

Morning Hypertension

Unmasking Diurnal Variations

Why Home Monitor?

A home blood pressure monitoring regimen may help improve the effectiveness of antihypertensive drug treatment since multiple measurements can help physicians chart variations in blood pressure and the effectiveness of treatment.¹¹ The American Heart Association recommends taking two to three blood pressure measurements in the morning and evening. The average of the multiple measurements helps provide a better indication of one's blood pressure.¹² Morning measurements typically are taken in a sitting position within an hour of waking, but before breakfast and before taking medication. Evening measurements are taken before bedtime.

Omron Healthcare's groundbreaking HEM-780, HEM-775 and HEM-790IT Blood Pressure Monitors are the only FDA-cleared home blood pressure monitors which include a morning hypertension indicator. These sophisticated units calculate morning and evening blood pressure averages and display a morning hypertension symbol if a user's weekly average is above 135/85 mmHg. The monitors are designed to automatically store eight weeks of separate morning and evening averages for up to two users. Monitor memory storage can provide physicians a more reliable record of accurate readings than self-recording, which may prove vital to patient health.⁷ ●



Cardiovascular disease is the leading cause of death in the United States, according to recent statistics released by the American Heart Association.¹ Clinicians often struggle to provide early interventions to prevent cardiovascular events, such as heart attack and stroke. These interventions include attaining tight blood pressure control in their patients. However, 50 percent of patients treated for blood pressure continue to suffer from morning or “masked” hypertension.² Thus, clinicians may need to dig deeper to achieve optimal control in their patients, especially during early morning hours.

What is Morning Hypertension?

Normally, blood pressure decreases throughout the night and slightly increases in the morning hours just before a person awakens. However, this pattern is slightly different in some patients with hypertension. Patients exhibiting “non-dipper patterns” in blood pressure demonstrate consistent increases in blood pressure while asleep during the overnight hours. In contrast, patients demonstrating “morning surge patterns” or “dippers,” have exaggerated spikes in blood pressure in the early morning hours. “Non-dippers” have been reported to have greater risk for target organ damage to their brain, heart and kidneys, while patients exhibiting “morning surge” are at a higher risk for stroke.³

What is its Clinical Significance?

The time of day a cardiovascular event occurs seems to be associated with diurnal variations of blood pressure, particularly in the morning hours. In one study, patients were four times as likely to suffer a heart attack between 8:00-9:00 a.m. as between midnight and 1:00 a.m.⁴ There is also evidence that morning and daytime blood pressure may vary throughout the week with morning blood pressure levels and surge being highest on Mondays. This finding reflects the fact that most cardiovascular events occur on Monday versus any other day of the week.⁵

For more information about morning hypertension, visit www.morningbp.com/dsn2

Morning hypertension is an independent risk factor for stroke. In one study, each 10 mmHg surge in morning blood pressure increased stroke risk by 44 percent. Additionally, this study found that the difference in morning and evening blood pressures is also an independent risk factor for stroke as each 10 mmHg increase was associated with a 24 percent increase in stroke.⁶

How is Morning Hypertension Managed?

Patients taking once daily blood pressure medications every morning may risk low therapeutic plasma drug levels prior to the next scheduled dose, thus raising early morning blood pressures. Twenty-four hour control of blood pressure is paramount to effectively treating hypertension. Research has shown that a variety of agents dosed at nighttime, including doxazosin or Cardizem LA, can be beneficial in controlling morning hypertension.^{7,8}

At any rate, home blood pressure monitoring, especially in the early morning hours, can assist clinicians in the decision making process. Patients should also be encouraged to engage in lifestyle changes, such as weight loss, reducing sodium intake, exercise, and moderating alcohol use as additional means to attain optimal blood pressure control.⁹

Is Home Blood Pressure Monitoring Accurate?

Recent technology for home blood pressure monitoring has advanced so that patients can select from a variety of accurate, affordable and easy-to-use automated systems. These devices should serve to assist the patient in their self-care regimens as a means to improve medication compliance and to help clinicians develop optimal therapeutic regimens. Rigorous testing of 23 automated home blood pressure devices, using the upper arm, was accomplished as part of recommendations established by the European Society of Hypertension. Of these 23 meters, only five were classified as being “recommended;” all five were manufactured by Omron.

1. American Heart Association. “Causes of death—statistics.” Available at <http://www.americanheart.org/downloadable/heart/1173881560405CAUSOFDTH07doc.pdf>. Accessed on April 13, 2007. 2. Inquirer News Service. “Reducing Risks of Heart Attack, Stroke.” June 26, 2004. 3. Kario K. “Time for focus on morning hypertension: pitfall of current antihypertensive medication.” *American Journal of Hypertension* 2005;18:149-151. 4. Willich SF. “Circadian variation and triggering of cardiovascular events.” *Vascular Medicine*, 1999;4:41-49. 5. Arntz HR, Willich SN, Schreiber C et al. “Diurnal, weekly, and seasonal variation of sudden death. Population-based analysis of 24,061 consecutive cases.” *European Heart Journal*, 2000;21:315-320.6. Jeffrey S. “Early to rise—morning blood pressure predicts stroke.” *Neurology Reviews.com*. March 2003;11(3). 7. Kamoi K, Ikarashi T. “The bedtime administration of doxazosin controls morning hypertension and albuminuria in patients with type 2 diabetes: evaluation using home-based blood pressure measurements.” *Clinical Experimental Hypertension*, 2005;27:369-76. 8. Business Wire. “Study shows nighttime dosing of Biovail’s Cardizem LA lowers blood pressure and other risks more than nighttime dosing of Altace.” May 16, 2003. 9. “U.S. Department of Health and Human Services: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.” NIH Publication No. 03-5233. Available at www.nhlbi.nih.gov/guidelines/hypertension/express.pdf. Accessed on April 13, 2007. 10. O’Brien E, Waebler B, et al. “Blood pressure measuring devices: recommendations of the European Society of Hypertension.” *BMJ*, 2001;322:531-536. Available at <http://www.bmj.com/cgi/content/full/322/7285/531/T4>. Accessed April 17, 2007. 11. Ewald, S., vor dem Esche, J., Uen, S., Neikes, F., Vetter, H., and Mengden, T. “Relationship between the Frequency of Blood Pressure Self-Measurement and Blood Pressure Reduction with Antihypertensive Therapy: Results of the OLMETEL (OLMESartan TELEmonitoring Blood Pressure) Study.” *Clinical Drug Investigation*. 2006;26(8):439. Available at http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=pubmed&list_uids=17163276&cmd=Retrieve&index=google accessed on Mar. 1, 2007.