

Medical Policy



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Title: Ambulatory Blood Pressure Monitoring

Professional

Original Effective Date: February 2, 1995

Revision Date(s): July 1, 2000;

November 6, 2003; January 1, 2004

Current Effective Date: September 18, 2009

Institutional

Original Effective Date: July 1, 2005

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Current Effective Date: October 19, 2009

DESCRIPTION

Ambulatory blood pressure monitors are portable devices that record blood pressure while the patient is involved in daily activities.

Ambulatory blood pressure monitoring (ABPM), typically done over a 24-hour period with a fully automated monitor, provides more detailed blood pressure information than typically obtained during office visits. The greater number of readings with ABPM ameliorates the variability of single blood pressure measurements, and is more representative of the circadian rhythm of blood pressure compared to the limited number obtained during office measurement.

There are a number of potential applications of ABPM. One of the most common is evaluating suspected "white-coat hypertension" (WCH), which is defined as an elevated office blood pressure with normal blood pressure readings outside the physician's office. The etiology of WCH is poorly understood but may be related to an "alerting" or anxiety reaction associated with visiting the physician's office.

In evaluating patients having elevated office blood pressure, ABPM is often intended to identify patients with normal ambulatory readings who do not have sustained hypertension. Since this group of patients would otherwise be treated based on office blood pressure readings alone, ABPM could improve outcomes by allowing these patients to avoid unnecessary treatment. However, this assumes patients with WCH are not at increased risk for cardiovascular events and would not benefit from antihypertensive treatment.

Many ambulatory blood pressure monitors have received clearance to market through the U.S. Food and Drug Administration (FDA) 510(k) marketing clearance process.

POLICY

Automated ambulatory blood pressure monitoring (ABPM) includes multiple blood pressure (BP) measurements over a 24-hour period and is considered **medically necessary**, for up to 72 hours with FDA-approved devices, for the evaluation of individuals with any of the following:

1. Suspected "White Coat Hypertension" (WCH) which is defined as:
 - In-office BP >140/90 mmHg on at least three separate clinic/office visits with two separate measurements taken at each visit; and
 - At least two documented separate BP measurements taken outside the office setting which are <140/90 mmHg; and
 - No evidence of end-organ damage
2. Individuals with resistant hypertension who are being treated with three or more medications
3. Hypertensive individuals with hypotensive symptoms and/or syncopal events thought to be related to antihypertensive medications or neurological syndromes, including autonomic dysfunction.
4. Episodic hypertension suspected when office BP measurements are normal and associated symptoms (e.g., excessive sweating, palpitations, pallor) suggest episodic hypertension secondary to an existing condition.
5. Suspected autonomic dysfunction.

RATIONALE

This policy originates from a 1999 TEC Assessment (1) and subsequent re-analysis conducted for the Centers for Medicare and Medicaid Services (CMS) in 2001. The focus is on the use of ABPM in previously untreated patients with elevated office blood pressure. In this situation, ABPM is intended primarily to evaluate "white coat hypertension" (WCH), defined as an elevated office blood pressure with normal blood pressure readings outside the physician's office, by obtaining multiple out-of-office blood pressure measurements and comparing them to office readings. The Assessment attempted to determine if health outcomes are improved by a strategy of using ABPM to identify patients with WCH. Relevant publications since completion of the TEC Assessment, including a comprehensive evidence report, have been incorporated into this policy review. Various organizational and consensus statements have also been issued concerning relevance of ABPM.

Evidence addressing this clinical context arises from 3 study designs: randomized, controlled trials (RCTs), prospective cohort, and cross-sectional studies.

1) Randomized controlled trials (RCTs). Direct evidence of the efficacy of ABPM improving outcomes in this setting would be obtained from RCTs comparing outcomes of: 1) patients diagnosed and treated based on conventional blood pressure measurements alone to 2) patients additionally undergoing ABPM used to guide therapy (e.g., withholding or randomizing treatment among those with WCH). This notion parallels the statement from the National High Blood Pressure Education Program Working Group on Ambulatory Blood Pressure Monitoring in 1992, "Ideally, de novo longitudinal studies should be undertaken to determine which ambulatory profiles are associated with increased cardiovascular risk and what transformations of ambulatory profiles induced by antihypertensive therapy are associated with reductions in risk." (2) RCTs using ABPM for monitoring treatment response have been conducted but not to diagnose hypertension. However, a substudy of the Systolic Hypertension in Europe (Syst-Eur) trial did address this question indirectly.

The Syst-Eur trial, a large, multicenter RCT, enrolled patients 60 years of age or older with isolated systolic hypertension and randomized them to antihypertensive treatment or placebo. A substudy evaluated 695 patients (from the total Syst-Eur sample of 4,695 patients) who underwent 24-hour ABPM in addition to the usual study protocol. Conventional blood pressure was defined from the mean of 6 baseline clinic blood pressures: 2 readings obtained with the patient seated at 3 baseline visits ≥ 1 month apart. (3) Participants were classified into 3 groups based on ABPM readings: nonsustained hypertension (i.e., WCH), mild-sustained hypertension, and moderate-sustained hypertension. The reduction in cardiovascular events was compared between active and placebo groups among patients in each of the 3 categories. For patients with nonsustained hypertension, there was a numerically lower rate of adverse outcomes in the treated group for stroke (0 vs. 2, $p=0.16$) and cardiovascular events (2 vs. 6, $p=0.17$), i.e., differences not reaching statistical significance. There was a significant reduction in events with treatment only among patients with moderate-sustained hypertension.

Staessen et al (4) analyzed data from an apparently overlapping subset of 808 older individuals from the Syst-Eur trial followed up a median of 4.4 years in the same trial with isolated systolic hypertension measured conventionally (systolic BP 160–219 mm Hg, diastolic BP <95 mm Hg). Blood pressures were also measured by ABPM; average systolic and diastolic blood pressures were higher with conventional measurements (by 21.9 and 1.9 mm Hg, respectively). ABPM was significantly associated with cardiovascular endpoints, even when conventional blood pressure was taken into account.

2) Prospective cohort studies. Well-designed, prospective cohort studies could provide indirect evidence regarding prognosis of WCH and whether patients benefit from treatment. Ideally, prospective studies would compare outcomes of untreated patients with WCH to normotensive and sustained hypertensive patients (the latter being treated). Studies should control for important potential confounders such as adequacy of blood pressure control, age, sex, smoking, lipid levels, and diabetes. Well designed and

conducted prospective cohort studies finding untreated WCH patients having a cardiovascular event risk similar to normotensive patients would imply these patients accrue little treatment benefit.

Numerous large cohort studies have used ABPM to identify patients with WCH, and compared future cardiovascular outcomes in WCH patients, normotensive patients, and sustained hypertensive patients. Despite the large amount of data that has accumulated on this topic, the evidence is not conclusive on whether patients with WCH have a higher risk of cardiovascular events compared to normotensive patients.

At least 3 meta-analyses have been published that summarize the results of available cohort studies. Fagard and Cornelissen (5) summarized data from 7 cohort studies with a total of 11,502 patients that compared outcomes in 4 groups of patients: normotensive patients, WCH patients, "masked" hypertensive patients, and sustained hypertensive patients. The average follow-up in these studies was 8.0 years. Using normotensive patients as the reference standard, the risk for patients with WCH was not significantly higher (hazard ratio [HR] 1.12; 95% CI: 0.84–1.50). There was an increased risk for patients with "masked" hypertension (HR 2.00; 95% CI: 1.58–2.52) and patients with sustained hypertension (HR 2.28; 95% CI: 1.87–2.78).

Hansen et al (6) used patient-level data from 4 previous cohorts of patients to construct an international database on ambulatory blood pressure monitoring. This database included 7,069 patients from 4 cohorts in Europe and Japan that represented population-level patient samples. In this analysis, there was a trend toward increased cardiovascular events in patients with WCH that did not reach statistical significance (HR 1.22; 95% CI: 0.96–1.53, $p=0.09$). There were significant increases in risk for patients with "masked" hypertension (HR 1.62; 95% CI: 1.35–1.96, $p<0.0001$) and patients with sustained hypertension (HR 1.80; 95% CI: 1.59–2.03, $p<0.0001$).

A third pooled analysis by Verdecchia et al (7) included studies conducted in the United States, Italy, and Japan. This analysis compared short- and long-term stroke risk among 4,406 individuals with essential hypertension and 1,549 normotensive controls; none treated at baseline. WCH was present in 9% of the hypertensive group. During the first 6 years, follow-up stroke incidence appeared similar among WCH and normotensive groups. However, by 9 years, stroke incidence among white-coat hypertensives reached that of the hypertensive group (measured by ABPM). At the last telephone contact or clinic visit, similar proportions of those initially classified as WCH and normotensive were receiving antihypertensive medications from 5 different drug classes. This result suggests WCH may not be entirely benign.

Results from some of the larger individual cohort studies are not consistent in reporting whether WCH is associated with an increased risk for cardiovascular events. Verdecchia et al (8) followed up 1,187 subjects with essential hypertension and 205 normotensive individuals a mean of 3.2 years with baseline ABPM assessed off therapy. At least 3

conventional blood pressure measurements were obtained; 89 fatal and nonfatal cardiovascular endpoints occurred. Events were least frequent among normotensive (4.7 per 1000 person-years) and WCH patients (4.9 per 1000 person-years) but higher in those with sustained hypertension (17.9 and 49.9 per 1000 person-years among nocturnal "dippers" and "non-dippers," respectively). However, 29% of those with WCH were treated at baseline, and subsequent drug therapy was not reported. In Cox regressions controlling for "significant" confounders, no increased risk of cardiovascular endpoints accompanied a WCH diagnosis. While other variables could have been included in the analyses, altering the results would have required considerable confounding.

Khattar et al (9) followed up 479 patients who had undergone 24-hour intra-arterial ambulatory blood pressure monitoring off medication a mean of 9.1 years. WCH was diagnosed in 26%; the remainder had mild sustained hypertension. Approximately 72% of the white-coat hypertensives were treated. The cardiovascular event rate among the sustained hypertension group was approximately twice that of the WCH group (25.6 and 13.2 per 1000 person-years, respectively). Although the association persisted when controlling for confounders, normotensives were not included for comparison.

Strandberg and Salomaa (10) compared cardiovascular events occurring among men followed up 20 years: those with WCH (n=18), normotensive (n=259), mildly hypertensive (n=150), and sustained hypertensive (n=109) subjects. They found men with WCH (defined by a nurse-obtained blood pressure <140 mmHg or <90 mmHg and physician >160 mmHg or >95 mmHg) had an increased risk of dying over 20 years compared to normotensives (adjusted relative risk 3.3 [95% CI: 1.2–7.6]). However, ABPM was not used to classify patients as having WCH; the sample cannot be directly compared to other studies using a 24-hour monitoring. Furthermore, results were based on a single baseline blood pressure measurement, and there were very few individuals with WCH to provide precise risk estimates.

Gustavsen et al (11) followed up 566 individuals evaluated with ABPM a mean of 10.2 years: 344 patients had sustained hypertension, 76 WCH, and 146 patients were normotensive. Treatment was at the discretion of the patient's primary care physician: 60% of patients with WCH and 86% with sustained hypertension were treated with medications. Numerous potential confounders were measured and controlled for in the analysis, including age, gender, mean daytime blood pressure, office blood pressure, body mass index, smoking, previous cardiovascular disease, and diabetes. Cardiovascular events occurred in 16.3% of the sustained hypertension group and 18.4% in the WCH group, compared to 6.8% in the normotensive group. Using a Cox model to control for potential confounders, time to cardiovascular event in the sustained hypertension and the WCH groups were similar. Both had a slightly significantly higher event rate compared to the normotensive patients ($p=0.03$).

The Ohasama study (12) enrolled a representative sample from the Ohasama community in Japan (872 women and 462 men aged 40 years or older). Ambulatory and casual blood

pressures were obtained from all participants and those with white-coat and masked hypertension (normal casual blood pressures but elevated ABPM measurements). Over a mean 10.2-year follow-up, in a comparison with sustained normotensives, WCH was not accompanied by an increased risk of experiencing a cardiovascular endpoint or stroke morbidity (relative risks for men and women of 1.30 [95% CI: 0.64–2.66] and 1.15 [95% CI: 0.54–2.43], respectively). The analyses included relevant confounders, e.g., age, sex, smoking, antihypertensive medications, history of cardiovascular disease, hypercholesterolemia, and diabetes.

In another analysis from the same cohort (13), investigators examined whether WCH increased the risk of developing hypertension (contrasting the previous report that addressed cardiovascular endpoints). WCH appeared associated with developing hypertension in the home setting over an 8-year follow-up, “suggesting that white-coat hypertension may carry a poor cardiovascular prognosis” after all. However, inferences from the Japanese to U.S. population with regard to hypertension and cardiovascular risk must be considered circumspectly—even among those of Japanese descent living in the United States. (14)

In summary, these cohort studies establish that patients with WCH have a risk for cardiovascular events that is less than that of patients with sustained hypertension. However, the available evidence is not conclusive in ruling out a small increase in risk for patients with WCH compared to normotensive patients. Consequently, this evidence does not permit conclusions on whether patients with WCH will derive a clinically significant benefit from treatment with antihypertensive medications.

3) Cross-Sectional Studies. Many investigators have examined cross-sectional associations of cardiovascular risk factors with ABPM results. The implication of such studies is that if individuals with WCH or other ABPM profiles have adverse risk-factor profiles and other cardiovascular abnormalities similar to normotensive patients, treatment might be of little benefit. Still, cross-sectional results can be subject to incidence-prevalence biases and fail to define future events.

Numerous studies included in the 1999 TEC Assessment, and others subsequently published (e.g., Grandi et al [15], Bjorklund et al [16], and Sega et al [17]), compared end-organ damage (e.g., left ventricular mass, diastolic dysfunction, nephropathy, retinopathy, carotid intima media thickness) among WCH patients, true hypertensive patients, and normotensive patients. In general, results suggest that the risk profile of patients with WCH is less favorable than that for normotensive patients but more favorable than that for true hypertensive patients.

Taken as a whole, available studies do not provide consistent evidence that diagnostic use of ABPM leads to clinically significant health benefits for patients with elevated office blood pressure. The single RCT addressing this question, a substudy of a larger trial, was of limited power not providing definitive evidence for or against treatment benefit.

Furthermore, prospective cohort studies have reported inconsistent results regarding the risk of cardiovascular events among patients with WCH. Cross-sectional studies indicate patients with WCH have risk profiles differing from normotensive patients, suggesting they might benefit from treatment. The overall effect on health outcomes depends on the balance between potential overtreatment of hypertension using office-based blood pressure measurements and under treatment of hypertension using ABPM. The net effect of this trade-off cannot be determined from available evidence.

A report on blood pressure monitoring was completed by the Johns Hopkins Evidence-based Practice Center in November 2002. (18) This report comprehensively reviewed evidence relevant to various methods of blood pressure measurement, including review of the utility of ABPM for diagnosing and treating WCH. The evidence from prospective cohort studies was deemed insufficient to determine the risk of cardiovascular events for WCH compared to normotensive patients. The conclusion from cross-sectional studies was that patients with WCH had intermediate-risk profiles between normotensive and hypertensive patients. Furthermore, the authors stated that the "evidence was insufficient to determine whether the risks associated with WCH are sufficiently low to consider withholding drug therapy in this large subgroup of hypertensive patients." (18)

It has also been suggested that the number of baseline blood pressure measurements can influence interpretation of differences between clinic-based readings and ABPM results. Palatini examined ABPM, 6 clinic-based blood pressures obtained at baseline, or 18 obtained during the first 6 months from the Hypertension and Ambulatory Recording Venetia Study (n=1,067). (19) When analyzed in a model including potential confounders, 18 clinic-based measures obtained over 6 months more strongly predicted sustained hypertension over the ensuing 5 years than did ABPM.

Finally, research in numerous related areas has expanded the rationale and knowledge base for use of ABPM. One important area addresses the question of reference values for ABPM to provide guidelines for "normal" and "abnormal" ABPM readings. (20,21) A number of trials have evaluated ABPM for the management of established hypertension, comparing the effect of ABPM use on blood pressure control and medication use with usual care based on office measurements. (22-24) Some studies have compared home self-monitoring to ABPM and office measurement for management of medication treatment. (25-27) Others have attempted to determine predictors of WCH based on clinical factors and office blood pressure readings. (28) However, these areas of research do not provide specific evidence on the use of ABPM for diagnosing and treating patients with elevated office blood pressure, and thus are not included in the final evidence base for this policy.

Organization Policy Statements

Organization and consensus panels have established recommendations regarding the use of ABPM: the National High Blood Pressure Education Program; American College of Physicians; the American College of Cardiology; the Joint National Committee on

Prevention, Detection and Treatment of High Blood Pressure; the Canadian Hypertension Education Program; the European Society of Hypertension; and the British Hypertension Society. These policy statements are reviewed below.

National High Blood Pressure Education Program. The 1990 report (29) recommended that ambulatory blood pressure monitoring is not necessary or clinically appropriate for most hypertensive patients, particularly when target organ damage is apparent (clear candidates for antihypertensive therapy) or when other risk factors are present, i.e., strong family history of diabetes. However, a variety of clinical situations in which ambulatory measurements of blood pressure may be useful were outlined:

- Borderline hypertension with evidence of target organ damage (e.g., left ventricular hypertrophy, hypertensive retinopathy). Ambulatory pressure reading may be used to confirm or refute high blood pressure as the etiology.
- Resistant hypertension, diagnosed when multiple antihypertensive medications fail to control high blood pressure. Ambulatory recording can be used to determine if the office reading truly represents resistance to treatment.
- Episodic hypertension, raising the possibility of a pheochromocytoma or anxiety syndromes. Both of these may be best evaluated with a 24-hour recording of blood pressure.
- Transient hypotension from antihypertensive drug therapy. This may be difficult to diagnose in the office, ambulatory recordings may allow recognition and avoid overtreatment.
- “WCH” in patients with elevated office blood pressure. This situation presents a treatment dilemma. Ambulatory blood pressure reading is an objective method of evaluation of these patients, and may be useful for deciding whether to treat with medications.

The document noted definitive evidence of improved outcomes associated with the clinical use of ABPM was lacking, particularly in comparison with other methods of measuring blood pressure, e.g., serial measurements by a nonphysician in the office setting or patient self-measurement at home. In addition, the policy statement also points out that several technical issues remain unresolved, such as a standardized approach to data analysis. Furthermore, most of the data that link blood pressure to cardiovascular risk and clinical trials of antihypertensive agents have been primarily based on episodic office readings. It is unclear how 24-hour ambulatory reading should be extrapolated to office settings.

American College of Physicians. The American College of Physicians' 1993 position paper consists of an evidence-based review (30) and policy statement derived from the literature review. (31) The main findings regarding the use of ABPM for diagnosing hypertension are summarized as follows: “Self-measured blood pressure and automated ambulatory blood pressure monitoring devices may, in theory, have a specific role in the diagnosis, prognosis, and management of hypertension. The evidence supporting the role of automated ambulatory blood pressure measurement in the diagnosis and treatment of

hypertension is, for the most part, indirect. The major studies showing the benefits of treatment in decreasing the morbidity and mortality risks associated with hypertension have used office-based blood pressure measurements to make diagnoses and to treat and follow patients. Similar studies comparing treatment guided by self-measured blood pressures or automated ambulatory blood pressure to treatment guided by office-based blood pressures are required but have not been conducted. Therefore, the available evidence does not warrant widespread dissemination or routine use of automated ambulatory blood pressure measurement at this time. On the other hand, we support a more circumspect use of such devices for research and for the care of subgroups of hypertensive patients with specific clinical problems.”

However, the position paper does not further define the recommended patient subgroups to be targeted. The literature review also identified technical issues, similar to those identified by the National High Blood Pressure Education Program, i.e., lack of standardization of data analysis. In addition, limitations of the published literature were carefully considered—varying number of blood pressure readings, variety of personnel performing the readings, small sample sizes, and representativeness of study samples. The literature review concluded that published data suggest, but do not establish, the clinical utility of ambulatory blood pressure monitoring. The authors recommended that either patient self-monitoring or ambulatory blood pressure monitoring be considered in those patients with mild hypertension (diastolic pressure between 90 and 99 mm Hg) without end-organ damage, in whom the results of the measurements would help determine the necessity of antihypertensive medications.

American College of Cardiology. In 1990, the American College of Cardiology issued a policy statement on ambulatory blood pressure monitoring that identified the technology as “investigational,” based in part on technical concerns regarding device accuracy. The position statement was revised in 1994, stating that the previous concerns had been addressed. (32) Specifically, manufacturing standards had been developed, leading the American College of Cardiology to conclude that “ambulatory blood pressure monitoring has become a mature, clinically applicable (useful) technology for the management of selected hypertensive patients.” However, the policy statement does not appear to be evidence-based; no detailed discussion of the literature accompanied it.

Canadian Hypertension Education Program (CHEP). Guidelines for blood pressure measurement, diagnosis, and risk assessment have been published annually by CHEP. Strength of evidence underlying recommendations is graded ranging from “A” (studies with high internal validity, statistical precision, and generalizability) to “D” (expert opinion).

The 2005 recommendations (33) include ABPM as an alternative in the evaluation of patients “without evidence of microvascular target organ damage, diabetes mellitus and/or chronic kidney disease” with blood pressures less than 180 mm Hg systolic (SBP) and 110 mm Hg diastolic (DBP; grade C recommendation). “If ABPM is used, patients can

be diagnosed as hypertensive if the mean awake SBP is 135 mmHg or greater or the DBP is 130 mmHg or greater or the DBP is 80 mmHg or greater." Other clinical recommendations for ABPM included: 1) untreated patients with mild to moderate clinic blood pressure elevations and without target organ damage (grade B), 2) treated patients with blood pressure that is above target despite appropriate therapy (grade C), 3) treated patients with symptoms of hypotension (grade C), and 4) treated patients with fluctuating office readings (grade D).

A 2006 update to these guidelines (34) included new recommendations on the use of ABPM in the evaluation of "masked" hypertension (normal office blood pressure and elevated out-of-office blood pressure), but did not include any modifications for patients with isolated office hypertension.

Joint National Committee VII. The seventh report of the Joint National Committee (JNC) on the prevention, detection, evaluation, and treatment of high blood pressure (35), released in 2003, includes a brief section on the use of ABPM. The report states that "[a]mbulatory blood pressure monitoring is warranted for the evaluation of (white-coat) hypertension in the absence of target organ damage. It is also helpful to assess patients with apparent drug resistance, hypotensive symptoms with antihypertensive medications, episodic hypertension, and autonomic dysfunction."

European Society of Hypertension. The European Society of Hypertension updated guidelines in 2005 pertaining to the use of conventional, ambulatory, and home blood pressure measurement. (36) Outlined are both "accepted" and "potential indications" for the use of ABPM. The listed "accepted indications" include: suspected white-coat, nocturnal, masked, and resistant hypertension as well as to establish dipper status, and in hypertension of pregnancy.

The 2006 update to their recommendations on the clinical value of ABPM (37) states that "...use of office and ambulatory BP measurements has allowed the identification of a condition characterized by a persistently elevated office BP and a persistently normal ambulatory one." The guidelines further state that the evidence is conflicting on whether this is a benign condition or one that is associated with increased cardiac risk. Thus, they recommend that "...caution should be used when deciding whether or not such patients should be treated."

British Hypertension Society (BHS) Guidelines issued by the society in 2004 (38) include discussion of ABPM noting "[l]ike home blood pressure measurements, there are no outcome trials based solely on ABPM values," and "We do not recommend the use of ABPM for all patients, but it is helpful in specific circumstances." Those listed circumstances include: unusual blood pressure variability, possible WCH, informing equivocal treatment decisions, evaluation of nocturnal hypertension, evaluation of drug-resistant hypertension, determining the efficacy of drug treatment over 24 hours,

diagnoses and treatment of hypertension in pregnancy, and evaluation of symptomatic hypotension.

DOCUMENTATION

1. There must be documentation of the home blood pressure readings.
2. Multiple medications is defined as three or more antihypertensive medications at therapeutic dose.
3. There must be documentation in the medical record of the patient's compliance with provider orders.

CODING

The following codes for treatment and procedures applicable to this policy are included below for informational purposes. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

CPT/HCPCS

- 93784 Ambulatory blood pressure monitoring, utilizing a system such as magnetic tape and/or computer disk, for 24 hours or longer; including recording, scanning analysis, interpretation and report
- 93786 Ambulatory blood pressure monitoring, utilizing a system such as magnetic tape and/or computer disk, for 24 hours or longer; recording only
- 93788 Ambulatory blood pressure monitoring, utilizing a system such as magnetic tape and/or computer disk, for 24 hours or longer; scanning analysis with report
- 93790 Ambulatory blood pressure monitoring, utilizing a system such as magnetic tape and/or computer disk, for 24 hours or longer; physician review with interpretation and report
- A4670 Automatic blood pressure monitor

DIAGNOSIS

- 401.0 Essential hypertension, malignant
- 401.1 Essential hypertension, benign
- 401.9 Unspecified essential hypertension
- 796.2 Elevated blood pressure reading without diagnosis of hypertension
- 796.4 Other abnormal clinical findings

REVISIONS

11-06-2003	Added #4 a and b – “One follow up test will be allowed at least three weeks after initial test for: a. patients diagnosed with white-coat hypertension or b. assessment of hypertension apparently resistant to appropriate therapy.
09-18-2009	In Description section: ▪ Updated wording

	<p>In Policy section:</p> <ul style="list-style-type: none"> ▪ Updated indications From: <p>"Ambulatory blood pressure monitoring: will be allowed for patients with symptoms meeting the following criteria:</p> <ol style="list-style-type: none"> 1. Failed home blood pressure monitoring 2. Office pressure greater than 180/95 but less than 105 diastolic. 3. Treatment resistant and taking multiple medications. 4. One follow up test will be allowed at least three weeks after initial test for: <ol style="list-style-type: none"> a. Patients diagnosed with white-coat hypertension or b. Assessment of hypertension apparently resistant to appropriate therapy." <p>To:</p> <p>"Automated ambulatory blood pressure monitoring (ABPM) includes multiple blood pressure (BP) measurements over a 24-hour period and is considered medically necessary, for up to 72 hours with FDA-approved devices, for the evaluation of individuals with any of the following:</p> <ol style="list-style-type: none"> 1. Suspected "White Coat Hypertension" (WCH) which is defined as: <ul style="list-style-type: none"> ▪ In-office BP >140/90 mmHg on at least three separate clinic/office visits with two separate measurements taken at each visit; and ▪ At least two documented separate BP measurements taken outside the office setting which are <140/90 mmHg; and ▪ No evidence of end-organ damage 2. Individuals with resistant hypertension who are being treated with three or more medications 3. Hypertensive individuals with hypotensive symptoms and/or syncopal events thought to be related to antihypertensive medications or neurological syndromes, including autonomic dysfunction. 4. Episodic hypertension suspected when office BP measurements are normal and associated symptoms (e.g., excessive sweating, palpitations, pallor) suggest episodic hypertension secondary to an existing condition. 5. Suspected autonomic dysfunction."
	<p>Added Rationale section.</p>
	<p>In Coding section:</p> <ul style="list-style-type: none"> ▪ Added HCPCS code: A4670.

REFERENCES

1. 1999 TEC Assessments; Tab 8.
2. National High Blood Pressure Education Program. National High Blood Pressure Education Program (NHBPEP) Working Group Report On Ambulatory Blood Pressure Monitoring U.S.DHHS, NIH Publication No. 92-3028, 1992.
3. Fagard RH, Staessen JA, Thijs L et al. Response to antihypertensive therapy in older patients with sustained and nonsustained systolic hypertension. Systolic Hypertension in Europe (Syst-Eur) Trial Investigators. Circulation 2000; 102(10):1139-44.
4. Staessen JA, Thijs L, Fagard R et al. Predicting cardiovascular risk using conventional vs ambulatory blood pressure in older patients with systolic hypertension. Systolic Hypertension in Europe Trial Investigators. JAMA 1999; 282(6):539-46.
5. Fagard RH, Cornelissen VA. Incidence of cardiovascular events in white-coat, masked and sustained hypertension versus true normotension: a meta-analysis. J Hypertension, 2007; 25(11):2193-8.
6. Hansen TW, Kikuya M, Thijs L et al. Prognostic superiority of daytime ambulatory over conventional blood pressure in four populations: a meta-analysis of 7,030 individuals. J Hypertension, 2007;25(8):1554-64.

7. Verdecchia P, Reboldi GP, Angeli F et al. Short- and long-term incidence of stroke in white-coat hypertension. *Hypertension* 2005; 45(2):203-8.
8. Verdecchia P, Porcellati C, Schillaci G et al. Ambulatory blood pressure. An independent predictor of prognosis in essential hypertension. *Hypertension* 1994; 24(6):793-801.
9. Khattar RS, Senior R, Lahiri A. Cardiovascular outcome in white-coat versus sustained mild hypertension: a 10-year follow-up study. *Circulation* 1998; 98(18):1892-7.
10. Strandberg TE, Salomaa V. White coat effect, blood pressure and mortality in men: prospective cohort study. *Eur Heart J* 2000; 21(20):1714-8.
11. Gustavsen PH, Hoegholm A, Bang LE et al. White coat hypertension is a cardiovascular risk factor: a 10-year follow-up study. *J Hum Hypertens* 2003; 17(12):811-7.
12. Ohkubo T, Kikuya M, Metoki H et al. Prognosis of "masked" hypertension and "white-coat" hypertension detected by 24-h ambulatory blood pressure monitoring 10-year follow-up from the Ohasama study. *J Am Coll Cardiol* 2005; 46(3):508-15.
13. Ugajin T, Hozawa A, Ohkubo T et al. White-coat hypertension as a risk factor for the development of home hypertension: the Ohasama study. *Arch Intern Med* 2005; 165(13):1541-6.
14. Marmot MG, Syme SL, Kagan A et al. Epidemiologic studies of coronary heart disease and stroke in Japanese men living in Japan, Hawaii and California: prevalence of coronary and hypertensive heart disease and associated risk factors. *Am J Epidemiol* 1975; 102(6):514-25.
15. Grandi AM, Broggi R, Colombo S et al. Left ventricular changes in isolated office hypertension: a blood pressure-matched comparison with normotension and sustained hypertension. *Arch Intern Med* 2001; 161(22):2677-81.
16. Bjorklund K, Lind L, Vessby B et al. Different metabolic predictors of white-coat and sustained hypertension over a 20-year follow-up period: a population-based study of elderly men. *Circulation* 2002; 106(1):63-8.
17. Sega R, Trocino G, Lanzarotti A et al. Alterations of cardiac structure in patients with isolated office, ambulatory, or home hypertension: Data from the general population (Pressione Arteriose Monitorate E Loro Associazioni). *Circulation* 2001; 104(12):1385-92.
18. Appel LJ, Robinson KA, Guallar E et al. Utility of blood pressure monitoring outside of the clinic setting. Agency for Healthcare Research and Quality Evidence-based Practice Program, Evidence Report/Technology Assessment Number 63, 11/2002, available at <http://www.ahrq.gov/downloads/pub/evidence/pdf/utpb/utbp.pdf>.
19. Palatini P. Too much of a good thing? A critique of overemphasis on the use of ambulatory blood pressure monitoring in clinical practice. *J Hypertens* 2002; 20(10):1917-23.
20. Imai Y, Hozawa A, Ohkubo T et al. Predictive values of automated blood pressure measurement: what can we learn from the Japanese population - the Ohasama study. *Blood Press Monit* 2001; 6(6):335-9.
21. Verdecchia P. Reference values for ambulatory blood pressure and self-measured blood pressure based on prospective outcome data. *Blood Press Monit* 2001; 6(6):323-7.
22. Addison C, Varney S, Coats A. The use of ambulatory blood pressure monitoring in managing hypertension according to different treatment guidelines. *J Hum Hypertens* 2001; 15(8):535-8.
23. Staessen JA, Byttebier G, Buntinx F et al. Antihypertensive treatment based on conventional or ambulatory blood pressure measurement. A randomized controlled trial. *Ambulatory Blood Pressure Monitoring and Treatment of Hypertension Investigators. JAMA* 1997; 278(13):1065-72.
24. Staessen JA, Den Hond E, Celis H et al. Antihypertensive treatment based on blood pressure measurement at home or in the physician's office: a randomized controlled trial. *JAMA* 2004; 291(8):955-64.
25. Aylett M, Marples G, Jones K. Home blood pressure monitoring: its effect on the management of hypertension in general practice. *Br J Gen Pract* 1999; 49(446):725-8.

26. Rickerby J. The role of home blood pressure measurement in managing hypertension: an evidence-based review. *J Hum Hypertens* 2002; 16(7):469-72.
27. Weisser B, Mengden T, Dusing R et al. Normal values of blood pressure self-measurement in view of the 1999 World Health Organization-International Society of Hypertension guidelines. *Am J Hypertens* 2000; 13(8):940-3.
28. Verdecchia P, Palatini P, Schillaci G et al. Independent predictors of isolated clinic ('white-coat') hypertension. *J Hypertens* 2001; 19(6):1015-20.
29. National High Blood Pressure Education Program Working Group report on ambulatory blood pressure monitoring. *Arch Intern Med* 1990; 150(11):2270-80.
30. Appel LJ, Stason WB. Ambulatory blood pressure monitoring and blood pressure self-measurement in the diagnosis and management of hypertension. *Ann Intern Med* 1993; 118(11):867-82.
31. American College of Physicians. Automated ambulatory blood pressure devices and self-measured blood pressure monitoring devices: their role in the diagnosis and management of hypertension. *Ann Intern Med* 1993; 118(11):889-92.
32. Sheps SG, Clement DL, Pickering TG et al. Ambulatory blood pressure monitoring. Hypertensive Diseases Committee, American College of Cardiology. *J Am Coll Cardiol* 1994; 23(6):1511-3.
33. Hemmelgarn BR, McAllister FA, Myers MG et al. The 2005 Canadian Hypertension Education Program recommendations for the management of hypertension: part 1- blood pressure measurement, diagnosis and assessment of risk. *Can J Cardiol* 2005; 21(8):645-56.
34. Hemmelgarn BR, McAlister FA, Grover S et al. The 2006 Canadian Hypertension Education Program recommendations for the management of hypertension: part I – blood pressure measurement, diagnosis, and assessment of risk. *Can J Cardiol* 2006; 22(7):573-81.
35. Chobanian AV, Bakris GL, Black HR et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA* 2003; 289(19):2560-72.
36. O'Brien E, Asmar R, Beilin L et al. Practice guidelines of the European Society of Hypertension for clinic, ambulatory and self blood pressure measurement. *J Hypertens* 2005; 23(4):697-701.
37. Mallion JM, Baguet JP, Mancia G. European Society of Hypertension Scientific Newsletter: clinical value of ambulatory blood pressure monitoring. *J Hypertens* 2006; 24(11):2327-30.
38. Williams B, Poulter NR, Brown MJ et al. Guidelines for management of hypertension: report of the fourth working party of the British Hypertension Society, 2004-BHS IV. *J Hum Hypertens* 2004; 18(3):139-85.
39. Centers for Medicare and Medicaid Services. Coverage Determinations Manual, Part 1, Section 20.19, Ambulatory Blood Pressure Monitoring (Rev. 1, 10-03-03). Available online at http://www.cms.hhs.gov/manuals/downloads/ncd103c1_Part1.pdf . Last accessed June 2008.
40. Blue Cross and Blue Shield of Kansas Family Practice Liaison Committee, July 2009.
41. Blue Cross and Blue Shield of Kansas Internal Medicine Liaison Committee, August 2009.