Name of Policy: 
Automated Ambulatory Blood Pressure Monitoring

Policy #: 128
Category: Medicine

Background/Definitions:
As a general rule, benefits are payable under Blue Cross and Blue Shield of Alabama health plans only in cases of medical necessity and only if services or supplies are not investigational, provided the customer group contracts have such coverage.

The following Association Technology Evaluation Criteria must be met for a service/supply to be considered for coverage:

1. The technology must have final approval from the appropriate government regulatory bodies;
2. The scientific evidence must permit conclusions concerning the effect of the technology on health outcomes;
3. The technology must improve the net health outcome;
4. The technology must be as beneficial as any established alternatives;
5. The improvement must be attainable outside the investigational setting.

Medical Necessity means that health care services (e.g., procedures, treatments, supplies, devices, equipment, facilities or drugs) that a physician, exercising prudent clinical judgment, would provide to a patient for the purpose of preventing, evaluating, diagnosing or treating an illness, injury or disease or its symptoms, and that are:

1. In accordance with generally accepted standards of medical practice; and
2. Clinically appropriate in terms of type, frequency, extent, site and duration and considered effective for the patient’s illness, injury or disease; and
3. Not primarily for the convenience of the patient, physician or other health care provider; and
4. Not more costly than an alternative service or sequence of services at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of that patient’s illness, injury or disease.
**Description of Procedure or Service:**
Ambulatory blood pressure monitoring (ABPM) is a non-invasive technique by which multiple indirect blood pressure readings can be obtained over a period of one to three days while the individual maintains his daily activities. The devices are automatic, lightweight, and quiet and use auscultatory or oscillometric methods, or both, to determine blood pressure. There are several types of monitors, including fully automated monitors which inflate at preprogrammed levels; semi-automated monitors, which are activated by the individual; and transtelephonic monitors, which allow the use of the telephone to transmit continuously measured automatic digital readings of blood pressure to a computer assisted receiver. This policy only addresses fully automated monitors which inflate and record blood pressure at pre-programmed intervals.

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.

This policy does not directly address other uses of ABPM, including the use of ABPM for the evaluation of ‘masked’ hypertension. Masked hypertension refers to normal blood pressure (BP) readings in the office and elevated BP readings outside of the office. This phenomenon has recently received greater attention, with estimates that up to 10-20% of individuals may exhibit this pattern. Other potential uses of ABPM include monitoring patients with established hypertension under treatment; evaluating refractory or resistant blood pressure; evaluating whether symptoms such as lightheadedness correspond with blood pressure changes; evaluating nighttime blood pressure; examining diurnal patterns of blood pressure; and/or other potential uses.

**Policy:**
**Effective for dates of service on or after March 28, 2012:**
Automated ambulatory blood pressure monitoring meets Blue Cross and Blue Shield of Alabama’s medical criteria for coverage for a onetime 24-hour period for patients with elevated office blood pressure (BP), when performed to differentiate between “white coat” hypertension and true hypertension when **all** of the following conditions are met:

- Office blood pressure elevation is in the mild to moderate range (<180/110), not requiring immediate treatment with medication: **AND**
- There is no hypertensive end-organ damage on physical exam and laboratory testing.
All other uses of ABPM for patients with elevated office BP including but not limited to repeated testing in patients with elevated office BP does not meet Blue Cross and Blue Shield of Alabama’s medical criteria for coverage and is considered investigational. This policy only addresses fully automated monitors which inflate and record blood pressure at pre-programmed intervals.

**Effective for dates of service prior to March 28, 2012:**

**Automated ambulatory blood pressure monitoring does not meet** Blue Cross and Blue Shield of Alabama’s criteria for medical necessity, is non-covered and is considered investigational.

*Blue Cross and Blue Shield of Alabama does not approve or deny procedures, services, testing, or equipment for our members. Our decisions concern coverage only. The decision of whether or not to have a certain test, treatment or procedure is one made between the physician and his/her patient. Blue Cross and Blue Shield of Alabama administer benefits based on the members' contract and corporate medical policies. Physicians should always exercise their best medical judgment in providing the care they feel is most appropriate for their patients. Needed care should not be delayed or refused because of a coverage determination.*

**Key Points:**

In 1990, the American College of Cardiology issued a policy statement on ambulatory blood pressure monitoring that identified the technology as “investigational”, because of problems with accuracy of devices and issues related to cost and fear of abuse. In 1994, the statement was revised to state, “ambulatory BP 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 and no detailed discussion of the literature exists.

In 2000, Marchiando and Elston looked at many articles in the literature on the use of automated ambulatory BP monitoring in a Family Practice setting. They noted that the literature describes a normal diurnal variation in BP readings, with peak pressures typically at 6 a.m., higher daytime readings, lower readings in the evening, and the pressure nadir (dip) between 2 a.m. and 4 a.m. The absence of this decline in pressure may place patients at an increased risk of cardiovascular disease. According to several articles they cited, there are situations in which ambulatory BP monitoring may be useful: evaluation of a newly diagnosed hypertensive patient with or without target-organ damage, white coat hypertension, evaluation of drug-resistance or resistant hypertension, evaluation of pregnancy-induced hypertension, episodic hypertension, autonomic neuropathy, and orthostatic hypotension. The authors note that the current definition of hypertension (≥ 140/90) is difficult to apply to ABPM data because studies indicate ambulatory pressures are lower than clinical pressures. They note that this technology has the potential to reduce or simplify pharmacotherapeutic regimens used to treat hypertension, but further research is needed to link this tool to an overall improvement in morbidity and mortality in hypertensive patients.
In addition, in 1999 a study by Jula et al concluded that carefully controlled non-physician-measured clinic and self-measured home BPs, when averaged over four duplicate measurements, are as reliable as ambulatory BP monitoring in the clinical evaluation of untreated hypertension.

The Duke Clinical Research Institute and the American Heart Journal convened a panel of experts in ABPM to identify the utility and role of ABPM in contemporary clinical practice. An article by O’Shea et al published in May 2006 provides an overview of the issues discussed in ABPM. Initially, previous guidelines that have been issued for ABPM have lacked agreement because of new evidence that is continually added to the field. Disagreements also reflect the biases and research interests of the selected panels. The consensus of the experts at this meeting was that ABPM should be used in conjunction with, rather than as an alternative to, clinic BP, so that it can supply additional prognostic information. However, the question of how best to use ABPM in clinical practice remains unanswered. The group also discussed a report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure that related this comment about ABPM: “Ambulatory blood pressure monitoring is most clinically helpful and most commonly used in patients with suspected white coat hypertension, but it is also helpful in patients with apparent drug resistance, hypotensive symptoms with antihypertensive medications, episodic hypertension, and autonomic dysfunction”. It is also determined that ABPM should not be used routinely for screening for hypertension, evaluating patients with suspected hypertension, evaluating asymptomatic patients with persistently normal clinic BP.

In a final summation, the group concluded that there is a growing body of evidence to support using ABPM, but many pieces of the puzzle are not yet in place. Data are still being collected from longitudinal studies that should help prognostically useful target ranges for ambulatory BP. Long-term outcome trials are needed to establish the role of ABPM in the routine management of hypertensive patients. Data suggesting that ABPM is cost-effective and may, in the long term, be cost-saving need to be built upon with evidence from larger clinical trials. The role of ABPM in expediting and improving the drug evaluation process also needs to be clarified. The guidelines outlined in this review reflected a combination of evidence-based and consensus-derived recommendations.

Goyal et al reviewed evidence about the role of ambulatory blood pressure monitoring for people with congestive heart failure. This review of six small studies revealed that the evidence is limited. The authors concluded that ABPM monitoring may have prognostic and treatment implications for people with heart failure. Controlled studies are needed to assess the impact of treatment on circadian blood pressure profile in people with congestive heart failure.

August 2008 update
In August 2008, the American Heart Association (AHA) published a scientific statement recommending ambulatory blood pressure monitoring (ABPM) for certain children and adolescents suspected of having high blood pressure. The authors said that accurate diagnosis and early treatment of clinical hypertension is essential in this age group and that ABPM can aid in such diagnoses. While the AHA recently recommended home monitoring for adults with high blood pressure, the authors of the statement say ABPM has better diagnostic specificity for children compared with home measurement. But because the use of ABPM in children is relatively new, there are little data on the technology’s predictive ability or its effects on hard
outcomes such as heart attack and stroke, so the statement is expert-opinion driven, rather than evidence-based, they note. The authors also wrote that it is clear that ABPM is useful in the evaluation of BP levels in youth. However, there is a need for larger data sets, including normative data in healthy non-white populations. Information relating ABPM to well-defined or intermediate end points in youth with sustained hypertension is also lacking. Additional data will be important in evaluating the efficacy of ABPM in measuring effects of interventions and reversal of target organ damage. Further research is needed in the development of standardized protocols appropriate for validation of monitors used in pediatric patients. Also, cost-effectiveness analyses, that compare cost savings from the use of ABPM versus conventional CBP measurements to monitor hypertensive patients, have not been performed in children.

August 2010 Update
In a recent literature search no new published peer-reviewed studies were identified that would alter the coverage statement of this policy.

March 2012 Update
The focus is on the use of ambulatory blood pressure monitoring (ABPM) in previously untreated patients with elevated office blood pressure. In this situation, ABPM is intended primarily to evaluate “white coat hypertension” (WCH), or “isolated clinic hypertension” (ICH). This entity is defined as an elevated office blood pressure with normal blood pressure readings outside the physician’s office. It is diagnosed by obtaining multiple out-of-office blood pressure measurements and comparing them to office readings.

Evidence on whether ABPM improves health outcomes for patients with elevated office BP will be summarized in three general areas of research:

1. Reference values for ABPM
2. Impact of ABPM on outcomes (clinical trials)
3. Accuracy of ABPM as a diagnostic test for hypertension
   a. Prospective cohort studies
   b. Cross-sectional studies

Reference values for ABPM monitoring
One important area addresses the question of reference values for ABPM to provide guidelines for “normal” and “abnormal” ABPM readings. Studies that have compared ABPM measurements to office measurement consistently reveal lower values for ABPM. Therefore, it is not possible to use reference values for office blood pressure to evaluate the results of ABPM. Reference values for ABPM have been derived by several methods. 1) Estimates of population-based ABPM results to define the range and distribution of ABPM values. 2) Direct comparisons of the average values for ABPM and office blood pressure, to determine the level of ABPM, which corresponds to a office blood pressure (BP) of 140/90, and 3) Correlations of ABPM results with cardiovascular outcomes to determine the ABPM levels at which the risk for cardiovascular events increases, or is similar to the risk for an office BP of 140/90.

Although the specific recommendations vary slightly, current thresholds for defining a normal ABPM are 24-hour average BP of 130/80 and daytime average BP of 135/85. A task force from a Consensus Conference on ABPM considered data on the statistical distribution of ABPM, the correlation with office BP, and the correlation with cardiovascular outcomes in deriving
recommendations for reference values for ABPM. Their recommendations are summarized in the following chart:

<table>
<thead>
<tr>
<th>ABPM measure</th>
<th>95\textsuperscript{th} percentile</th>
<th>Normotension</th>
<th>Hypertension</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-hr average</td>
<td>132/82</td>
<td>&lt;130/80</td>
<td>&gt;135/85</td>
</tr>
<tr>
<td>Daytime average</td>
<td>138/87</td>
<td>&lt;135/85</td>
<td>&gt;140/90</td>
</tr>
<tr>
<td>Nighttime average</td>
<td>123/74</td>
<td>&lt;120/70</td>
<td>&gt;125/75</td>
</tr>
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**Impact of ABPM on outcomes**

Clinical Trials: Direct evidence of the efficacy of ABPM improving outcomes in this setting would be obtained from randomized controlled trials (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.” 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 equal to or more than 1 month apart. 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 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 [SBP] 160–219 mm Hg, diastolic BP [DBP] <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 BP was taken into account.

Prospective cohort studies: Well-designed, prospective cohort studies could provide indirect evidence on the potential benefit of treatment for patients with WCH. 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. In contrast, if the cardiovascular risk for patients with WCH is increased, then there is a potential benefit to treatment.

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. These studies have been generally consistent in reporting that the cardiovascular risk for patients with WCH is intermediate, between that of hypertensive patients and normotensive patients.

At least 3 meta-analyses have been published that summarize the results of the available cohort studies. Fagard and Cornelissen 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% confidence interval [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 used patient-level data from 4 previous cohorts of patients to construct an international database on ambulatory BP 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 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.
Accuracy of ABPM as a diagnostic test for hypertension

Studies of the accuracy of ABPM as a diagnostic test for hypertension are of two types. First, prospective cohort studies that correlate the results of ABPM with future cardiovascular events, and compare this correlation to office BP measurements, provides indirect evidence on the accuracy of ABPM by assuming that the more accurate test will have a higher correlation with hypertension-related outcomes. Second, cross-sectional studies can directly compare the accuracy of ABPM compared with office BP, using a gold standard for diagnosis. For these types of studies, ABPM is often considered to be the gold standard, and the accuracy of other methods of measuring BP is compared against ABPM.

Prospective cohort studies. Many prospective cohort studies have compared ABPM with office BP in predicting cardiovascular events. Although the results of these studies are not entirely consistent, the majority report that ABPM has greater predictive ability for cardiovascular events compared to office BP measurement. A summary of relevant systematic reviews and meta-analyses of these studies is given below.

Hansen et al performed a patient-level meta-analysis using data from four populations in Belgium, Denmark, Japan, and Sweden with a total of 7,030 individuals. The predictive value of ABPM and clinic BP for fatal and non-fatal cardiovascular events was reported. Both ABPM and office BP were predictors of outcomes in univariate and partially-adjusted multivariate models. In the fully adjusted model, ABPM remained a significant predictor of outcomes while office BP did not.

Conen et al performed a meta-analysis on 20 cohort studies that evaluated the correlation between ABPM and outcomes and controlled for office BP in the analysis. These authors reported that ABPM was a strong predictor of cardiovascular outcomes and that controlling for office BP had little effect on the risk estimates. These results support the hypothesis that the risk information obtained from ABPM is independent of that from office BP.

Cross-sectional studies. Numerous studies have directly compared ABPM with office BP and/or home self-measured BP. Hodgkinson et al performed a systematic review of studies that compared ABPM with home or office BP and used clearly defined thresholds to determine the accuracy of diagnosis of hypertension. Seven studies were identified that compared ABPM with office BP measurements, and three studies were identified that compared ABPM to home self-measurement. Using a 24-hour ABPM threshold of 135/85, clinic BP measurements had a sensitivity of 74.6% (95% CI: 60.7-84.8%) and a specificity of 74.6% (95% CI: 47.9-90.4%). Home BP self-measurement had a sensitivity of 85.7% (78.0-91.0%) and a specificity of 62.4% (48.0-75.0%). The accuracy of office and home BP was not considered adequate for use as a single diagnostic test for hypertension, and it was hypothesized that the use of office and/or home measurements may lead to substantial over-diagnosis and overtreatment.

In a similar systematic review, Stergiou and Bliziotis compared the accuracy of ABPM with home blood pressure measurement for the diagnosis of hypertension. A total of 16 studies were included in this analysis. The sensitivity of home BP measurement, compared to ABPM, ranged from 36-100% with a median value of 74%. Specificity ranged from 44-96% with a median value of 84%. This study also reported the diagnostic agreement between the 2 methods of BP measurement, as measured by the kappa statistic. In the 11 studies where kappa could be
calculated, the range of scores was 0.37 to 0.73, with a median value of 0.46. This kappa level indicates moderate agreement between ABPM and home monitoring in the diagnosis of hypertension.

Lovibond et al performed a cost-effectiveness study comparing ABPM with office BP measurement and home measurements. For the majority of patient indications, ABPM resulted in the greatest amount of quality-adjusted life years (QALYs) gained, and in individuals older than age 50 years, ABPM was consistently associated with the largest incremental gain in QALYs. It was cost-saving in all patient groups compared to alternatives and remained the most cost-effective alternative under the majority of sensitivity analysis. As a result of these findings, the authors recommended that ABPM be performed for most patients before the decision to start anti-hypertensive medications is made.

Other studies. A number of trials have evaluated ABPM for the management of established hypertension, comparing the effect of ABPM use on BP control and medication use with usual care based on office measurements. Some studies have compared home self-monitoring to ABPM and office measurement for management of medication treatment. Others have attempted to determine predictors of WCH based on clinical factors and office BP readings. 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.

**December 2012 Update**

**ABPM in children and adolescents**
ABPM has been used in children and adolescents for similar purposes as in adults, including use in children and adolescents with elevated office BP to distinguish true hypertension (HTN) from white coat hypertension (WCH). The evidence on use in children and adolescents is of a similar type for adults but of a smaller quantity. A representative sample of studies identified is described below.

In a study from Europe, 139 children and adolescents between the ages of 4-19 years of age with elevated office BP were evaluated by ABPM monitoring. A total of 32/139 (23.0%) of participants had WCH as evidenced by a normal 24-hour ABPM result. Of patients with true hypertension, 21/107 (19.6%) had evidence of target organ damage, compared to none of the patients with WCH. In a similar study from the U.S., Sixty-seven otherwise healthy children underwent ABPM, 51 of whom had an elevated office BP. Using three definitions of WCH of varying BP cutoffs, WCH was identified in 22-53% of children with elevated office BP. In a study from Japan, 206 children and adolescents between the ages of 6-25 years underwent ABPM, 70 of whom had elevated office BP. Among the 70 patients with elevated office BP, 33/70 (47%) had WCH, as defined by a normal ABPM result. A white coat effect of 10 mmHg or more was reported in 50% of patients with office HTN and 25% of patients with normal office BP.

**Clinical Input Received through Physician Specialty Societies and Academic Medical Centers**
None
Summary
Ambulatory blood pressure monitoring performed over a 24-hour period is a more accurate method for evaluating blood pressure compared to office measurements and home blood pressure measurements. Reference values for normal and abnormal ABPM results have been derived from epidemiologic research. These reference values vary slightly among different sources but are available for clinical use. Data from large prospective cohort studies establish that ABPM correlates more strongly with cardiovascular outcomes compared to other methods of BP measurement. Prospective cohort studies also indicate that WCH, as defined by ABPM, is associated with an intermediate risk of cardiovascular outcomes compared to normotensive and hypertensive patients.

Studies comparing home blood pressure monitoring and office monitoring to ABPM as the gold standard report that the sensitivity and sensitivity of alternative methods of diagnosing hypertension are suboptimal. Substantial percentages of patients with elevated office BP are found to have normal BP on ABPM, and these patients are at risk for over-diagnosis and overtreatment based on office BP measurements alone. Use of ABPM in these patients will improve outcomes by eliminating the inconvenience and morbidity of pharmacologic treatment in patients who are not expected to benefit. Therefore, ambulatory blood pressure monitoring may be considered medically necessary for the evaluation of patients with elevated office blood pressure.

Practice Guidelines and Consensus Statements
NICE: The UK’s National Institute for Health and Clinical Excellence (NICE) issued updated hypertension guidelines in 2011. For diagnosing hypertension, NICE made the following recommendations concerning ABPM:

- If the clinic blood pressure is 140/90 mm Hg or higher, offer ambulatory blood pressure monitoring (ABPM) to confirm the diagnosis of hypertension.
- When using ABPM to confirm a diagnosis of hypertension, ensure that at least two measurements per hour are taken during the person’s usual waking hours. Use the average of at least 14 measurements taken during usual waking hours to confirm a diagnosis of hypertension.

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 2010 recommendations include ABPM as an alternative in the evaluation of patients “without evidence of 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). ABPM is considered an acceptable alternative to continued office BP readings or home self-monitoring to confirm the diagnosis of hypertension. If ABPM is used, patients can be diagnosed as hypertensive if the mean awake SBP is 135 mm Hg or greater or the DBP is 130 mm Hg or greater or the DBP is 80 mm Hg 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).

**European Society of Cardiology:** The European Society of Cardiology published updated guidelines on the diagnosis and treatment of hypertension in 2007. These guidelines made the following recommendations:

- Ambulatory blood pressure monitoring may improve prediction of cardiovascular risk in untreated patients.
- 24-hour ambulatory blood pressure monitoring should be considered when:
  - Considerable variability of office BP is found over the same or different visits.
  - High office BP is measured in subjects otherwise at low total cardiovascular risk.
  - There is marked discrepancy between BP values measured in the office and at home.
  - Resistance to drug treatment is suspected.
  - Hypotensive episodes are suspected, particularly in elderly and diabetic patients.
  - Office BP is elevated in pregnant women and pre-eclampsia is suspected.
- Normal values for ABPM should be approximately 125-130/80 for a 24-hour average BP; and 135/85 for average daytime BP.

**Joint National Committee VII:** The seventh report of the Joint National Committee (JNC) on the prevention, detection, evaluation, and treatment of high blood pressure, 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. 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 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 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.

**AHRQ Evidence-Based Practice Center Program:** A report on blood pressure monitoring was completed by the Johns Hopkins Evidence-based Practice Center in November 2002. 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 "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."

**National High Blood Pressure Education Program:** The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents was published in 2004. This report made the following statements concerning the use of ABPM in children and adolescents:

- ABPM is especially helpful in the evaluation of white-coat hypertension, as well as the risk for hypertensive organ injury, apparent drug resistance, and hypotensive symptoms with antihypertensive drugs.
- ABPM is also useful for evaluating patients for whom more information on BP patterns is needed, such as those with episodic hypertension, chronic kidney disease, diabetes, and autonomic dysfunction.
- Conducting ABPM requires specific equipment and trained staff. Therefore, ABPM in children and adolescents should be used by experts in the field of pediatric hypertension who are experienced in its use and interpretation.

**Key Words:**
Automated ambulatory blood pressure monitoring, ABPM, 24-hour sphygmomanometers

**Approved by Governing Bodies:**
There are numerous blood pressure monitors that have received a 510K marketing clearance per the U.S. Food and Drug Administration.

**Benefit Application:**
Coverage is subject to member’s specific benefits. Group specific policy will supersede this policy when applicable.

ITS: Home Policy provisions apply
FEP contracts: FEP does not consider investigational if FDA approved. Will be reviewed for medical necessity. Special benefit consideration may apply. Refer to member’s benefit plan. Pre-certification/Pre-determination requirements: Not applicable
CPT codes: 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  recording only
93788  scanning analysis with report
93790  physician review with interpretation and report

References:


Policy History:
Medical Policy Group, September 2003
Medical Policy Administration Committee, September 2003
Available for comment September 8-October 22, 2003
Medical Policy Group, July 2005 (1)
Medical Policy Group, July 2007 (1)
Medical Policy Group, August 2008 (3)
Medical Policy Group, August 2010 (1) No new info to change coverage statement
Medical Policy Group, March 2012 (3): 2012 Updates: Policy, Key Points, Key Words, References
Available for comment March 28 through May 14, 2012
Policy statement remains unchanged

This medical policy is not an authorization, certification, explanation of benefits, or a contract. Eligibility and benefits are determined on a case-by-case basis according to the terms of the member’s plan in effect as of the date services are rendered. All medical policies are based on (i) research of current medical literature and (ii) review of common medical practices in the treatment and diagnosis of disease as of the date hereof. Physicians and other providers are solely responsible for all aspects of medical care and treatment, including the type, quality, and levels of care and treatment.

This policy is intended to be used for adjudication of claims (including pre-admission certification, pre-determinations, and pre-procedure review) in Blue Cross and Blue Shield’s administration of plan contracts.