Economics of Suboptimal Drug Use: Cost-Savings of Using JNC-Recommended Medications for Management of Uncomplicated Essential Hypertension

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Objectives: To quantify potential cost-savings associated with better compliance with the guidelines of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC V) and to determine whether suboptimal utilization of medications is associated with higher costs for other health services.

Study Design: Secondary data analysis using the Medical Expenditure Panel Survey (MEPS) conducted by the Agency for Healthcare Research and Quality and the National Center for Health Statistics. A complex sampling design was used to provide nationally representative estimates.

Methods: From interviews with a population-based and nationally representative sample of 22 601 individuals, 1588 patients with essential hypertension without other comorbid cardiovascular conditions were selected, representing 19.6 million patients in the United States in 1996. All medical treatments for essential hypertension in 1996 were extracted from the MEPS. Using the JNC V guidelines, prescriptions used in treating essential hypertension were categorized into first-line drugs (diuretics and β-blockers), second-line drugs (calcium-channel blockers and angiotensin-converting enzyme inhibitors), and third-line (nonrecommended) drugs. Nonprescription expenditures were calculated. Multivariate analyses were performed to determine whether use of the first-line drugs was associated with cost-savings.

Results: Compliance rate with the JNC guidelines was low. About 36%, 67%, and 87% of patients in the nation received first-, second-, and third-line drugs, respectively, at some point during 1996. Prescription expenditure constituted more than 67% of the total expenditures for treating essential hypertension. The use of first-line drugs (vs second-line drugs) was associated with expenditures that were $2.6 billion to $3.2 billion lower.

Conclusions: Compliance with the JNC guidelines for treating essential hypertension may reduce the costs of prescriptions and other medical services. Raising awareness of the JNC guidelines is crucial to achieve cost effectiveness in choosing treatment alternatives.

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Cost-savings resulting from implementing optimal medication regimens in compliance with clinical guidelines can extend beyond the costs of medications. Inappropriate medication use can compromise quality and effectiveness of care by causing patients to overutilize other healthcare resources to achieve a health outcome that could have been achieved at a lower cost had appropriate medications been used in the first place. As cost-containment becomes a necessity for a managed care environment, attention has been drawn to the economics of optimal and suboptimal use of medications.[1,2] In particular, the appropriate use of antihypertensive agents has been the focus of several investigations.[3,4]

Hypertension was found to be the most prevalent health problem among adult primary care patients, but its treatment was often suboptimal.[5] Some recent studies showed that the use of newer medications increased the total expenditures on antihypertensive therapy.[6-8] In addition, researchers have shown that compliance with the guidelines of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC) in the treatment of hypertension has been low throughout the last decade.[4,9-11] The JNC V[12] and later the JNC VI[13] guidelines promoted initiating pharmacotherapy with diuretics and β-blockers because these agents have demonstrated efficacy in reducing hypertension-related morbidity and mortality in long-term controlled clinical trials.[14] Despite the growing evidence of the efficacy of diuretics during the study intervals, 1988-1995 and 1985-2000, respectively, the use of diuretics steadily decreased throughout those time periods in relation to other antihypertensive agents.[15,16] Prescriptions for diuretics and β-blockers continue to decline despite supporting evidence for the benefits of using them as first-choice agents for treating hypertension in patients with certain major risk factors and target organ damage.[13]

Although JNC guidelines identify cost-effective therapies in treating hypertension, 1 study analyzing trends in antihypertensive use demonstrated that the JNC V

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guidelines had little effect on physicians' prescribing patterns.[4] Furthermore, contrary to the JNC recommendations, that study found actual increased use of calcium antagonists and angiotensin-converting enzyme (ACE) inhibitors (second-line drugs, JNC V) and decreased use of diuretics and β-blockers (first-line drugs, JNC V) between 1992 and 1995. The authors concluded that the increase of pharmaceutical costs in treating hypertension was attributable to the substitution of calcium antagonists and ACE inhibitors for diuretics and β-blockers. Furthermore, these authors alluded that such substitution may also lead to additional costs for other health services used to manage hypertension. However, they did not provide any estimate of the magnitude of the potential cost savings in other services had diuretics and β-blockers been prescribed.

To further our understanding of the economic effect of suboptimal drug use in the management of essential hypertension, we examined how compliance with therapies suggested by JNC V guidelines was associated with costs of drugs and health services other than pharmaceuticals. Our specific aims were the following:

(1) to describe the compliance with the JNC guidelines in the hypertensive patients' annual drug use profiles;
(2) to provide national estimates of expenditures for managing essential hypertension with health services other than medications;
(3) to determine whether suboptimal utilization of medications is associated with higher costs for other health services; and
(4) to quantify potential cost-savings associated with better compliance with the JNC guidelines.

DATA AND METHODS

To provide nationally representative estimates, we used data from the Medical Expenditure Panel Survey (MEPS) 1996, conducted by the Agency for Healthcare Research and Quality (AHRQ) and the National Center for Health Statistics (NCHS).[17] The primary objective of the MEPS was to provide nationally representative estimates of healthcare use, expenditures, sources of payment, and insurance coverage for the noninstitutionalized US population. The MEPS has 4 components: household, medical provider, insurance, and nursing home survey. To produce nationally representative estimates, the MEPS used a complex sampling design. The sampling frame for the household survey component was drawn from respondents in the National Health Interview Survey, conducted by NCHS. Hispanic and black individuals were oversampled. More details on data collection process, survey design, and methodology can be found elsewhere.[18]

Using the MEPS data for our analyses provided 4 advantages. First, the data provided comprehensive information of health service utilization. The MEPS recorded each medical care event a respondent had in 1996, including inpatient, outpatient, emergency room, office-based provider, and prescription drug use. Second, each event was linked to a primary condition for which medical care was sought. The prescription data file contained all the prescriptions a patient took in 1996, including new prescriptions, refills, and dosages. The prescription data file also contained information reported by a patient's pharmacy, such as the date a prescription was dispensed and payment made by sources other than the patient if the pharmacy filed claims for the patient. Third, using the MEPS, we were able to derive the costs incurred to society (ie, all payers, rather than only the patients) as a result of managing essential hypertension. A previously mentioned study[4] used average wholesale prices in calculating the total costs for pharmacotherapy in managing essential hypertension. In addition, they assumed that each medication prescribed was dispensed with a 30-day supply. By doing so, the variation in the actual costs of prescriptions was considerably reduced. Finally, we were able to provide national estimates by incorporating the MEPS complex sampling design.

There were 22 601 individuals interviewed by the MEPS, out of which 2245 had essential hypertension (ICD-9 401.10-401.99). Of these, we studied only the 1588 persons with essential hypertension who had no cardiovascular comorbidities to eliminate any potential confounding in medication use. That is, we chose only patients whose use of second- and third-line drugs cannot be readily justified according to the JNC V guidelines. For these 1588 patients, we would expect the use of diuretics and β-blockers to be prevalent if their medication regimens followed the JNC V recommendations for managing essential hypertension. Under the JNC VI risk stratification and treatment recommendations for the management of hypertension, the patients in our final sample belonged in the following categories: stage 1 risk group A after 12 months; stage 1 risk group B after 6 months; stages 2 and 3, risk groups A and B.[13]

For the 1588 patients, each medical care event (inpatient, outpatient, emergency room, or office-based provider) associated with managing essential hypertension was extracted. The total expenditure for each event was then calculated. The total expenditure of an event was calculated based on the payments for the event from the patient or family (out-of-pocket), Medicare, Medicaid,

private insurance, VA, Civilian Health and Medical Program for the Uniform Services, other federal source, other state source, workers' compensation, and other unclassified sources. Thus, the societal cost of each event related to managing essential hypertension was known.

All information regarding medication use for treating hypertension in the 1588 patients was extracted from the prescription drug data file. Prescriptions that were not first-line (diuretics and β-blockers) or second-line (calcium-channel blockers and ACE inhibitors) drugs were classified as nonrecommended or third-line drugs. Because we were taking a "snapshot" of the prescription profiles of the hypertensive patients on an annual basis, we did not attempt to establish whether patients were taking 2 or more prescriptions at the same time during a given timeframe within 1996. Rather, we examined what drugs appeared in a patient's annual prescription profile. Dummy variables were created to represent that a patient's prescription profile contained any first-, second- or third-line drugs. The comparison group comprised the hypertensive patients who did not take any prescription drugs to manage their hypertension in 1996. Note that the dummy variables were not mutually exclusive; a patient could have first-, second-, and third-line drugs in his or her prescription profile. The annual total expenditure on all prescriptions treating essential hypertension was calculated. Similar to the calculation of other medical service expenditures, the prescription expenditures calculated combined payments from the 10 sources mentioned in the previous paragraph.

Using the information of the 1588 hypertensive patients, we first profiled antihypertensive use patterns in the United States in 1996 according to the recommendations made by JNC V. Proportions of patients who took first-, second-, and third-line drugs as well as any possible combinations of these 3 types of drugs were calculated. We then calculated the total annual expenditure of treating essential hypertension and the total annual expenditures of inpatient, outpatient, emergency room, office-based provider, and prescription use.

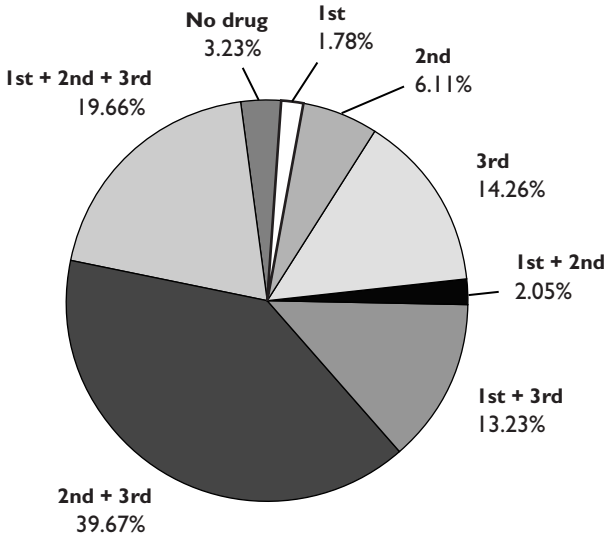
Multivariate analyses were performed to calculate the annual cost-savings per patient of using first-line drugs compared with second-line and nonrecommended drugs, controlling for the following potential confounders: the length of hypertension history, age, sex, race, Hispanic ethnicity, poverty level, insurance status, and region of residence. Inpatient, outpatient, emergency room, and office-based provider expenditures associated with treating essential hypertension were the dependent variables. An additional dependent variable indicating overall nonprescription expenditures was also used. Because medical expenditures are likely to have a skewed distribution,[19,20] the 5 dependent variables were log-transformed. Five ordinary least squares (OLS) regressions were performed with the log-transformed expenditures as the dependent variables. Dummy variables indicating having first-, second-, and third-line drugs in the prescription profile were entered into the OLS estimations as correlates. The comparison group composed of those patients with no prescription use. In addition, the interaction terms between the dummy variables were also included.

Two methods were used to calculate the cost-savings of using first-line drugs based on the estimates from the multivariate regressions. The first method was to compare the marginal effects of the dummy variables of having first-, second-, and third-line drugs in the prescription profile. The second approach was to use a simulation based on a smearing method.[21] First, the total nonprescription expenditure was predicted assuming that all patients used only the first-line drugs. Then, a similar prediction was made assuming that all patients used only the second-line drugs. The following 7 simulations were performed: (1) first-line only, (2) second-line only, (3) nonrecommended (third-line) only, (4) first-line and second-line only, (5) first-line and nonrecommended only, (6) second-line and nonrecommended only, and (7) first-line, second-line, and nonrecommended drugs. The simulation results were compared to determine the cost-savings of using the first-line drugs. Because the MEPS used a complex sampling design, failure to control for a person's weight and primary sampling unit would provide inaccurate standard errors for the nationally representative estimates. Therefore, statistic software STATA, version 7.0 (Stata Corp, College Station, Tex), was used to control for the complex sampling design of the MEPS.

RESULTS

Similar to conclusions drawn from previous studies,[4,9-11] we found that compliance with the JNC V recommendations for the management of essential hypertension was low. Only about one third of the hypertensive patients without comorbid cardiovascular diseases/conditions used first-line medications at some point in 1996. In contrast, two thirds of this subpopulation used second-line medications, and approximately 86.81% used third-line medications during that year. The most frequently observed pattern of medication use among all the prescription profiles was the combination of second- and third-line drugs (39.71%). The **Figure** shows the breakdown of the prescription profiles for hypertensive patients in 1996. About 86.81% of patients with essential hypertension and without any other cardiovascular diseases/conditions received nonrecommended drugs

Figure. Annual Antihypertensive Use Profile in the United States, 1996



(third-line). About 67.49% received calcium-channel blockers or angiotensin-converting enzyme inhibitors (second-line). Only about 36.72% of the patients received diuretics or β-blockers (first-line). Only 3.23% of the 1588 patients did not take any prescription medications for essential hypertension.

In 1996, about 19.6 million, or 7.28%, of the noninstitutionalized US population had essential hypertension without any other cardiovascular diseases/conditions. In treating these patients, prescription expenditures ($6.16 billion) constituted more than two thirds of the total costs ($9.15 billion). Office-based provider service was the second largest category at $1.99 billion, approximately 21.75% of the total expenditure. The details of the national expenditures and estimated confidence intervals (CI) for managing essential hypertension in 1996 are shown in **Table 1.** Among prescription drugs, the proportions of the expenditures on first-, second-, and third-line medications were 17.53%, 64.61%, and 17.86%, respectively.

Table 2 provides descriptive statistics for the socioeconomic characteristics of the 1588 patients in the sample and in the nonhypertensive population. The last column reports the *P* values for comparisons between the 2 groups. For continuous variables, *F* tests were performed. For categorical variables, Pearson tests were performed.

We regressed the log-transformed expenditures of all services (excluding prescriptions); inpatient, outpatient, emergency room, and office-based pro-vider services on the dummy variables indicating the use of first-line, second-line, and nonrecommended drugs; the interactions; and other correlates. The dummy variables and their interactions were significant only in the equation of overall nonprescription expenditures, but not each type of service. The R^2 measures were less than 0.05 for each equation of specific type of service. Two possible reasons were that the variation of expenditure for each type of service was low and for services such as emergency room visits, only a small proportion of the sample had nonzero expenditure. Below, we limited discussion to only the overall nonprescription expenditure.

Selected estimates from the overall nonprescription equation are reported in **Table 3.** Considering the fact that cross-sectional micro data were used in the estimation, the goodness-of-fit measure was fairly good (R^2 = 0.35). The parameter estimates, their standard errors, *t* statistics, and 95% CIs are shown. All dummy variables for drugs and their interactions were significant ($P < .01$). The marginal effects of the first-line, second-line, and nonrecommended drugs were calculated at the population means for the hypertensive subpopulation using the parameter estimates of the dummy and interaction variables. Based on the marginal effects, the cost-saving from using the first-line drugs in comparison with the second-line drugs is $162 per patient per year, which can be translated to $3.176 billion for the subpopulation of hypertensive patients without other cardiovascular

Table 1. National Expenditures in Treating Essential Hypertension Without Other Cardiovascular Comorbidities in 1996

Expenditure	Total (US$ billion)	95% CI
All expenditures	9.15	(7.92, 10.4)
Inpatient	0.67	(–1.40, 1.49)*
Emergency room	0.11	(0.05, 0.17)
Outpatient	0.22	(0.13, 0.0.31)
Office-based provider	1.99	(1.70, 2.28)
All Rx	6.16	(5.50, 6.82)
First-line Rx	1.08	(0.79, 1.38)
Second-line Rx	3.98	(3.56, 4.40)
Nonrecommended Rx	1.10	(0.84, 1.35)

*Due to great variations and strong skewness in inpatient expenditure, the lower bound of this confidence interval is negative.
CI indicates confidence interval; Rx, prescription.

comorbidities in the United States in 1996. Although the nonrecommended drugs cost less, their effectiveness is unknown based on the recommendations from JNC guidelines. In addition, because all nonrecommended drugs were included in this category, the heterogeneity made any comparisons between first-line and nonrecommended drugs problematic if not impractical.

Table 4 presents the simulation of the costs of different drug use patterns encompassed by the Figure. Based on the parameter estimates of the full model, smearing was used to transform the error term. First, the cost of the overall nonprescription expenditure was calculated under the assumption that all hypertensive patients without other cardiovascular comorbidities used only first-line drugs in the United States in 1996. Under this scenario, the overall nonprescription expenditure per patient per year could have been $327, or $6.308 billion for all patients per year. Similarly, under the assumption that all patients used only the second-line drugs, the cost could have been $461 per patient per year. Under the assumption that all patients used the second-line and nonrecommended drugs, the cost would have been $735 per patient per year. The cost-saving from using the first-line drugs as compared with using the second-line drugs was $134 per patient per year, or $2.593 billion per year. The simulation approach produced an estimate of the cost-saving smaller than that derived from the cost-saving derived from marginal effects.

Caution must be taken in interpreting the simulation results. First, it is important to note that the costs are not additive. That is, the overall nonprescription cost under the assumption that all patients used first- and second-line drugs was not the summation of the costs under the assumptions of using only first-line drugs plus the costs using only second-line drugs. Second, the magnitudes of all the parameter estimates of the dummy and interaction variables are in comparison with using no drugs. Consequently, the absolute cost simulated may

Table 2. Descriptive Statistics of the Sample

	Hypertensive Patients	Nonhypertensive Population	*P*
Hypertension history, years, mean (SE)*	8.18 (0.29)		
Age, years, mean (SE)*	58.38 (0.49)	31.67 (0.46)	.000
Sex			
Male	42.63	49.71	.000
Female	57.37	50.29	
Race			
White	79.16	82.18	.001
Black	16.62	12.75	
Other Races	4.22	5.06	
Ethnicity			
Non-Hispanic	94.45	88.21	.000
Hispanic	5.55	11.79	
Poverty level			
<100% poverty	11.30	14.41	.002
100%-124% poverty	5.35	4.70	
125%-199% poverty	17.16	14.62	
200%-399% poverty	30.30	33.16	
≥400% poverty	35.89	33.11	
Insurance			
Uninsured for 12 months	5.42	13.03	.000
Insured for 1-6 months	4.05	6.16	
Insured for 7-11 months	3.62	8.33	
Insured for 12 months	86.91	72.48	
MSA			
Non-MSA	2392	20.00	.007
MSA	7608	80.00	
Geographic area			
East	18.16	19.38	.051
Midwest	24.41	23.17	
South	38.01	34.58	
West	19.42	22.87	

Population proportions are shown, unless otherwise indicated.
*Continuous variables.
MSA indicates medical savings account.

Table 3. Drug Use and Other Service Expenditures*

	β	SE	*t*	95% CI	Marginal Effect ($)†
First-line	3.054	0.450	6.79	(2.170, 3.937)	127
Second-line	3.398	0.375	9.05	(2.661, 4.135)	289
Nonrecommended	1.977	0.403	4.91	(1.186, 2.767)	115
First-line × second-line	–2.409	0.526	–4.58	(–3.442, –1.376)	
First-line × nonrecommended	–1.804	0.493	–3.66	(–2.771, –0.837)	
Second-line × nonrecommended	–1.510	0.424	–3.56	(–2.342, –0.678)	
First-line × second-line × nonrecommended	1.497	0.567	2.64	(0.383, 2.610)	

*The estimation results from the multivariate analysis. The estimates of other correlates are available upon request.
†Calculated at the population means.
CI indicates confidence interval; SE, standard error.

not be realistic. However, the comparative cost (eg, first-line vs second-line drugs) is meaningful.

DISCUSSION

The current study investigated the relative costs of using calcium antagonists and ACE inhibitors compared with diuretics and β-blockers for managing uncomplicated essential hypertension. We demonstrated that prescribing diuretics and β-blockers recommended by JNC V as first choice for treating uncomplicated essential hypertension was associated with a lower total cost of prescriptions. More importantly, we found that the cost of the whole "treatment package," that is, inpatient, outpatient, emergency room, and office visits combined, was associated with $134 to $162 less in treatment per patient per year. For the US hypertensive population without other cardiovascular comorbidities, the cost-savings could be $2.6 billion to $3.2 billion per year. An earlier study concluded that the cost saving from using the first-line drugs was approximately $3.1 billion in 1992,[22] an estimate within the range produced by the current study.

A number of explanations have been provided for the phenomenon of poor compliance with JNC V guidelines.[4] One possibility that has not been adequately explored is that the JNC IV guidelines[23] were a watershed event. We believe that those guidelines have been influential in determining subsequent physician behavior. The JNC IV report recommended any of the following classes of drugs as first choices in initiating pharmacological treatment for mild hypertension: diuretics, β-blockers, calcium-channel blockers, or ACE inhibitors. In particular, the therapeutic "2-for-1" concept was emphasized in which any antihypertensive drug choice might also be beneficial for a coexisting condition (other than hypertension). The tendency to choose calcium-channel blockers was further promoted

Table 4. Simulations of Other Service Expenditures Under Different Drug Use Patterns*

Drug Use Pattern	Population Mean (US$)	Population Total (US$ in billion)
First-line only	327	6.308
Second-line only	461	8.901
Nonrecommended only	111	2.148
First-line and second-line	879	16.967
First-line and nonrecommended	388	7.493
Second-line and nonrecommended	735	14.191
First-line, second-line, and nonrecommended	1030	19.890

*Simulation results based on multivariate analysis results using the smearing method.

by a comparative study conducted in 1993 suggesting that calcium-channel blockers were superior to other alternatives.[24] The trend to use calcium-channel blockers and ACE inhibitors continued into the late 1990s because of anticipated results from ongoing randomized trials suggesting that such treatment would be superior to JNC first-choice drugs in the management of hypertensive outcomes.[25-28] The presumption was that second-line medications might provide a greater degree of "cardiac protection."[29]

It may be argued that the prevailing prescriptions of second- and third-line drugs were due to "step-down" therapies for patients who experienced adverse side effects caused by diuretics and β-blockers. However, we believe that such an argument does not hold for 2 reasons. First, the recommendations by JNC V and JNC VI for using diuretics and β-blockers as first-line medication was based on evidence of the efficacy and effectiveness of these drugs in randomized trials and other scientific studies. If the first-line drugs in these randomized trials were the most cost effective, this pattern should be mirrored in our nationally representative sample. That is, if the "step-down" therapy accounted for the prevalent use of second- or third-line antihypertensives and if the use of the second- or third-line medications were indeed appropriate in practice for most patients within our nationally representative sample, then it can be inferred that either the randomized trials and studies cited in the JNC reports had fundamental flaws in design or the effectiveness of the first-line drugs cannot be demonstrated in the general population. Second, we included only patients with essential hypertension who had no comorbid cardiovascular diseases/conditions. Patients selected under this criterion would be the perfect candidates for using the first-line drugs if the conclusions reached by the JNC guidelines were true.

A critical issue in the cost comparison of drug classes is the comparative effect of treatment on the risk of cardiovascular complications. In a meta-analysis, patients assigned to receive calcium antagonists were found to have had a significantly higher risk of acute myocardial infarction, congestive heart failure, and major cardiovascular events.[30] In addition to the evidence provided in the JNC V and VI, the results of randomized trials indicated that second- and third-line medications have no greater benefit than first-line medications in terms of long-term morbidity and mortality in treating hypertension.[25-28,31] A comparison between results from several randomized trials also indicated that in addition to insignificant or inconsistent findings regarding the differences between health outcomes as a result of the various regimens, a high rate of patient withdrawal also weakened the statistic power of these trials.[32] Furthermore, investigators conducting the Antihypertensive and Lipid-Lowering treatment to prevent Heart Attack Trial (ALLHAT) concluded that not only may antihypertensive drugs have important mechanisms of action apart from blood pressure lowering, but also that effective treatment is not a matter of simply lowering blood pressure.[33]

Cautions must be taken in interpreting our results. First, the cost-savings provided by our study are conservative because we did not account for the costs of medication errors. Second, our estimated prevalence rate for essential hypertension in 1996 was 7.3%, which was lower than prevalence rates reported by other studies.[4,34] The low prevalence in our study is likely because we included only patients with essential hypertension without other cardiovascular diseases/conditions. We also excluded patients with secondary hypertension. Nonetheless, with a higher prevalence rate, the total cost-savings at the national level would be even higher. Third, because of the lack of clinical markers for blood pressure in the MEPS survey, we could test the cost-effectiveness of using first-line drugs only indirectly. Fourth, the cost-savings derived from our study may have to be updated to be applicable to the current time because some second-line drugs, such as captopril and enalapril, are now generic, which may lower the cost estimates of second-line drug treatment. Fifth, additional costs associated with the use of diuretics, such as the cost of monitoring serum potassium, were not included in the current study because of data limitations. Lastly, because most of the data collected by the MEPS were self reported, and only limited information of each medical event was available, medical conditions and resource use may have been mismatched.

In conclusion, our results suggest that in managing uncomplicated essential hypertension, the use of diuretics and β-blockers is associated with lower costs of medications and other health services. In addition, evidence from other studies has demonstrated that the first-line drugs are at least as effective, if not significantly more effective, in treating essential hypertension than second-line or nonrecommended drugs. From a cost effectiveness perspective, use of first-line drugs is associated with lower costs with the same or better health outcomes. Consequently, it can be concluded that diuretics and β-blockers are cost effective.

Although compliance with the JNC guidelines improves the cost effectiveness of pharmacotherapy, our results concur with those of other studies demonstrating that the actual rate of compliance with JNC standards is low. One study using physician data found that 41% of respondents in a national sample reported they had not heard of or were not familiar with the

guidelines.[10] In a recent study, researchers demonstrated that physicians' knowledge of the JNC VI report is deficient.[5,31] However, other evidence suggests that awareness of the guidelines is growing and that younger physicians have higher levels of awareness.[9] It is crucial, from a societal perspective, to further elevate awareness of the JNC VI guidelines among clinicians so that the rising costs of medical care can be contained and greater efficiency be achieved in the healthcare system.

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