

Treatment of Hypertension in a Managed Care Setting

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Background: Based on recommendations of the Fifth and Sixth Reports of the Joint National Committee (JNC) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, Health Care Plan (now Univera Healthcare) Buffalo, NY, developed a clinical guideline to improve the management of patients with hypertension. To increase awareness and utilization, the guideline was distributed as hard copy reports and made available through our electronic information system.

Objective: To determine blood pressure (BP) control rates and adherence to guideline recommendations.

Study Design: Retrospective chart review.

Patients and Methods: We randomly sampled hypertensive patients seen during 1998 to evaluate hypertension management. Computerized medical and pharmacy records were reviewed for patient demographics, antihypertensive medications, comorbid conditions, and BP readings. Patient assessment was based on antihypertensive regimen and achievement of target BP according to the recommendations of the guideline (<140/90 mm Hg for the general population and <130/85 mm Hg for special populations). In addition, we assessed control rates using traditional Health Plan Employer Data and Information Set (HEDIS) measures (<140/90 mm Hg).

Results: Overall, 35% of patients achieved target BP and 68% were treated with agents recommended by our JNC-based guideline. In contrast, using traditional HEDIS measures, 41% of patients achieved BP control. Of 39 patients with compelling indications (primarily diabetic patients), 13% achieved BP target and 67% were treated with recommended agents.

Conclusions: The impact of our clinical guideline is reflected through the relatively high utilization of recommended drugs. However, optimal BP control continues to be problematic. In particular, patients with diabetes warrant focused attention.

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It is estimated that of the 50 million people in the United States with hypertension, only 50% are treated and only 25% are controlled to target blood pressure (BP).¹ Although, it is well established that proper management of BP reduces the incidence of cardiovascular disease, results of studies^{2,3} indicate that improvements in the awareness, treatment, and control of high BP have slowed in recent years.

The Joint National Committee (JNC) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure has published several consensus guidelines that provide recommendations for the management of patients with hypertension.^{1,4} The guidelines support the use of β -adrenergic blocking agents and diuretics as first-line agents in patients with uncomplicated hypertension, and the JNC VI further supports the use of specific agents for patients with comorbid conditions.⁴ In addition, the JNC places emphasis on target BP, with recommendations to control BP to a target of <140/90 mm Hg for the general population and <130/85 mm Hg for diabetics and patients with renal insufficiency.⁴

Despite the overwhelming evidence supporting the recommendations made by the JNC, there is

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evidence^{5,6} that during the past 2 decades use of β -adrenergic blocking agents and diuretics has declined and calcium antagonist use has increased. In addition, results of the Study of Hypertensive Prescribing Practices⁷ indicate that initial choice of antihypertensive therapy for special patient populations (older patients, black patients, and patients with mild renal failure) was not consistent with JNC recommendations. The results of this study,⁷ however, also demonstrated that an increasing number of physicians are prescribing appropriate medications for patients with heart failure, diabetes, hypercholesterolemia, and postmyocardial infarction.

Our managed care organization, Health Care Plan (now Univera Healthcare), Buffalo, New York, has recently dedicated efforts to improve the care of patients with hypertension. In 1996, a committee of primary care physicians, including a clinical pharmacologist, developed a clinical guideline for the management of hypertension based on the recommendations of JNC V. With the release of JNC VI, this guideline was revised in 1997. The guideline was distributed to physicians and midlevel practitioners as hard copy reports and was made available through the electronic information system.⁶ The clinical pharmacologist was also responsible for academic detailing of providers, newsletter updates, and direct interaction with pharmacy staff to encourage utilization of the guideline.

We conducted a study of hypertensive patients to determine adherence to recommendations of the hypertension clinical guideline. Patients were evaluated based on control of their BP and antihypertensive medication.

... METHODS ...

Our managed care facility is a group-model health maintenance organization (HMO) with approximately 90,000 members. We randomly sampled 3200 hypertensive patients (*International Classification of Diseases*,

Ninth Edition, code 401) between January 1, 1998, and December 31, 1998, to assess hypertension management.

We retrospectively reviewed the medical records to collect the following data: patient age, sex, smoking history, previous and current antihypertensive medications, history of intolerance to antihypertensive agents, comorbid conditions, and BP. The most recent fasting lipid profile in patients with dyslipidemia and glycosylated hemoglobin level in patients with diabetes were obtained from patient laboratory data. Pharmacy records were used to determine adherence to antihypertensive medication regimens.

Evaluation of BP Readings

We collected BP readings recorded in patients' medical charts during routine clinic visits. To reflect the recommendations of JNC VI and our clinical guidelines, target BP was defined as systolic BP <140 mm Hg and diastolic BP <90 mm Hg for the general population and <130/85 mm Hg for patients with diabetes or renal insufficiency. To determine the number of patients with BP control according to

Table 1. Agents Recommended by the Clinical Guideline for Treating Specific Comorbid Conditions*

Compelling Indication/Comorbidity	Recommendation
Recommended Agents	
Diabetes mellitus	ACE inhibitors [†] Calcium antagonists [†]
Heart failure	ACE inhibitors
Isolated systolic hypertension	Diuretics [†] Dihydropyridine calcium antagonists (long acting) [†]
Myocardial infarction	β -adrenergic blocking agents
Agents That May Have Favorable Effects	
Ischemic heart disease	β -adrenergic blocking agents [†] Calcium antagonists [†]
Dyslipidemia	ACE inhibitors <i>or</i> Low-dose thiazides <i>or</i> α -adrenergic antagonists

ACE = angiotensin-converting enzyme.

*Based on the recommendations of the Fifth and Sixth Reports of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.^{1,4}

[†]First-line treatment.

*Second-line treatment.

traditional Health Plan Employer Data and Information Set (HEDIS) measures, target BP was defined as <140/90 mm Hg for all patients. Blood pressure was considered controlled if the average of the 2 most recent readings, no more than 6 months apart (with the patient taking current stable medication), was at target BP.

Evaluation of Medication

Patients' medication regimens were evaluated with respect to medication adherence and treatment with a recommended agent. Patients were considered to be adherent to antihypertensive therapy if throughout the observation period medication was refilled within 7 days of the refill due date. **Table 1** outlines the recommended agents for specific comorbid conditions, as stated in our guideline. Assessment of medication was based on consistency with clinical guideline recommendations and history of drug intolerance. In addition, we noted

the number of antihypertensive agents each patient received.

Data Analysis

Analysis was performed using SYSTAT.⁸ Baseline demographics, comorbidities, receipt of a recommended agent, and adherence with drug regimens were compared in subgroups of patients who achieved and did not achieve target BP. Continuous variables were analyzed by Kruskal-Wallis analysis of variance. Dichotomous or categorical variables were analyzed using χ^2 or Fisher exact tests when the expected value of any cell size was less than 5. Multiple logistic regression with backward stepping was used to investigate factors associated with achievement of target BP. Variables considered in the analysis included demographic data, laboratory values, antihypertensive medications, medication adherence, comorbidities, and appropriateness of treatment.

... RESULTS ...

Table 2. Demographic Data for 176 Patients*

	Patient at BP Target	
	Yes (n = 59)	No (n = 117)
BP, mean (SD), mm Hg		
Systolic	132 (6)	149 (13) [†]
Diastolic	82 (5)	87 (9) [†]
Age, mean (SD), y	60 (11)	63 (13)
≥65 y	16 (27)	50 (43) [†]
Sex		
F	31 (53)	67 (57)
M	28 (47)	50 (43)
Compelling indications	8 (14)	34 (29) [†]
Diabetes mellitus	5 (8)	21 (18) [†]
Heart failure	1 (2)	4 (3)
Isolated systolic hypertension	0	5 (4) [†]
Myocardial infarction	2 (3)	4 (3)
Comorbidities		
Dyslipidemia	19 (32)	43 (37)
Hypothyroid	6 (10)	15 (13)
Ischemic heart disease	16 (27)	14 (12) [†]
CVD/PVD	5 (8)	11 (9)
Gout	6 (10)	14 (12)
Asthma	3 (5)	10 (9)
Renal insufficiency	1 (2)	4 (3)

BP = blood pressure; CVD = cerebrovascular disease; PVD = peripheral vascular disease; SD = standard deviation.

*Data are given as number (percentage) of patients except where indicated otherwise.

[†]P < .05, patients at target vs patients not at target.

We reviewed the medical records of 176 patients. Mean patient age was 62 years (range, 22-91 years), 44% were men, 22% had compelling indications, and 10% were smokers. Based on our clinical guideline recommendations, 35% of patients reached target BP, with 72 (41%) and 118 (67%) reaching target systolic and diastolic BP, respectively. **Table 2** summarizes the demographic information with respect to achievement of target BP. Patients with ischemic heart disease were more likely to reach target BP, whereas patients ≥65 years and those with a compelling indication were more likely not to reach target BP.

In contrast, using traditional HEDIS measures, 41% of patients achieved target BP, with 78 (44%) and 124 (70%) reaching target systolic and diastolic BP, respectively.

Sixty-seven percent of patients with compelling indications were treated with a recommended agent, but only 13% reached BP target. The majority of patients (74%) with a compelling indication, however, were diabetic and thus had a lower target BP. Despite the fact

that 59% of diabetic patients received 2 or more antihypertensive agents, only 10% achieved a target BP of <130/85 mm Hg, and 44% reached a BP of <140/90 mm Hg.

Antihypertensive therapy is summarized in **Table 3**. Patients significantly more likely to reach target BP included those adherent to antihypertensive therapy and those who received a recommended agent. In contrast to this, patients receiving a calcium antagonist were more likely not to reach target BP. Among patients who received antihypertensive therapy, drug utilization analysis showed that 53% of patients received a diuretic, 43% received a β -adrenergic blocking agent, 42% received an angiotensin-converting enzyme inhibitor, and 20% were treated with a calcium antagonist. In addition, 60% of patients received combination therapy—49% received 2 agents and 11% received 3 or more agents. There was no significant difference in the number of agents received for patients who reached target BP and those who did not.

Factors associated with achievement of target BP were determined by multiple logistic regression. The presence of diabetes was significantly associated with failure to reach target BP (odds ratio [OR], 0.13; 95% confidence interval [CI], 0.03-0.48; $P < .01$), whereas ischemic heart disease (OR, 2.79; 95% CI, 1.06-7.32; $P = .04$), medication adherence (OR, 2.26; 95% CI, 1.18-4.30; $P = .01$), and treatment with a recommended agent (OR, 3.03; 95% CI, 1.27-7.24; $P = .01$) were significantly associated with achievement of target BP.

... DISCUSSION ...

Previously published studies^{3,10-12} indicate BP control rates of up to 43%. Using a more stringent JNC-based guideline with lower targets in select patients, we observed only one third of patients achieving target BP. In our population, this emphasized suboptimal control of select patients, which is not recognized by traditional HEDIS surveys.

The majority of patients were treated with agents recommended by the clinical guideline, with diuretics and β -adrenergic blocking

agents among the most used antihypertensive agents. This is in contrast to several other studies^{5,6,13,14} that indicate that use of diuretics and β -adrenergic blocking agents has steadily declined during the past 15 years. In addition, although these studies indicate that calcium antagonists are now among the most used antihypertensive agents, only 20% of our population was treated with these agents, reflecting adherence to JNC guidelines.^{5,6,14,15}

Although few strategies aimed at increasing guideline utilization have proven to be effective,¹⁶ the results of our study are encouraging. Studies indicate that interventions such as physician conferences and mailing of educational materials have little effect on practice patterns. Strategies reported to be successful include the use of intercurrent measurements, reporting of clinically important healthcare performance indicators, and use of explicit practice guidelines. Although this analysis is not comparative with hypertension treatment before guideline implementation, we believe that our interventions (clinical guideline, academic detailing, and pharmacy interventions) have contributed to awareness and utilization of the clinical guidelines.

Table 3. Summary of Antihypertensive Therapy

	Patients, No. (%)	
	At BP Target (n = 59)	Not at BP Target (n = 117)
Lifestyle modification only	2 (3)	13 (11)
Receiving medication	57 (97)	104 (89)
Adherent to medication regimen	48 (85)	67 (64)*
Antihypertensive medications, No.		
1	23 (39)	42 (36)
2	30 (51)	48 (41)
≥ 3	4 (7)	14 (12)
Treated with a recommended agent	50 (85)	70 (60)*
Medications [†]		
Diuretics	32 (56)	53 (51)
β -adrenergic blocking agents	25 (43)	44 (42)
Angiotensin-converting enzyme inhibitors	23 (39)	45 (43)
Calcium antagonists	6 (10)	27 (26)*

BP = blood pressure.

* $P < .05$, patients at target vs patients not at target.

[†]Utilization rates in patients treated with medication.

Treatment of patients with compelling indications, such as diabetes, offers several challenges. Studies^{7,10} indicate that while physicians use appropriate agents in patients with compelling indications, patients with diabetes are rarely treated to a BP target of <130/85 mm Hg. According to a study by Mehta et al,⁷ 84% of physicians reported that they would prescribe an angiotensin-converting enzyme inhibitor as initial treatment for a hypertensive patient with diabetes. Consistent with this, 66% of our diabetic population received a recommended agent. However, 44% of patients reached a BP of <140/90 mm Hg, and only 10% reached <130/85 mm Hg. Elliott et al¹⁰ reported similar results, with 45% and 15% of patients reaching a BP of <140/90 mm Hg and <130/85 mm Hg, respectively. These results illustrate the need to emphasize the lower target BP, especially in light of results from recent clinical trials^{17,18} that demonstrate the dramatic benefits of lowering BP in patients with diabetes.

Our results further indicate that treatment with a recommended agent and the presence of ischemic heart disease were significantly associated with patients reaching target BP. Although it is not likely that the choice of a recommended agent would exclusively influence the achievement of target BP, our data support the notion that physicians who were observant of the guideline recommendations were also conscientious about treatment goals. Better control of BP in patients with a history of coronary disease may be due to the high-risk nature of this patient population, influencing physicians to treat BP aggressively.¹²

Combination therapy was not associated with reaching target BP. This may be due to the number of patients with diabetes who did not reach a target of <130/85 mm Hg. Sixty percent of patients with diabetes received 2 or more antihypertensive agents, but only 10% reached target BP. In addition, patients who reached target BP were more often adherent to medication, emphasizing the importance of this factor in hypertension management.

This analysis provides some insight regarding the impact of our clinical guideline. We believe that increased awareness and promotion of guideline recommendations at our institution has led to improved utilization of recommended drugs. In addition, despite studies of traditional HEDIS-based surveys suggesting that BP control rates are improving, BP management in patients with diabetes continues to be problematic and warrants focused attention.

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