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Tips and algorithms to get your patient's BP to goal

Having diagnosed, treated, and studied hypertension for more than 3 decades, this author offers advice and 3 handy algorithms to help you optimize your care.

The Systolic Blood Pressure Intervention Trial (SPRINT),¹ a study of more than 9000 patients published late last year, was stopped prematurely when it became clear that those receiving intensive treatment (systolic target 120 mm Hg) had significantly lower rates of myocardial infarction (MI), stroke, cardiovascular death, and other severe heart disease than those getting standard treatment (systolic target 140 mm Hg). Participants had an elevated cardiovascular risk at baseline (age ≥ 75 years, history of cardiovascular disease [CVD], chronic kidney disease [CKD], or elevated 10-year Framingham CVD risk score $\geq 15\%$); those with diabetes, history of stroke, or polycystic kidney disease were excluded.

Although serious adverse events were not significantly different between the intensive and standard treatment groups, syncope, acute renal failure, electrolyte abnormalities, and hyponatremia were all statistically more common in the aggressively treated group. (To learn more, see "Is lower BP worth it in higher-risk patients with diabetes or coronary disease?" *Clinical Inquiries, J Fam Pract.* 2016;65:129-131.)

■ **Taking an aggressive approach.** This trial shined a light on an important topic in medicine—the aggressive treatment of hypertension. And while this article will not discuss the finer points of the SPRINT trial or the limitations of generalizing aggressive treatment to the broad population of patients with hypertension, it will outline important

considerations for physicians who wish to aggressively treat hypertension. I offer recommendations based on my 34 years of clinical practice and experience as a co-investigator on a number of hypertension studies to help you better balance each patient's risks (eg, age, frailty, fall risk) and potential benefits (prevention of stroke, MI, and congestive heart failure).

Taking an aggressive approach, however, starts with ensuring that the diagnosis and treatment are based on accurate measures.

How accurate are your BP readings?

Measuring BP in clinical practice is markedly different from measurements taken in a research setting.² This can result in large, clinically significant differences in readings and adversely affect treatment decisions.

Quiet time, multiple readings

SPRINT used techniques similar to those followed by other hypertension outcomes studies I've been involved in—methods that are rare in medical practice. Each study participant sat quietly in a chair for 5 minutes prior to the first BP reading. In addition, the researchers used an automatic oscillatory BP device (Omron Healthcare, Lake Forest, Ill), recording the average of 3 readings.

■ **Practices that compromise accuracy.** In clinical practice, BP is rarely measured after the patient has had 5 minutes of rest in a quiet

room. Nor are readings done in triplicate. Instead, BP is typically measured while patient and clinician are engaged in conversation, often using a BP cuff that is too small (in my experience, most Americans require a large cuff).

BP is usually taken shortly after the patient has walked, frequently with some difficulty, from the waiting area to the exam room. Often, too, patients are weighed before their BP is measured, a common source of concern that can lead to a short-term rise in pressure. (Conversely, rapid deflation during the auscultatory measurement [>2 mm Hg/sec] can have the opposite effect, resulting in under-reading the true value.)

■ Compounding matters is the failure to consider the approximately 20% of patients who develop White Coat Syndrome. Such individuals, who typically have elevated office measurements but normal out-of-office readings, may develop further hypotensive symptoms if their treatment is based solely on in-office findings. Overtreatment of frail patients who often have marked orthostatic hypotension is an additional concern.

How to get more accurate readings

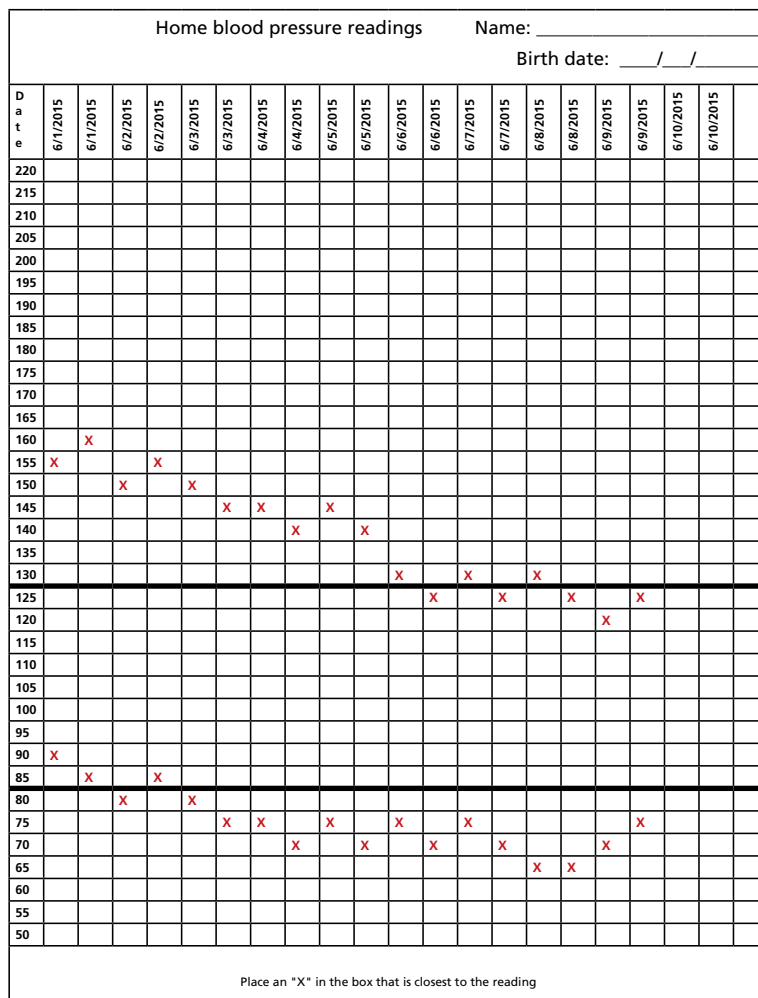
It's clear that taking the treatments that lead to optimal outcomes in clinical trials and applying them to clinic patients based on their office measurements is likely to result in overtreatment, leading to hypotension and endangering patients. The following steps, however, can ensure more accurate readings and thus, a proper starting place for treatment.

■ Use an oscillatory device. I suggest that clinical practices switch to oscillatory digital devices like those used in virtually all clinical research studies I've been involved in for the past 20 years. There are oscillatory digital devices designed for medical offices that automatically record BP readings. However, these are much more expensive.² The home oscillatory devices I'm referring to can be purchased for each exam room, with various sized cuffs.

■ Go slow, repeat as needed. Have the rooming staff or medical assistant measure BP only after the patient interview is complete. The patient should sit down, with both feet on the floor, legs uncrossed.

FIGURE

Changing medications? Have patients monitor themselves twice daily for a month



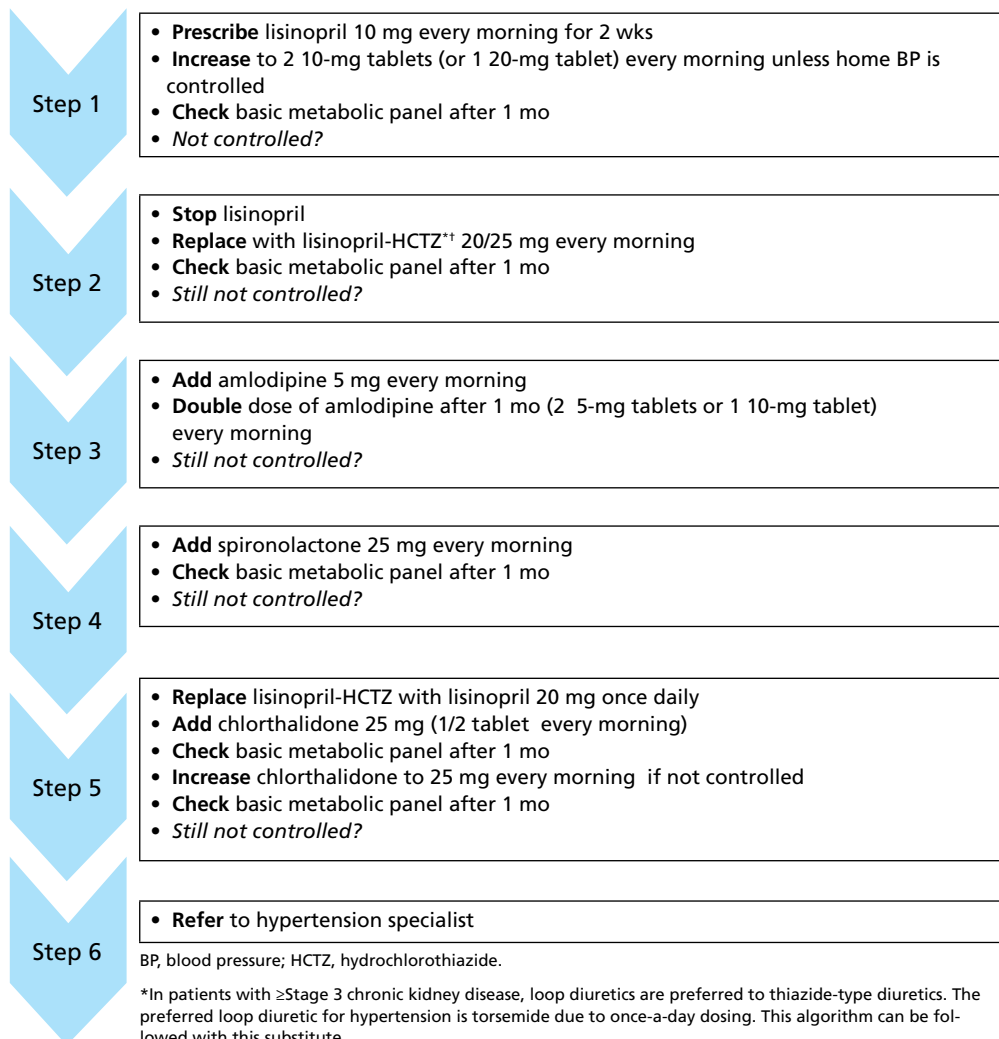
This patient's home blood pressure readings for 10 days of the month (measured daily at breakfast and dinnertime after a change in medication) revealed a gradual decline in BP.

If the reading is elevated, the staffer should show the patient how to repeat the measurement, then prepare to leave the room, advising him or her to sit quietly for 3 to 5 minutes before doing so. This method is both practical and time efficient. Occasionally, oscillometric measures result in an extremely elevated diastolic reading; in such a case, I recommend that a clinician manually rereasure BP.

■ Incorporate home monitoring. Out-of-office readings are important, not only for the initial diagnosis of hypertension, but

ALGORITHM 1

For patients requiring a modest (10/5 mm Hg) reduction in BP



BP, blood pressure; HCTZ, hydrochlorothiazide.

*In patients with \geq Stage 3 chronic kidney disease, loop diuretics are preferred to thiazide-type diuretics. The preferred loop diuretic for hypertension is torsemide due to once-a-day dosing. This algorithm can be followed with this substitute.

[†]Indapamide, the preferred diuretic outside of the United States, has favorable outcome data and could be considered rather than hydrochlorothiazide. It is more potent than hydrochlorothiazide and similar to chlorthalidone; however, combination products are lacking in the United States.¹⁰

➤ Having patients sit quietly for 5 minutes before measuring their blood pressure may lead to more accurate results.

for clinical management of established hypertension, as well.³ Guidelines from both the US Preventive Services Task Force (USPSTF) and the National Institute for Health and Care Excellence (NICE) call for 24-hour ambulatory monitoring to establish a hypertension diagnosis.^{3,4} Accuracy is imperative, as this is commonly a lifelong diagnosis that should not be established based on a few, often inaccurately measured office readings.

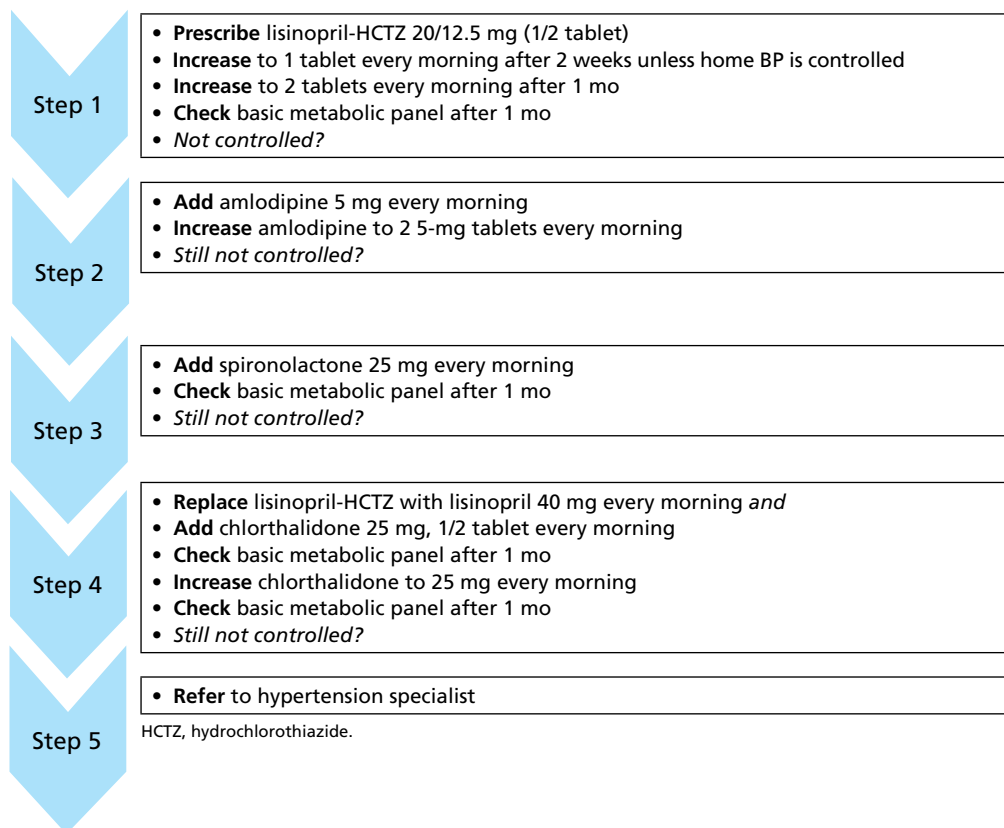
Home monitoring improves BP control and correlates more closely with ambulatory monitoring than with office readings.^{5,6} I use

an Excel spreadsheet (Microsoft, Bellevue, Wash.) to have patients send me their home BP readings, but commercially available software programs, if available, and smart phone apps may be used instead.

My preference is to have patients measure and record their BP at breakfast and dinnertime (always after a 3-to-5-minute rest) for a month after any change in the medication regimen (FIGURE), and then send the chart to the office. (There are other protocols for how often and how long to monitor home BP, but this is the format I use.)

ALGORITHM 2A

For reductions $\geq 20/10$ mm Hg—and for Asian or African American patients



➤ Spironolactone, an aldosterone receptor antagonist, is very useful in resistant hypertension.

Adjustments in medications can be continued based on the home readings until the goal is reached.

I advise all patients I treat for hypertension to check their BP on the first day of each month and record the measurements for review at their next office visit.

What to consider for optimal treatment

Screening patients for concurrent disease and hypertensive end-organ damage, of course, should be routine for primary care physicians. Baseline tests should include a complete blood count, electrolytes with creatinine clearance, and an electrocardiogram. A review of a recent echocardiogram and spot urine for microalbuminuria will also be useful, if clinically indicated.

■ Cost, compliance, and concurrent

disease. Generic drugs with a long half-life to ensure 24-hour coverage are the optimal choice due to both cost and compliance. Some agents may be chosen because they also treat concurrent disease—a beta-blocker for a patient with heart failure with reduced ejection fraction or migraines, an angiotensin-converting enzyme (ACE) inhibitor/angiotensin receptor blocker (ARB) for diabetes, a diuretic for fluid overload, or spironolactone for systolic congestive heart failure.

Single agent or combination?

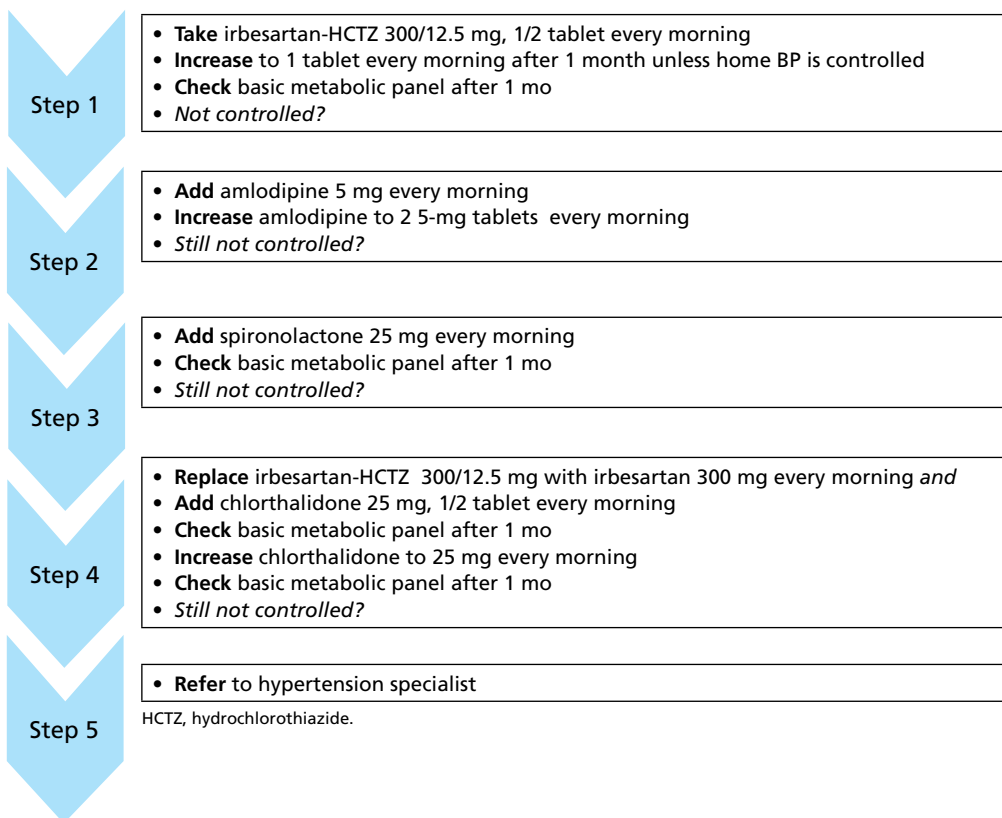
Most single drugs lower BP by approximately 10 mm Hg systolic and 5 mm Hg diastolic, with 2-drug combinations lowering pressure by 20 mm Hg and 10 mm Hg, respectively.⁷ Amlodipine, chlorthalidone, and azilsartan medoxomil, all of which have long half-lives, are approximately 50% more potent than other antihypertensive agents.

CONTINUED

➤
Home monitoring of blood pressure correlates more closely with ambulatory monitoring than with office readings.

ALGORITHM 2B

Another option for patients needing reductions $\geq 20/10$ mm Hg—and for African American patients



When the target BP is a reduction $\geq 20/10$ mm Hg, starting with dual drug therapy is often useful. In such cases, it is prudent not only to be sure that BP has been accurately measured, but to begin with half-tablet doses for several days to allow the patient to acclimate to the change in pressure. Beta-blockers, central sympatholytic drugs, direct vasodilators, and alpha antagonists are *not* considered first-, second-, or third-line agents.

Spironolactone, an aldosterone receptor antagonist, is very useful in resistant hypertension,⁸ defined as inadequate BP control despite a triple regimen of an ACE inhibitor or ARB, calcium channel blocker, and thiazide diuretic. (For more information, see "Resistant hypertension? Time to consider this fourth-line drug," on page 266.) Patients on spironolactone require electrolyte monitoring due to the risks of hyponatremia and hyperkalemia, especially in combination with an ACE inhibitor or ARB.

I advocate monitoring such patients after one month, although every 2 weeks for at least the first 6 weeks of treatment is prudent for patients with CKD. Mild hyperkalemia (<5.5 mEq/L) or hyponatremia (>130 mEq/L) is well tolerated, but conditions associated with sudden dehydration, such as diarrhea or vomiting, can rapidly worsen these imbalances and be clinically significant.

Treatment algorithms can help

SPRINT and other hypertension trials have used algorithm-based drug additions to reach the desired goals. In SPRINT, one or more antihypertensive drug classes with the strongest evidence to prevent cardiovascular disease outcomes were initiated and adjusted at the discretion of the investigators. The initial drug classes were thiazide-type diuretics (chlorthalidone was preferred unless advanced CKD was present, and then loop

diuretics), calcium channel blockers (amlodipine preferred), ACE inhibitors (lisinopril was preferred), and ARBs (losartan or azilsartan medoxomil preferred).

The algorithms in this article may be considered for the treatment of hypertension. They are based on my experience, as well as on guidance from the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.⁹

ALGORITHM 1 is suitable for patients who initially need only 10/5 mm Hg lowering.¹⁰ **ALGORITHM 2A** may be used for patients for whom you wish to lower BP by $\geq 20/10$ mm Hg. I also recommend **2A** for patients of Asian descent; that's because ARBs are preferable to ACE inhibitors, which are associated with a high incidence of cough in this patient population. Either **ALGORITHM 2A** or **2B** may be used for African-American patients with hypertension, as ACE inhibitors and ARBs alone are less effective for this group.

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