

Morning Hypertension:

Usefulness in Predicting Diabetic Complications.



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.⁵ 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.⁶ 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 first 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 ●



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Morning Hypertension: Usefulness in Predicting Diabetic Complications

Up to 60 percent of patients with diabetes have hypertension.¹ In fact, individuals with diabetes are up to three times more likely to have high blood pressure than those who do not have diabetes.¹ A concomitant diagnosis of hypertension places these patients at an increased risk for diabetic complications such as heart disease, renal insufficiency, diabetic retinopathy and possibly neuropathy.¹ Research has demonstrated a possible link between morning hypertension and an increased risk for complications in both type 1 and type 2 diabetes.^{2,3}

What is the potential effect of morning hypertension in type 2 diabetes?

A study by Kamoi, et al. examined 170 patients with type 2 diabetes being treated with both antidiabetic and antihypertensive agents using clinic and home blood pressure measurements.² Researchers classified patients as having "clinic hypertension" if they had blood pressure readings greater than or equal to 130/85 mmHg during a clinic visit, according to criteria set forth by the World Health Organization and International Society of Hypertension at that time. If blood pressure readings were above that goal within 10 minutes of awakening using home blood pressure monitors, patients were classified as having "morning hypertension." Results found no significant differences in the rates of nephropathy, retinopathy, coronary heart disease and cardiovascular disease in the patients with clinic hypertension compared to those without clinic hypertension (normotensive). However, when patients considered normotensive were stratified into groups with or without morning hypertension, significant differences were evident. Ninety-one percent of patients with morning hypertension had nephropathy while no incidence of nephropathy was noted in the group without morning hypertension. Rates of retinopathy, coronary heart disease and cardiovascular disease also were significantly higher in those with morning hypertension compared to those without it.

While the study found that one-half of all patients with clinic hypertension also had morning hypertension, two-

thirds of those with normal clinic blood pressures exhibited morning hypertension patterns. Thus, patients who would otherwise be considered "normotensive" were actually hypertensive in the early morning hours upon awakening. The authors concluded that classification of hypertension based on home blood pressure measurements in patients with type 2 diabetes is strongly correlated to both micro- and macrovascular complications.

What about type 1 diabetes?

In another study done by Kamoi, et al. 53 patients with type 1 diabetes were assessed for the usefulness of home versus clinic blood pressure measurements in predicting micro- and macrovascular complications.³ Similar to previous research with type 2 diabetes, this study again used clinic and home blood pressure measurements to classify patients as having clinic hypertension and/or morning hypertension. Results showed no difference between the groups with clinic hypertension and those with normotension in the prevalence of nephropathy or retinopathy. However, patients with morning hypertension again showed a significantly increased prevalence for nephropathy and retinopathy. Differences in the prevalence of nephropathy were not related to age, sex, duration of disease, BMI, A1C, lipids, methods of insulin therapy or antihypertensive drugs. Only duration of diabetes significantly contributed to the increased rates of retinopathy. This study indicates that patients with type 1 diabetes who would be considered normotensive by clinic measurements may still exhibit morning hypertension, thereby putting them at increased risk for microvascular complications, especially nephropathy.

Is home blood pressure monitoring beneficial in patients with diabetes?

Home blood pressure measurements appear to be a very useful tool in classifying hypertensive status and establishing risk for diabetic complications. Readers should be aware that current guidelines dictate blood pressure goals for patients with type 1 and type 2 diabetes to be <130/80 mmHg.⁴ Clinicians should consider utilizing home blood pressure monitoring in addition to self-monitoring of blood glucose to help identify patients at risk for diabetic complications.

For more information about morning hypertension, visit www.morningbp.com/dsn4

1. American Diabetes Association. "Diabetes and cardiovascular disease review." Available at http://www.diabetes.org/uedocuments/ADACardioReview_2.pdf. Accessed on August 16, 2007. 2. Kamoi K, Miyakoshi M, Soda S, et al. Usefulness of home blood pressure measurement in the morning in type 2 diabetic patients. *Diabetes Care* 2002; 25:2218-2223. 3. Kamoi K, Imamura Y, Miyakoshi M, and Kobayashi C. Usefulness of home blood pressure measurement in the morning in type 1 diabetic patients. *Diabetes Care* 2003; 26:2473-2475. 4. American Diabetes Association. "Standards of medical care in diabetes-2007." Available at http://care.diabetesjournals.org/cgi/reprint/30/suppl_1/S4. Accessed on August 16, 2007. 5. Ewald S, von 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&md=Retrieve&index=google accessed on Mar. 1, 2007. 6. American Heart Association Scientific Standard. 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.