NEW JOINT NATIONAL COMMITTEE RECOMMENDATIONS AS THEY AFFECT BLACK HYPERTENSIVE PATIENTS

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The Joint National Committee (JNC) on Detection, Evaluation, and Treatment of High Blood Pressure has released three reports since the founding of the National High Blood Pressure Education Program (NHBPEP) in 1972. The most recent report was published in May of 1988[1] and, like previous reports, was based on the latest scientific research relating to the management of hypertension. Among its more notable features, the new report broadens the stepped-care approach, encourages greater involvement of the patient in the treatment program, addresses the quality of life in the management of patients, provides a discussion on the cost of care, and places greater emphasis on control of other cardiovascular risk factors.

Importantly too, the 1988 JNC report examines the needs of a number of special populations, including blacks and other racial and ethnic minority groups, young and elderly patients, pregnant patients, surgical candidates, and hypertensives with coexisting medical problems. In this article, I review some of the key recommendations contained in this report, especially as they pertain to black hypertensives. I also focus on certain problem areas common to patients of any racial or ethnic background. For completeness, the 1988 JNC report should be examined in its entirety.[1]

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PROBLEM OF HYPERTENSION IN BLACK PATIENTS

Epidemiologic data have shown that black people have a considerably higher prevalence of high blood pressure than do whites. Blacks may develop hypertension at an earlier chronologic age and tend to have a more severe form of the disease. The higher prevalence, along with greater severity, increases the risk of stroke, end-stage renal disease, congestive heart failure, and left ventricular hypertrophy (LVH). As a result, hypertension-related mortality rates are disproportionately high among blacks, particularly in younger age groups.

On the positive side, there is perhaps a greater potential for reducing hypertension-related morbidity and mortality in the black population, due, in part, to the fact that heightened concern about the problem has prompted increased efforts at blood pressure control in blacks throughout the country. Indeed, there is evidence that hypertension-related deaths among blacks are now declining and that, in some communities, stroke mortality rates are falling more rapidly in blacks than in whites. Despite these encouraging trends, the JNC report emphasizes that hypertension continues to be the most serious health problem among blacks in this country.

DETECTION OF HIGH BLOOD PRESSURE

The JNC report stresses that hypertension should not be diagnosed on the basis of a single measurement. Initial elevated readings should be confirmed on at least two subsequent visits, with average levels of diastolic pressure of >90 mmHg or systolic pressure of >140

TABLE 1

FOLLOW-UP CRITERIA FOR INITIAL BP MEASUREMENT

Adults ≥18 Years

BP Range, mmHg	Recommended Follow-up
DBP	
<85	Recheck within 2 yr
85–89	Recheck within 1 yr
90–104	Confirm within 2 mo
105–114	Evaluate or refer promptly to source of care within 2 wk
≥115	Evaluate or refer immediately to source of care
SBP, when DBP <90 mmHg	
<140	Recheck within 2 yr
140–199	Confirm within 2 mo
≥200	Evaluate or refer promptly to source of care within 2 wk

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TABLE 2

CLASSIFICATION OF HYPERTENSION IN THE YOUNG

Age Group	≥95th Percentile	≥99th Percentile
Newborns, d		
7 (SBP)	≥96	≥106
8-30 (SBP)	≥104	≥110
Infants (≤2 yr)		
SBP	≥112	≥118
DBP	≥74	≥82
Children, yr		
3–5		
SBP	≥116	≥124
DBP	≥76	≥84
6–9		
SBP	≥122	≥130
DBP	≥78	≥86
Children, yr		
10–12		
SBP	≥126	≥134
DBP	≥82	≥90
13–15		
SBP	≥136	≥144
DBP	≥86	≥92
Adolescents (16-18 yr)		
SBP	≥142	≥150
DBP	≥92	≥98

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mmHg required for diagnosis. Table 1 provides follow-up advice based on the initial blood pressure measurement. Repeated measurements determine whether initial elevations persist and require close observation or prompt attention, or whether they have returned to normal and need only periodic remeasurement.

Clinicians may elect to observe patients with newly diagnosed "mild" hypertension (90 to 104 mmHg diastolic or 140 to 199 mmHg systolic) over a three- to six-month interval prior to initiating drug therapy because pressures may return to normal during that time. In my own practice, I prefer not to use the term "mild" because patients often will interpret that to mean "unimportant" or "benign."

On the other hand, patients with severely elevated initial diastolic blood pressure readings (>115 mmHg) need immediate attention and perhaps treatment. If these patients are lost to follow-up, the consequences could be devastating. Importantly too, it is recommended that patients with initial diastolic blood pressures of 105 to 114 mmHg or isolated systolic blood pressures of >200 mmHg be evaluated or referred promptly within two weeks.

The JNC report briefly considers the problem of hypertension in children (<18 years of age), referring readers to the Report of the Second Task Force on Blood Pressure in Children 1987 for more comprehensive information.[2] Although less than 3% of children in the US have hypertension, data indicate that a substantial proportion of the black pediatric population has significant increases in blood pressure as early as the age of 10 to 14 years.

Significant hypertension in children is defined as blood pressure persistently equal to or greater than the 95th percentile for age, whereas severe hypertension indicates blood pressure persistently equal to or greater than the 99th percentile (Table 2). As in adults, children require repeated and appropriately obtained measurements to determine the stability or lability of the blood pressure elevation. The higher the blood pressure and the younger the child, the greater the possibility of secondary hypertension.

The type of intervention is dictated by the underlying cause, severity, or complications of hypertension in children. The JNC report recommends that antihypertensive drug therapy generally be reserved for those whose blood pressure levels are above the 99th percentile or whose significantly elevated pressures fail to respond to nonpharmacologic approaches. Generally, pharmacologic agents used for adults are also effective in young persons.

TABLE 3
DRUG-RELATED CAUSES OF REFRACTORY HYPERTENSION

- Doses too low
- Inappropriate combinations (eg, two centrally acting adrenergic inhibitors)
- Rapid inactivation (eg, hydralazine)
- Effects of other drugs
  - —Sympathomimetics
  - —Antidepressants
  - —Adrenal steroids
  - —Nonsteroidal antiinflammatory drugs
  - —Nasal decongestants
  - —Oral contraceptives
- Associated conditions
  - —Increasing obesity
  - —Excess alcohol intake: >30 mL/d (1 oz/d)
  - —Renal insufficiency
  - —Renovascular hypertension
  - —Malignant or accelerated hypertension
  - —Other causes of hypertension

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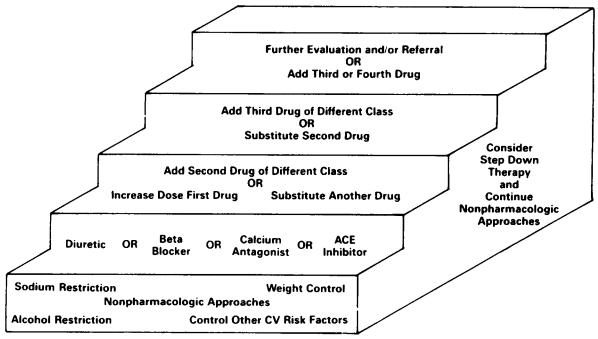

Figure. Individualized stepped-care therapy for hypertension. From the 1988 Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure.[1]

INDIVIDUALIZED STEPPED-CARE APPROACH

Over the past several years, antihypertensive therapy based on a stepped-care approach has substantially reduced the incidence of hypertension-related morbidity and mortality. In its 1988 report, the JNC indicated that nonpharmacologic approaches (eg, weight reduction, salt restriction, moderation of alcohol intake, and control of other cardiovascular risk factors such as hyperlipidemia), whether used as a definitive intervention or as an adjunct to pharmacologic therapy, should be considered for all hypertensive patients (Figure).

For some patients, nonpharmacologic approaches should be tried first, with drug therapy being added if goal blood pressure (<140/90 mmHg) is not achieved. For example, patients whose diastolic pressures fall between 90 and 94 mmHg and who are otherwise at relatively low risk of developing cardiovascular disease should be treated vigorously with nonpharmacologic approaches; drug therapy should be reserved as a possible option if the diastolic pressure remains above 90 mmHg. Physicians who elect not to use drug therapy in the latter situation are advised to monitor their patients closely because some patients will progress to higher levels of blood pressure that clearly warrant pharmacologic intervention.

Other patients may require pharmacologic therapy as initial treatment although nonpharmacologic treatment may be a helpful adjunct. The range of first-step pharmacologic options has been broadened to provide more flexibility for clinicians. In its 1984 report, the JNC recommended that either thiazide-type diuretics or beta blockers be used as initial drug therapy, unless contraindications existed.[3] This recommendation has now changed, however, with the addition of calcium antagonists and angiotensin-converting enzyme (ACE) inhibitors as other choices.

If response to the initial choice of drug therapy is inadequate after one to three months—and if the patient is not experiencing significant side effects and is adhering to therapy—the clinician has three options: (1) increase the dose of the first drug if it is below the maximum recommended; (2) add an agent from another class; or (3) discontinue the initial choice and substitute a drug from another class. The JNC report emphasizes that when additional drugs are added and the combination succeeds, a later attempt should be made to reduce the dose and, if possible, to eliminate the initial drug. In addition, before proceeding to each successive treatment step, the physician should address possible reasons for lack of responsiveness.

Refractory hypertension may be due to a variety of factors, including nonadherence to therapy, drug-related causes, associated conditions, or volume overload (Table 3). Clinicians who treat black patients are well aware that it is often difficult to get blood pressure levels

under adequate control. As indicated earlier during this symposium, black hypertensive patients tend to have a greater problem with obesity than their white counterparts, particularly in the South. In addition, black patients appear to have a tendency toward larger plasma volume, slower renal excretion of sodium, and increased salt sensitivity. The problem of excess alcohol intake, which cuts across racial and ethnic lines, is receiving increasing attention because, as the JNC report noted, it may lead not only to elevated blood pressure but also to poor adherence to antihypertensive therapy and occasionally to refractory hypertension. In my clinical experience, there is no question that patients who consume large amounts of alcohol often have difficulty controlling their blood pressure.

The 1988 JNC report emphasizes the importance of considering step-down therapy and even drug withdrawal for some hypertensive patients. For patients with mild hypertension who have satisfactorily controlled their blood pressure through treatment for at least one year, antihypertensive drugs may be reduced in a stepwise fashion, particularly if the patient has been following nonpharmacologic recommendations. However, regular follow-up must be maintained because blood pressure can rise again to hypertensive levels, even after years without drug therapy.

NONPHARMACOLOGIC APPROACHES

The JNC report states that there are no recognized differences in response to nonpharmacologic therapy between white and black hypertensive patients. At the same time, it emphasizes that weight reduction is strongly indicated for the obese black hypertensive. This is an important first-step measure, from the standpoint of both lowering elevated blood pressure levels and also lessening the risk of diabetes mellitus. There is good evidence that the incidence of diabetes is increased in the black community, especially among black females, and that this may be related to an increase in obesity. Certainly, all obese hypertensive patients, black or white, should be encouraged to participate in weight-reduction programs, with goal body weight being within 15% of desirable weight. Evidence suggests that weight reduction may reduce blood pressure in such individuals, even without reduction in sodium intake and before goal body weight is achieved.

Although it is difficult to identify which patients can benefit from the restriction of sodium, black patients tend to be especially salt-sensitive, and some will respond effectively to a moderate restriction of sodium. The JNC suggests reducing sodium intake to 70 to 100 mEq/dL per day (ie, approximately 1.5 to 2.5 gr sodium per day). For certain large segments of the black population, it is important to recognize that consumption of prepared foods may contribute substantially to daily sodium intake. Hence, counseling about sodium labeling on canned, frozen, and processed foods is important. A more difficult problem, I have found, is that many black patients consume large amounts of take-out food, the sodium content of which is generally high but difficult to quantitate.

A regular aerobic exercise program facilitates weight control and may be helpful in reducing blood pressure. If the patient's cardiovascular system and joints can withstand it, I recommend 30 to 40 minutes of walking, bicycling, jogging, or swimming three to four times per week.

PHARMACOLOGIC THERAPY

The 1988 JNC report notes that there are some important differences in the therapeutic response of blacks as compared with white hypertensive patients. Black patients usually do not respond as well to beta blockers or ACE inhibitors as do whites, and diuretics are generally more effective as monotherapy in the black population. However, combinations of beta blockers or ACE inhibitors with diuretics are equally effective in both groups of patients. In addition, calcium antagonists, labetalol (a combined alpha-beta blocker), centrally acting alpha-adrenergic agonists, and peripheral alpha blockers are equally effective in black patients and white patients.

In the selection of antihypertensive drug therapy, the JNC report emphasizes the importance of considering not only potential side effects but also the interaction of certain agents with concomitant diseases or their therapies.

Diabetes

Noninsulin-dependent adult onset diabetes is perhaps more common in black populations, especially black females, versus whites.[4] Patients with diabetes made approximately 9.6 million visits to physicians' offices in 1980.[4] Sixteen percent of all visits for diabetes were made by blacks, a disproportionate number. The age-adjusted prevalence rate among nonwhite females is 76% higher than the rate among white females.[4] Diabetics have more severe atherosclerosis, twice as many myocardial infarctions, and about twice as many strokes as nondiabetics of the same age. For the hypertensive

patient with diabetes, blood pressure control and reduction of hyperlipidemia and cigarette smoking is particularly important.

Hypertensive patients with diabetes pose a particular problem because such individuals are very vulnerable to cardiovascular complications. In addition, although no antihypertensive therapies are specifically contraindicated in diabetics, the JNC report noted that there are some potential problems related to drug therapy in this population.

Certain drugs may impair the control of diabetes. Decreased insulin release may occur in the presence of diuretic-induced hypokalemia, although this problem can usually be averted by maintenance of serum potassium in the normal range. Glucose control also may deteriorate with the use of beta blockers, and these agents also interfere with catecholamine-induced counterregulatory responses to insulin-induced hypoglycemia. As a result, beta blockers can blunt symptoms of hypoglycemia such as palpitations, tremors, and feelings of anxiety and, therefore, may prolong the duration of hypoglycemia. In addition, severe hypertension can occur during these episodes of hypoglycemia because blockade of the $beta_2$ (vasodilator) receptors leaves alpha (vasoconstrictive) receptors unopposed, giving rise to increases in both systolic and diastolic blood pressures.

It is also important for clinicians to recognize that neuropathic complications of diabetes may influence antihypertensive drug therapy. Orthostatic hypotension associated with autonomic neuropathy may be aggravated by certain medications, and sexual dysfunction, which is relatively common in diabetic patients, may accelerate further with antihypertensive drugs. Although the JNC report noted that sexual dysfunction, particularly impotence in men, may occur with the use of all antihypertensive agents, changes in therapy may help maintain adherence to drug regimens.

Finally, hyporeninemic hypoaldosteronism with resultant hyperkalemia may be seen in patients with diabetic nephropathy. Potassium-sparing diuretics, ACE inhibitors, and beta blockers can exacerbate this syndrome and, therefore, must be used cautiously with frequent monitoring of the serum potassium level.

Renal Disease

The prevalence of hypertension-related endstage renal disease is higher among black patients than white patients.[5] Antihypertensive therapy, therefore, should have as its goal the preservation of renal function. It is known that such therapy preserves renal function in severe or malignant hypertension and may decrease the proteinuria or progression of renal failure in patients with primary renal disease or diabetic nephropathy.

According to the JNC report, all of the commonly used classes of antihypertensive drugs are usually effective in lowering blood pressure in patients with renal disease and, thereby, may favorably influence the degree of proteinuria and the progression of renal failure. ACE inhibitors, possibly used in conjunction with a diuretic or other antihypertensive drug, appear to possess some advantages in decreasing proteinuria and slowing progression of renal failure. However, if the serum creatinine level is >2.5 mg/dL, serum potassium levels should be monitored frequently during ACE inhibitor therapy because of the increased risk for hyperkalemia. In addition, in patients with bilateral renal artery stenosis or stenosis in the artery supplying a solitary kidney, ACE inhibitors may lead to a further acute reduction in kidney function. This is usually reversible on discontinuation of the drug.

When renal function is impaired, sodium excretion may be compromised, thus making sodium restriction and the use of diuretics an important aspect of therapy in this subgroup of patients. If renal function is markedly impaired, large doses of loop diuretics or metolazone may be necessary to control hypertension. Although minoxidil may also be needed with severe hypertension, increased doses of a diuretic and an antiadrenergic drug are often required to control the sodium retention and tachycardia induced by minoxidil.

Left Ventricular Hypertrophy

LVH remains an independent and important risk factor for cardiac dysrhythmias and sudden death. Because black patients have an increased risk of LVH, control of elevated blood pressure should be directed at preventing LVH in this population. Although it has not been proven that reversal of hypertension-induced LVH per se reduces the independent risk of cardiovascular morbidity and mortality associated with its presence, the JNC report states that evidence of LVH is an indication for intensive therapy of patients with even mild hypertension. Although the echocardiogram remains the most sensitive and specific tool for detecting increased LV mass, it is somewhat limited in availability by its cost. Hence, the electrocardiogram continues to be of value.

The JNC report notes that regression of LVH has been demonstrated with a variety of therapies, including weight loss, methyldopa, beta blockers, ACE inhibitors, calcium antagonists, and, to a lesser extent, diuretics.

TABLE 4
DRUG INTERACTIONS IN ANTIHYPERTENSIVE THERAPY

Diuretics	
ACE inhibitors	Increased potassium-sparing effects of triamterene, spironolactone, amiloride Decreased thiazide diuretic-induced hypokalemia
Digitalis	Increased digitalis toxicity in presence of hypokalemia
Lithium	Increased lithium levels
NSAIDs	Decreased diuretic effectiveness
Sympatholytics	
Cocaine/ amphetamine	Decreased antihypertensive effect of guanethidine and guanadrel
Ephedrine/ amphetamine	Decreased antihypertensive effect of guanethidine and guanadrel
MAO inhibitors	Hypertension may occur
Phenothiazines	Hypertension may occur
Sympathomimetic amines	Hypertension may occur
Tricyclic antidepressants	Decreased antihypertensive effect of guanethidine and guanadrel Decreased antihypertensive effect of clonidine and guanabenz
Beta Blockers	
Calcium antagonists	Increased negative inotropic effects on failing myocardium
Chlorpromazine	Reduced plasma clearance of chlorpromazine
Cholestyramine/ colestipol	Decreased plasma levels of propranolol
Cimetidine	Decreased bioavailability of beta blockers metabolized by inducing hepatic oxidative enzymes
Coumadin	Reduced plasma clearance of coumadin
Hydralazine	Increased plasma concentrations of beta blockers
Lidocaine	Reduced plasma clearance of lidocaine
Reserpine	Marked bradycardia, syncope
ACE Inhibitors	
NSAIDs	Increased potassium-retaining effects of ACE inhibitors
Beta blockers	See above
Calcium Antagonists	
Cimetidine	Increased levels of nifedipine
Digoxin	Increased plasma digoxin level
Quinidine	Hypotension, especially in patients with idiopathic hypertrophic subaortic stenosis

Drugs that may increase LV mass include the direct-acting vasodilators, minoxidil, and hydralazine.

Coronary Artery Disease/Hyperlipidemia

As the JNC report points out, the effect of antihypertensive drug therapy on the development of complications of coronary artery disease remains unclear. Major clinical trials monitoring the effect of antihypertensive therapy on morbidity and mortality have demonstrated large reductions in the incidence of both fatal and nonfatal strokes. However, the benefits of such therapy to the incidence of either fatal or nonfatal myocardial infarction or to mortality related to coronary artery disease have been, in the words of the JNC, "modest at best."

As the report noted, several possible explanations have been offered for these results. It is clear that attention must be directed to controlling other cardiovascular risk factors in addition to hypertension, especially smoking, hyperlipidemia, and diabetes. Beyond that, consideration should be given to the possible adverse effects of antihypertensive agents themselves.

The potential metabolic side effects of the thiazide and related sulfonamide diuretics are well known and include hypokalemia, hyperuricemia, glucose intolerance, hypercholesterolemia, and hypertriglyceridemia. The JNC report recommends that, because of the potential adverse effects of hypokalemia and hypomagnesemia on the development of cardiac dysrhythmias, particularly in patients with coronary artery disease, therapy should include potassium supplementation or modification of antihypertensive drug treatment to prevent or correct diuretic-induced hypokalemia. With coexisting magnesium depletion, correction of potassium deficits can be difficult unless the magnesium deficiency is also managed. It may be noted that the glucose intolerance associated with diuretic therapy results from the drug-induced hypokalemia, which can be corrected with potassium replacement.[6]

With respect to the potential adverse effects of diuretics and certain other antihypertensive drugs on serum lipids and lipoproteins, the JNC report recommended that clinicians monitor serum lipids periodically and, if adverse changes are noted, alter treatment or take appropriate measures to counteract these effects. The beta blockers, except for pindolol and acebutolol, may decrease high-density lipoprotein (HDL) cholesterol, usually with little effect on low-density lipoprotein (LDL) cholesterol. The combined alpha-beta blocker, labetalol, does not adversely affect plasma lipids, presumably due to its mild intrinsic sympathomimetic activity (ISA) and its prazosin-like selective $alpha_1$ blocking activity.

The $alpha_1$-adrenergic blockers and the centrally acting adrenergic agonists may, to some degree, decrease concentrations of serum cholesterol, especially LDL. The JNC report suggests that these agents may, therefore, offer an advantage in managing hypertensive patients with hyperlipidemia; however, one must be aware of their side effects, such as drowsiness, sedation, dry mouth, fatigue, and sexual dysfunction. ACE inhibitors and calcium antagonists have no adverse effects on serum lipids and lipoproteins.

Chronic Obstructive Pulmonary Disease

Beta blockers should not be used in patients with chronic obstructive pulmonary disease (COPD) or bronchial asthma as they may cause major, often unpredictable, bronchospasm in these individuals. The JNC report indicates that if no suitable therapeutic alternatives are available, $beta_1$ selective agents or the combined alpha-beta blocker, labetalol, may be used with caution in some patients with mild COPD or asthma.

Drug Interactions

In addition to worsening some conditions and improving others, antihypertensive drugs may interact with medications used to treat these problems. Potential drug interactions listed in the JNC report are shown in Table 4.

HYPERTENSIVE EMERGENCIES

Because black patients tend not to adhere to their medication regimen and have more severe forms of hypertension, clinicians will want to pay close attention to the section of the JNC report that deals with hypertensive emergencies and urgencies. The report defines hypertensive emergencies as those situations in which blood pressure must be lowered within 1 hour (eg, hypertensive encephalopathy, intracranial hemorrhage), and hypertensive urgencies as those situations in which blood pressure should be reduced within a few hours (eg, accelerated or malignant hypertension without immediate complications, severe perioperative hypertension).

Table 5 lists the parenteral drugs for hypertensive emergencies and Table 6 the oral drugs for treatment of hypertensive emergencies and urgencies. Sodium nitroprusside, the old standby, works instantaneously, but it also has instantaneous hypotension as a side effect; in addition, doses of nitroprusside are difficult to calculate. Nitroglycerine is a good choice, especially if the patient has concomitant ischemic heart disease. Diazoxide has been shown to cause profound hypotension that is often prolonged and difficult to resolve.

Labetalol is a drug that can be used in many patients utilizing IV boluses. The JNC report suggests a 20 to 80 mg IV bolus every 10 minutes. However, in my opinion, it may be safer to use the smaller doses perhaps every 10 to 15 minutes. One can also give labetalol as a constant infusion, 2 mg/minute. In this regard, I have formulated what I call my "rule of 2," whereby one places two 20 mL (100 mg) vials equal to 40 mL (200 mg) of IV labetalol in enough fluid to make 200 mL total of fluid running in at 2 mL per minute, which is the same as 2 mg per minute.

Oral drugs—captopril, clonidine, minoxidil, or nifedipine—can be used for the treatment of hypertensive emergencies or urgencies. Caution should be exercised with nifedipine and with sublingual forms of the other drugs because of the risk of too rapid a fall in blood pressure, with consequent hypotension and possibly other complications.

COST OF CARE

The JNC report observes that, for some patients, lifelong antihypertensive therapy produces a burdensome financial obligation. In view of the widespread poverty and economic instability in large segments of the black community, cost of care must be taken into account and a means of minimizing expenses must be sought.

Initial workups may be especially expensive for patients with moderate to severe hypertension. Follow-up visits, which are important in terms of enhancing compliance with therapy, generate further charges, but these costs can be minimized by monitoring blood pressure at home and using community resources and nonphysician staffs. At our institution, patients may come in, scheduled or unscheduled, to have their blood pressure checked at no cost. This keeps patients in contact and gives them a better sense of their disease.

The JNC report notes that the selection of antihyper-

TABLE 5
PARENTERAL DRUGS FOR TREATMENT OF HYPERTENSIVE EMERGENCIES

	Dose	Reaction Time (min)	Adverse Reactions
Vasodilators			
Sodium nitroprusside	0.5-10 μg/kg/min as IV infusion	Instantaneous	Nausea, vomiting, muscle twitching, thiocyanate intoxication, methemoglobinemia
Nitroglycerin	5-100 μg/min as IV infusion	2-5	Headache, tachycardia, vomiting, methemoglobinemia
Diazoxide	50-150 mg/IV bolus, repeated, or 15-30 mg/min by IV infusion	1-2	Hypotension, tachycardia, aggravation of angina pectoris
Hydralazine	10-20 mg IV, 10-50 mg IM	10 20-30	Tachycardia, headache, vomiting, aggravation of angina pectoris
Adrenergic Inhibitors			
Phentolamine hydrochloride	5-15 mg IV	1-2	Tachycardia, orthostatic hypotension
Trimethaphan camsylate	1-4 mg/min as IV infusion	1-5	Paresis of bowel and bladder, orthostatic hypotension, blurred vision, dry mouth
Labetalol	20-80 mg/IV bolus every 10 min, 2 mg/min IV infusion	5-10	Bronchoconstriction, heart block, orthostatic hypotension
Methyldopa	250-500 mg IV infusion	30-60	Drowsiness

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TABLE 6
ORAL DRUGS FOR TREATMENT OF HYPERTENSIVE EMERGENCIES AND URGENCIES

Drug	Recommended Dose (mg)	Frequency
Captopril	25	Repeat as required
Clonidine	0.1–0.2	Every hour as required
Minoxidil	2.5–5	Repeat after 2–3 hr
Nifedipine	10	Repeat after 30 min

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tensive drugs influences the total cost of care in a variety of ways, including an agent's intrinsic cost, the burden of side effects, the impact on compliance, and the possible need for additional laboratory tests to monitor biochemical changes. The latter is an important hidden cost that clinicians do not always recognize.

Another factor to be taken into account is the likelihood that a particular agent will control blood pressure satisfactorily. If the drug is less than satisfactory, the need for further evaluation and a change in therapy can add substantially to the cost of care. Although not included in the JNC report, this point can be illustrated by comparing the therapeutic outcomes and costs of labetalol versus propranolol therapy in the treatment of black hypertensive patients.

Evidence that monotherapy with labetalol, which possesses $alpha_1$-blocking, nonspecific beta-blocking, and $beta_2$ agonist properties, is more effective than monotherapy with propranolol in black hypertensives is suggested by a number of comparative and noncomparative studies (Table 7).[7-11] Although these studies were conducted under diverse conditions, when the results are pooled the changes in diastolic blood pressure were generally greater with labetalol than with propranolol.

TABLE 7

RESULTS OF CLINICAL TRIALS OF LABETALOL AND PROPRANOLOL

	In US Blacks							
	Labetalol				Propranolol			
Study	No.	Mean Daily Dose (mg)	Baseline DBP (mmHg)	Change in DBP (mmHg)	No.	Mean Daily Dose (mg)	Baseline DBP (mmHg)	Change in DBP (mmHg)
Flamenbaum (1985)*	30	—	98.0	−6.0	35	—	99.0	−2.0
Saunders (1985)	74	927	102.0	−11.2	79	411	102.0	−8.6
Cubberley (1985)	17	624	102.3	−20.4	—	—	—	—
Veterans Administration (1982)†		—	—	—	196	534	101.6	−9.5
Pooled results		872	101.1	−11.2		481	101.4	−8.4

* Dosages of labetalol and propranolol are not reported.

† Dosage is reported only for those black patients achieving blood pressure control (DBP ≤90 mmHg).

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TABLE 8

OUTCOMES AND COSTS FOR LABETALOL (L) AND PROPRANOLOL (P)

	In US Blacks											
	Monotherapy Scenario						Stepped-Care Scenario					
Sex and Age at Initiation of Therapy	No. (%) of Strokes Averted in 10 Years/ 1,000 Patients*			Annual Cost of Medication/ Patient			No. Requiring Additional Medication/ 1,000 Patients			Annual Cost of Medication/ Patient		
	L	P	(P-L)	L	P	(P-L)	L	P	(P-L)	L	P	(P-L)
Men												
45-54	9 (24.0)	7 (18.9)	−2 (−5.1)	$436	$626	$190	264	381	117	$472	$678	$206
55-64	38 (45.6)	31 (37.4)	−7 (−8.1)	436	626	190	320	432	112	480	685	205
65-74	16 (13.9)	13 (11.3)	−3 (−2.6)	436	626	190	317	448	131	479	687	208
Women												
45-54	8 (34.8)	7 (28.1)	−2 (−6.7)	$436	$636	$190	403	557	154	$491	$702	$211
55-64	17 (38.0)	14 (30.8)	−3 (−7.2)	436	626	190	353	462	109	484	689	205
65-74	30 (31.2)	24 (25.5)	−6 (−5.8)	436	626	190	298	461	163	477	689	212

* Columns may not add to rounding.

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With this as background, Savage et al have analyzed the outcomes and costs of therapy with these two agents in terms of annual cost of medication per patient using a monotherapy scenario or a stepped-care scenario (Table 8).[12] This analysis indicates that more strokes can be averted in 10 years/1,000 patients and at a lesser annual cost of medication with labetalol than with propranolol therapy. This is true in both men and women and in both the monotherapy and stepped-care scenarios. Specifically, pooled results of clinical trials of labetalol and propranolol in US blacks demonstrate that, although diastolic blood pressure baselines were similar, changes in diastolic blood pressure averaged minus 11.2 mmHg for labetalol versus minus 8.4 mmHg for propranolol. For women in a monotherapy scenario, the annual cost of medication to control blood pressure would be expected to be $190 less with labetalol versus propranolol; with a stepped-care scenario, the annual cost may be

as much as $212 less to control blood pressure effectively. In men, the monotherapy annual cost savings with labetalol may be $190; in a stepped-care scenario, the cost savings may be $208.

CONCLUSION

The NHBPEP has been a major factor in reducing hypertension-related morbidity and mortality in this country. The periodic reports issued by its Joint National Committee have had tremendous influence on the everyday practice of physicians because each report has reflected the state of the art regarding hypertension management. In its 1988 report, the JNC, under the chairmanship of Abram V. Chobanian, MD, of Boston University School of Medicine, has captured, with remarkable concision, the many changes that have occurred in this field in recent years. Its emphasis on the needs of special populations, including black patients, should contribute significantly to improving the detection and treatment of hypertension in these often high-risk groups.

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