Essential Manual of 24 Hour Blood Pressure Management
For Tomoko
Essential Manual of 24 Hour Blood Pressure Management
From Morning to Nocturnal Hypertension

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Author biography

**Dr. Kazuomi Kario**, MD, FACC, FACP, FAHA, FESC, graduated from Jichi Medical School in 1986. He is currently Professor and Chairman of Cardiovascular Medicine, and Professor of the Department of Sleep and Circadian Cardiology, Jichi Medical University School of Medicine, Japan, and is Staff Visiting Professor, Institute of Cardiovascular Science, University College London, UK. Dr. Kario and his team were the first to demonstrate “morning surge” in blood pressure (BP) as an independent risk factor for cardiovascular disease in 2003 [1, 2]. He first used “morning hypertension” with the definition of morning BP >135/85 mmHg regardless of clinic BP and stressed its clinical relevance in his book, *Clinician’s Manual on Early Morning Risk Management in Hypertension* in 2004 (Science Press, London, UK, 2004) [3]. He has recently proposed a novel disease entity, systemic hemodynamic atherothrombotic syndrome (SHATS), which is characterized by synergistic risk of exaggerated hemodynamic stress (exaggerated variability of BP and blood flow) and vascular disease, not only for advancing organ damage but also for triggering cardiovascular events [4].

His research includes the development of new technology-based BP monitoring such as “IT-based home nocturnal BP monitoring” and “hypoxia-triggered home sleep BP monitoring (TSP)” to clarify the clinical relevance of 24-hour BP control [5, 6]. He is the principal investigator of several clinical studies, such as Japan Morning Surge-Home Blood Pressure (J-HOP) study, Japan Ambulatory BP Monitoring (JAMP) study, Country-based Ambulatory BP Registry in Asia 2010 (CARE Asia), and Sleep BP and disordered breathing in REsistant hypertension And cardiovascular Disease (SPREAD), and the Home BP measurement with Olmesartan Naive patients to Establish Standard Target blood pressure (HONEST) study, the largest prospective observational study involving >20 000 patients receiving angiotensin receptor blocker (ARB)-based antihypertensive treatment for 2 years [7].

He has served as Editor-in-Chief of *Current Hypertension Reviews* and is the past Executive Editor of *Hypertension Research*. He is an editorial board member of more than 15 international journals, including *Hypertension, Journal of Hypertension, Circulation Journal, Journal of Clinical Hypertension, Journal of the American Society*
of Hypertension, American Journal of Hypertension, Blood Pressure Monitoring, Current Hypertension Reports, and Current Cardiology Reviews. Dr. Kario has published more than 600 academic papers during his distinguished career.

References


The essential benefit of the management of hypertension is derived from blood pressure (BP) lowering per se, indicating the importance of BP throughout 24 hours. Recent guidelines stressed the importance of home BP for the diagnosis and management of hypertension.

It is well known that cardiovascular events occur more frequently in the morning; BP levels have been shown to increase during the period from night to early morning. In recent years, clinical research using ambulatory blood pressure monitoring (ABPM) or home BP monitoring (HBPM) has clarified that morning BP and BP surge are more closely related to the cardiovascular risk than clinic BP. Also, in hypertensive patients treated with antihypertensive medication, even patients whose clinic BP is well controlled, morning BP level prior to taking medication frequently remains high.

In addition, nocturnal hypertension, frequently found in high-risk hypertensives with diabetes, chronic kidney disease (CKD), and sleep apnea syndrome (SAS), are closely associated with organ damage and risk of cardiovascular events. We have recently developed an information technology (IT)-based home nocturnal BP pressure monitoring system (ITNP) [1]. This may be useful for assessing the risk during sleep in high-risk patients.

In this Essential Manual, I would like to show the recent evidence on “morning hypertension” and “nocturnal hypertension,” the technology which will support the home BP-guided individual approach. I believe the “perfect 24-hour BP control” by changing the dose, the class, and timing of administration of antihypertensive drugs will achieve the most effective cardiovascular and renal protection. I hope this book will provide good practical advice for the treatment of hypertension on a day-to-day basis.

Reference

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CHAPTER 1

First, focusing on “morning hypertension”

The morning is the most important period for cardiovascular diseases [1, 2]. Cardiovascular events occur most frequently in the morning just after awakening, at the time of the peak ambulatory blood pressure (BP) (Figure 1.1) [2]. Exaggerated morning BP surge (MBPS) and morning hypertension are a risk for cardiovascular events (Figure 1.2), and are associated with advanced organ damage (Figure 1.3) [3–7]. Morning BP level is more closely associated with organ damage to brain, heart, and kidney, and the risk of cardiovascular and cerebrovascular events (Figure 1.4) and disability in the elderly than clinic BP both in hypertensive patients and community-based normotensive populations [8, 9]. Finally, recent evidence demonstrates that uncontrolled morning hypertension on medication is a strong predictor of cardiovascular events [10].

What is the “perfect 24-hour blood pressure control”? 

The management of “morning hypertension” is the most effective first step to achieve “perfect 24-hour BP control” [1]. The majority of the benefit of antihypertensive treatment is derived from BP control per se. There is robust evidence that indicates BP control throughout 24 hours is essentially important for lowering the risk of organ damage and cardiovascular events. However, not only strict reduction of the 24-hour BP level (amount of 24-hour BP lowering), but also restoring disrupted circadian BP rhythms, and reducing exaggerated BP variability (quality of 24-hour BP lowering), are required to achieve “perfect 24-hour BP control” (Figure 1.5) [11].

Recent guidelines such as the Japanese Society of Hypertension (JSH2014) Guidelines [12], European Society of Hypertension/European Society of Cardiology (ESH/ESC2013) Guidelines [13], and NICE 2011 Guidelines (UK) [14] recommend the practical use of the out-of-office BP for the diagnosis and management of hypertension. Clinically, two methods are available to measure our BP in clinical practice. One is ambulatory BP monitoring (ABPM), and the other is home BP monitoring (HBPM) (Figure 1.6). Figure 1.7 demonstrates the different thresholds of clinic, home, and ambulatory BPs for the definition of hypertension [11–13].
Figure 1.1 Onset time of cardiovascular events. Source: Muller et al. 1989 [2].

Masked hypertension is defined as normotension for office BP and hypertension for out-of-office BP, while white-coat hypertension is defined as normotension for out-of-office BP and hypertension for office BP [15]. There are three subtypes of masked hypertension, namely morning hypertension, daytime (stress-induced) hypertension, and nocturnal hypertension (Figure 1.8). Among these masked hypertension subtypes, only morning hypertension could be definitively detected by the conventional measurement of HBPM.

Figure 1.2 Morning BP surge and stroke risk in hypertension (matching for age and 24-hour systolic BP). Source: Kario et al. 2003 [3].