution should be used when suggesting chronotherapy to address nondipping nocturnal BP using ambulatory BP monitoring. Chronotherapy has failed to consistently lower cardiovascular risk by targeting nocturnal hypertension.[8,9] The original trials supporting the hypothesis of chronotherapy for improving cardiovascular risk (ie, MAPEC and Hygia) have been called into question because their results could not be replicated, and they represent unrealistic reductions in cardiovascular risk.[10,11] The more recent and robust TIME and BedMed studies have cast doubt on the hypothesis that chronotherapy lowers cardiovascular risk.[8,9] Although the evidence for chronotherapy is mixed, we agree that choosing medications with longer half-lives to ensure activity throughout the 24-hour cycle may be beneficial in certain patients.

We agree that identifying patients with a nondipping pattern via ambulatory BP monitoring can be valuable for cardiovascular and kidney risk stratification. This may translate into more holistic monitoring and adjustments in care plans to ensure high adherence, such as the use of combination therapy. However, in light of mixed evidence for chronotherapy, management recommendations for "nondippers" may not truly be different from those for other individuals. Individualization of a patient's antihypertensive regimen remains important to address social

Email submissions to afplet@aafp.org.

Downloaded from the American Family Physician website at www.aafp.org/afp. Copyright © American Academy of Family Physicians. For the private, noncommercial use of one individual user of the website. All other rights reserved. Contact copyrights@aafp.org for copyright questions and/or permission requests.

and physiologic differences, minimize adverse effect burden, and reduce cardiovascular risk.

Scott Bragg, PharmD
Charleston, South Carolina

Sean P. Haley, MD, MPH
Charleston, South Carolina
haleys@musc.edu

Leah Stem, MD, MS
Charleston, South Carolina

Author Disclosure: No relevant financial relationships.

REFERENCES

1. Haley SP, Bragg S, Stem L. Resistant hypertension in adults: evaluation and treatment. *Am Fam Physician*. 2026;113(1):43-50.
2. Krist AH, Davidson KW, Mangione CM, et al. Screening for hypertension in adults: US Preventive Services Task Force reaffirmation recommendation statement. *JAMA*. 2021;325(16): 1650-1656.
3. Writing Committee Members; Jones DW, Ferdinand KC, Taler SJ, et al. 2025 AHA/ACC/AANP/AAPA/ABC/ACCP/ACPM/AGS/AMA/ASPC/NMA/PCNA/SGIM guideline for the prevention, detection, evaluation and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association joint committee on clinical practice guidelines. *Circulation*. 2025; 152(11):e114-e218.
4. Wang C, Deng WJ, Gong WY, et al. Nocturnal hypertension correlates better with target organ damage in patients with chronic kidney disease than a nondipping pattern. *J Clin Hypertens (Greenwich).* 2015;17(10):792-801.
5. Minutolo R, Agarwal R, Borrelli S, et al. Prognostic role of ambulatory blood pressure measurement in patients with nondialysis chronic kidney disease. *Arch Intern Med*. 2011;171(12):1090-1098.
6. Muntner P, Shimbo D, Carey RM, et al. Measurement of blood pressure in humans: a scientific statement from the American Heart Association. *Hypertension*. 2019;73(5):e35-e66.
7. Cepeda M, Pham P, Shimbo D. Status of ambulatory blood pressure monitoring and home blood pressure monitoring for the diagnosis and management of hypertension in the US: an up-to-date review. *Hypertens Res*. 2023;46(3):620-629.
8. Mackenzie IS, Rogers A, Poulter NR, et al.; TIME Study Group. Cardiovascular outcomes in adults with hypertension with evening versus morning dosing of usual antihypertensives in the UK (TIME study): a prospective, randomised, open-label, blinded-endpoint clinical trial. *Lancet*. 2022;400(10361):1417-1425.
9. Garrison SR, Bakal JA, Kolber MR, et al. Antihypertensive medication timing and cardiovascular events and death: the BedMed randomized clinical trial. *JAMA*. 2025;333(23):2061-2072.
10. Hermida RC, Ayala DE, Mojón A, et al. Influence of circadian time of hypertension treatment on cardiovascular risk: results of the MAPEC study. *Chronobiol Int*. 2010;27(8):1629-1651.
11. Hermida RC, Crespo JJ, Domínguez-Sardiña M, et al.; Hygia Project Investigators. Bedtime hypertension treatment improves cardiovascular risk reduction: the Hygia Chronotherapy Trial. *Eur Heart J*. 2020;41(48):4565-4576.