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TRENDS IN THE DIAGNOSIS AND TREATMENT OF ANTIHYPERTENSIVE /AMBULATORY PATIENTS BY US OFFICE-BASED PHYSICIANS

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TRENDS IN DIAGNOSIS AND TREATMENT OF HYPERTENSION

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Abstract

This descriptive study assessed trends in ambulatory patients' antihypertensive therapy by US office-based physicians for visits in 2001 in which hypertension was a diagnosis. These trends were compared with the Sixth Report by the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC-6) guidelines; the therapeutic antihypertensive standard in 2001. Data from the National Center for Health Statistics' 2001 National Ambulatory Medical Care Survey were used. Blood pressure measurements were documented in 88% of the patient office visits. No significant trends were observed in diagnostic screening services or in lifestyle modification services. Diuretics and beta-blockers, the antihypertensive drug classes preferred by the JNC-6 guidelines, were mentioned in 9.8% and 16.7% of antihypertensive patient office visits. Antihypertensive drug visits mentioning ACE inhibitors and calcium channel blockers were 24.3 and 21.7 percent respectively. Antihypertensive drug therapy was mentioned in 77.4 percent of patient office visits. Physician antihypertensive drug prescribing was generally consistent with the basic antihypertensive drug guidelines of JNC-6.

Introduction

Essential hypertension was the most common reason for office visits by ambulatory patients in the year 2000.[1] An additional 30 percent of the ambulatory population of the United States may have undetected high blood pressure.[2] Consequently, increasing the awareness and detection of hypertension [3], improving the control of hypertension [3], and reducing the risk of cardiovascular disease subsequent to hypertension [4] are recognized as being among the major public health challenges facing the United States. From 1977 through 1991, the percentage of Americans who were aware they had high blood pressure increased from 51% to 73%.[5] The number of individuals with hypertension who received treatment increased during that same period from 31% to 55%. The number of persons with high blood pressure controlled to below 140/90 mm Hg increased from 10% in 1977 to 29% by 1992.[5] These changes reportedly contributed to the 60% decline in age-adjusted death rates from stroke, and the 53% reduction from coronary heart disease experienced from 1972 to 1994.[6]

These changes were possible, in large part, due to the impact of recommended national guidelines for treating hypertension prepared by the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC). These national guidelines for managing hypertension have been issued at periodic intervals beginning with JNC-1 in 1977. These research-based guidelines reflect the available knowledge of the diagnostic evaluation and treatment of hypertension of the time. Each succeeding JNC report enriched the state of knowledge for managing hypertension accounting for the improvements mentioned above. The guidelines reported in JNC-1 through JNC-5 generally called for lifestyle modification and various stepped-care pharmacologic therapeutic options.[7, 8, 9, 10, 11] Unfortunately, in 1993, age-adjusted stroke rates rose, and the slope of the age-adjusted rate of decline in CHD demonstrated

a leveling effect which indicated that a new set of guidelines would be required.[12] The JNC-6 report issued in 1997 sought to reverse the downward trends in cardiovascular risk.[6] The JNC-6 guidelines broke new ground by emphasizing risk factors, clinical cardiovascular disease, and target organ damage in classifying patients and advising treatment decisions.[6] Thus, the JNC-6 report offers clinicians the means to consistently stratify people into risk groups based on the presence or absence of major cardiovascular disease risk factors, clinical cardiovascular disease, and target organ damage.[6] These risk groupings are used along with blood pressure level in guiding treatment recommendations. Lifestyle modifications have continued to play a vital role in the decision making process in preventing high blood pressure, as a definitive therapy for some, and as adjunctive therapy for all persons with hypertension. Perhaps more importantly, the JNC-6 departed from previous recommendations by suggesting that combination therapy might be appropriate as initial treatment in some patients.[6] Finally, the JNC-6 guidelines describe laboratory tests and other diagnostic procedures essential for the diagnosis of hypertension.[6]

The reduction in morbidity and mortality associated with essential hypertension depends upon adherence to the JNC-6 guidelines. The purpose of this study, therefore, was to utilize the NAMCS 2001 data set to examine trends over a one-year period in the provision of services for essential hypertension during patient office visits and to compare those trends with the JNC-6 guidelines which were the established guidelines for treating essential hypertension during this time period. Specifically, we examined the rate of use of 1) diagnostic and screening tools; 2) counseling and education therapies; 3) antihypertensive drug prescriptions all pursuant to the JNC-6 guidelines.

Methods

NAMCS 2001

The National Ambulatory Medical Care Survey (NAMCS) is a continuing survey conducted annually by the National Center for Health Statistics (NCHS). NAMCS is a national probability-sample survey designed to sample a nationally representative group of patient visits to office-based physicians. It provides ongoing nationally representative diagnostic and prescribing information on U.S. office-based physicians and their patients. Physicians from the master lists of the American Medical Association and the American Osteopathic Association are selected by random stratified sampling by specialty and geographic region. Nonpatient care specialties such as anesthesiology, pathology, and radiology are excluded. For each participating physician in each year, one week is randomly selected and visits during this week are systemically sampled. For this analysis, data from 2001, the most recent year available, was used. NAMCS 2001 employed a three-stage sampling design selecting primary sampling units (PSUs), physician practices within PSUs, and patient visits within practices. Physicians recorded standardized health-related information on patient visits made over randomly selected 1-week periods throughout 2001. The 2001 NAMCS excluded sample encounters such as telephone contacts, or visits made outside of the physician's office such as visits to hospitals and other institutional settings and visits to doctors' offices that were made for administrative purposes such as paying bills, or picking up insurance forms.

Antihypertensive Health Visits

For this report, antihypertensive patient office visits were selected from the NAMCS 2001 data set for analysis by codes related to a diagnosis of essential hypertension (ICD-9-CM code 401).[13] Physicians could indicate up to three diagnoses for each visit.

Diagnostic/Screening Services

Physicians recorded the services that were performed at the visit. The services selected for analysis are commensurate with JNC-6 guidelines and include blood pressure, urinalysis, complete blood count (CBC), cholesterol, and electrocardiogram (EKG).

Counseling/Education/Therapy

Physicians indicated whether any medical counseling or education therapy was ordered or given at the visit and then checked off the type of counseling/education provided. In the NAMCS 2001data set, the counseling/education/therapy opportunities pertaining to JNC-6 guidelines were diet/nutrition, exercise, mental health/stress management, tobacco use/exposure, and weight reduction.

Prescription Drug Visits

Physicians could record the antihypertensive drugs prescribed during the visit by using either the generic drug name or the brand name of up to six drugs. Each occurrence of an antihypertensive drug was categorized to its major antihypertensive drug class. If a particular antihypertensive drug class occurred more than once for a visit, it was counted only once. The frequency with which each drug class appeared across all antihypertensive drug visits was computed.

Patient Characteristics

Physicians reported patient age, sex, race, primary expected source of payment, whether the patient belonged to a health maintenance organization (HMO), and the region of the country in which the office visit occurred.

Practice Information

Physician specialty and geographic region were available from the practice description.

Statistical Methods

In this descriptive study, the analysis focused on estimating the rate of diagnostic screening services, counseling and therapy services, and antihypertensive drugs prescribed by drug class for those patients with a diagnosis of essential hypertension. Statistical analyses were conducted using SPSS 12.0 (SPSS, Chicago, Il).

The content and conduct of the NAMCS 2001 were subject to an institutional review board. All individuals participating in the NAMCS 2001 survey were required to sign a informed consent document. This study was subject to review by the Institutional Review Board of the University of North Texas Health Science Center.

Results

The NAMCS 2001comprised a total of 24,281 patient record forms received from 1,230 participating physicians. The NCHS included weights in the NAMCS 2001 to enable the sample to represent all patient office visits made during 2001 in the United States. Consequently, the figures reported are weighted to reflect national patterns of practice. The weights are associated with each visit-level record that allows extrapolation to national estimates. These weights account for the probability of sampling based on the physician's specialty and geographic area, adjusted for nonresponse. All calculations were weighted to the civilian noninstitutionalized

population of the US. An estimated total of 880, 486,669 individual patient office visits were made during the year 2001. The weighted total associated with a diagnosis of essential hypertension consisted of an estimated 67,818,911 patient office visits.

Selected patient demographics adjusted for patient weighting are displayed in Table 1. The results of the analysis on diagnostic screening services recommended by the JNC-6 are presented in Figure 1. Blood pressure, urinalysis, CBC, cholesterol, and EKG are the only diagnostic service variables pertaining to JNC-6 guidelines collected in NAMCS 2001. Blood pressure was measured in only 88.1% of the patients diagnosed with essential hypertension. It should be of concern that the measure of blood pressure was not 100%. The low percentages estimated for urinalysis, CBC, cholesterol, and EKG are not as alarming as these diagnostic measurements could have been obtained at an office visit not captured by the sample analysis.

The JNC-6 guidelines recommended specific lifestyle modifications. Those counseling and education-related services commensurate with the JNC-6 guidelines collected in the survey are displayed in Figure 2. The percentages of these prescribed services were unexpectedly low. It is possible, however, these services could have been offered during a non-assessed time period.

The use of prescription drugs by drug class recommended by the JNC-6 guidelines is presented in Figure 3. Nearly half of the patient office visits the survey documented the receipt of calcium channel blockers and/or ACE inhibitor prescriptions, whereas, approximately 26% of the patient office visits noted a prescription for diuretics and/or beta blockers. These percentages appear to reflect adherence to JNC-6 guidelines provided the physicians prescribing antihypertensive medications were considering compelling indications requiring, for example, ACE inhibitors and/or calcium channel blockers.

Discussion

The intent of this report was to evaluate the one-year trends in the diagnosis and treatment of essential hypertension in ambulatory patients by office-based physicians referencing the JNC-6 guidelines. The routine diagnostic procedures and laboratory tests recommended by the JNC-6 guidelines include urinalysis, complete blood cell count (CBC), blood chemistry (potassium, sodium, creatinine, fasting glucose, total cholesterol, and high-density lipoprotein cholesterol), and a 12-lead EKG.[6] The NAMCS 2001 data set collected data for CBC, cholesterol, urinalysis and EKG. As seen in Figure 1, the percentages for these diagnostic screening services were quite low. These services could have been performed at a time not included in the survey period. JNC-6 guidelines recommend classifying essential hypertension on the basis of the average of two or more blood pressure readings taken at each of two or more visits after an initial screening visit.[6] While sequential blood pressure measurements were not captured by NAMCS 2001, it was noted that blood pressure was monitored at 88% of the patient office visits for essential hypertension. Considering the patient office visits were for essential hypertension, it is curious that blood pressure measurements were not taken at each visit. Muntner et al[14] observed that valid blood pressure measurements were available for 88% of NHANES III participants. The reason for failing to monitor and record a blood pressure reading at all patient office visits for hypertension is unclear. It would seem to be in the best interests of the patients for this to be done.

Lifestyle modifications are recommended for hypertension prevention and management.[6] Among the lifestyle changes recommended are weight reduction, moderation of alcohol intake, physical activity, moderation of dietary sodium, potassium intake, calcium intake, magnesium intake, relaxation and biofeedback, and tobacco avoidance. The NAMCS 2001 survey collected

diet/nutrition, exercise, weight reduction, stress reduction, and tobacco cessation counseling and educational sessions as prescribed by the physician. As demonstrated in Figure 2, the percentage of counseling/education services prescribed by the physician was lower than expected. It is possible, however, that these services were provided in a time frame not measured in the survey.

In the event lifestyle changes should fail to reduce blood pressure, or to not reduce blood pressure enough, the addition of pharmacologic therapy to lower blood pressure has been shown to decrease cardiovascular morbidity and mortality.[6] The JNC-6 guidelines recommend therapy from the diuretic and beta-blocker drug classes as initial drug choices, unless contraindicated, for uncomplicated hypertension.[6] For complications such as diabetes mellitus (with proteinuria), heart failure, isolated systolic hypertension, or myocardial infarction, drug classes such as ACE inhibitor, calcium channel blocker, or beta-blocker with or without a diuretic drug class component in combination are recommended.[6] Finally, there are specific indications for the drug classes ACE inhibitor, alpha blocker, beta blocker, calcium channel blocker and diuretic depending on the level or stage of blood pressure elevation.[6] An inspection of Figure 3 shows the drug prescribing habits of physicians in the NAMCS 2001 survey appear to follow JNC-6 guidelines for hypertension, provided the compelling indication features of JNC-6 were followed. Diuretics (9.8% see Figure 3) and beta blockers (16.7% see Figure 3) do not seem large enough to represent compliance with the initial drug choice (unless contraindicated) component of JNC-6). Nelson and Knapp[15] examined NAMCS data sets from 1980, 1985, 1990, and 1995 and noted a trend in the reduction in the percentage of the diuretic drug class from 37.9, 27.4, 16.4 and 11.6 in the respective years. The beta-blocker drug class, on the other hand rose from 6.3 percent in 1980 to 14.8 percent in 1985, but fell to 11.1 percent in 1990 and 8.0 percent in 1995. The usage patterns of these two drug classes as noted in the Nelson and Knapp

report are in line with the findings of the present study. The drug classes ACE inhibitor and calcium channel blocker (see Figure 3) led the prescribing pattern in the 2001 data set. These results are similar with those noted by Nelson and Knapp.[15] In 1990 and 1995, ACE inhibitors and calcium channel blockers were the most frequently prescribed drug classes for hypertension.[15] The drug classes of ACE inhibitor and calcium channel blocker were introduced in 1990. These drugs were utilized advantageously for complications such as renal conservation in diabetes mellitus with proteinuria (ACE inhibitor) and isolated systolic hypertension (calcium channel blocker).

It should be noted in Figure 3, when the drug classes ACE inhibitor, calcium channel blocker, beta blocker, diuretic, and alpha agonists/blockers are considered, 22.6 percent of the patient office visits for hypertension did not mention antihypertensive pharmacotherapy. These results are similar to those of Nelson and Knapp, who noted that from 1980 to 1995, 20.5 to 26.6 percent of hypertension visits failed to mention antihypertensive drug therapy.[15] These results may be clouded by the putative generic category of antihypertensive (15.1 %, see Figure 3). Had physicians recorded a drug in a specific drug class instead of the generic antihypertensive class, the percentage of patient office visits occurring without mention of a drug would have been 7.5. Because of the study design employed by NAMCS 2001, we are unable to determine whether the failure to mention a drug is a non response error, or a valid example of non antihypertensive drug prescription.

In conclusion, physician prescribing habits for antihypertensive drugs as reported in the NAMCS 2001 survey was generally consistent with the antihypertensive drug guidelines of JNC-6.

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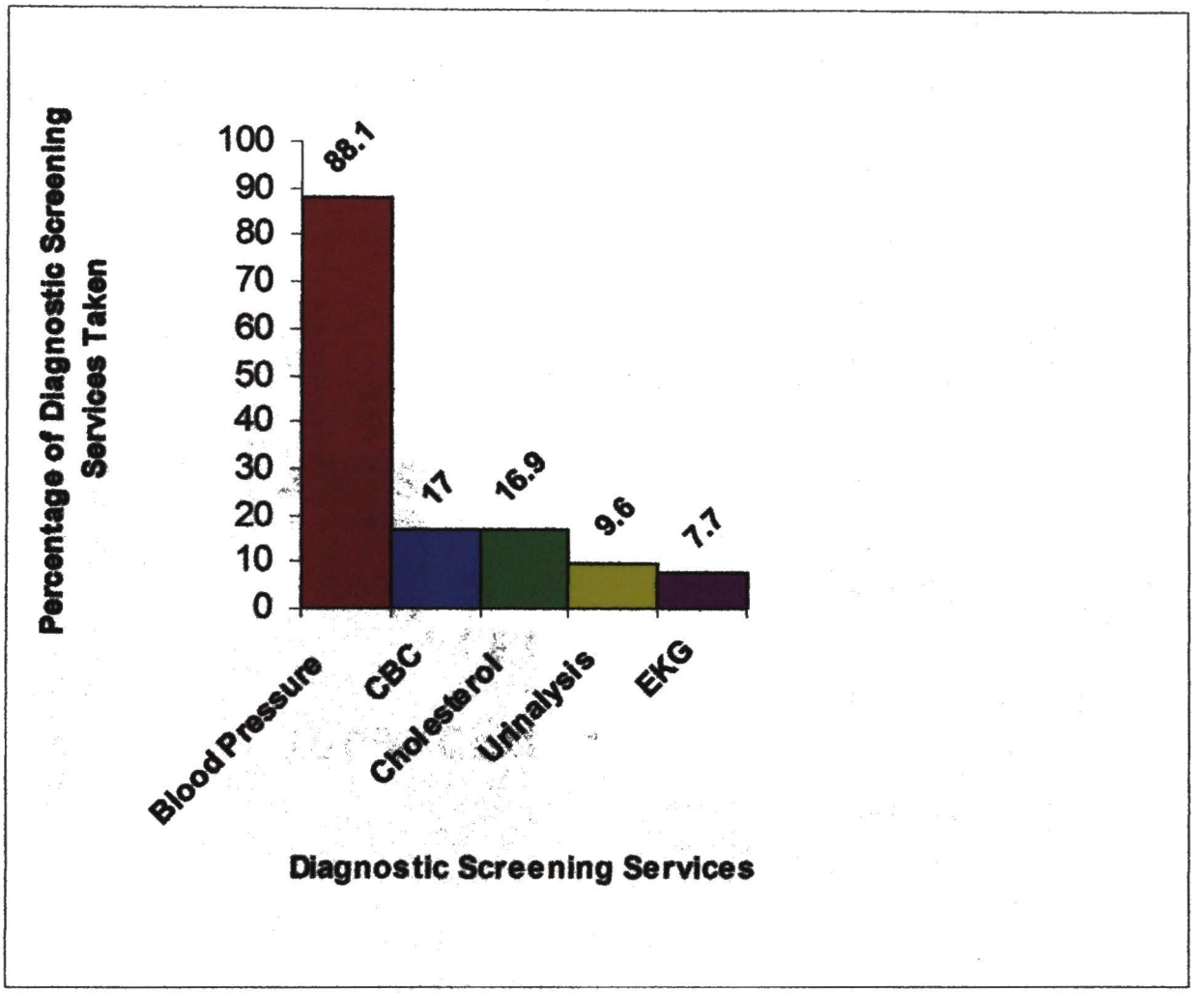
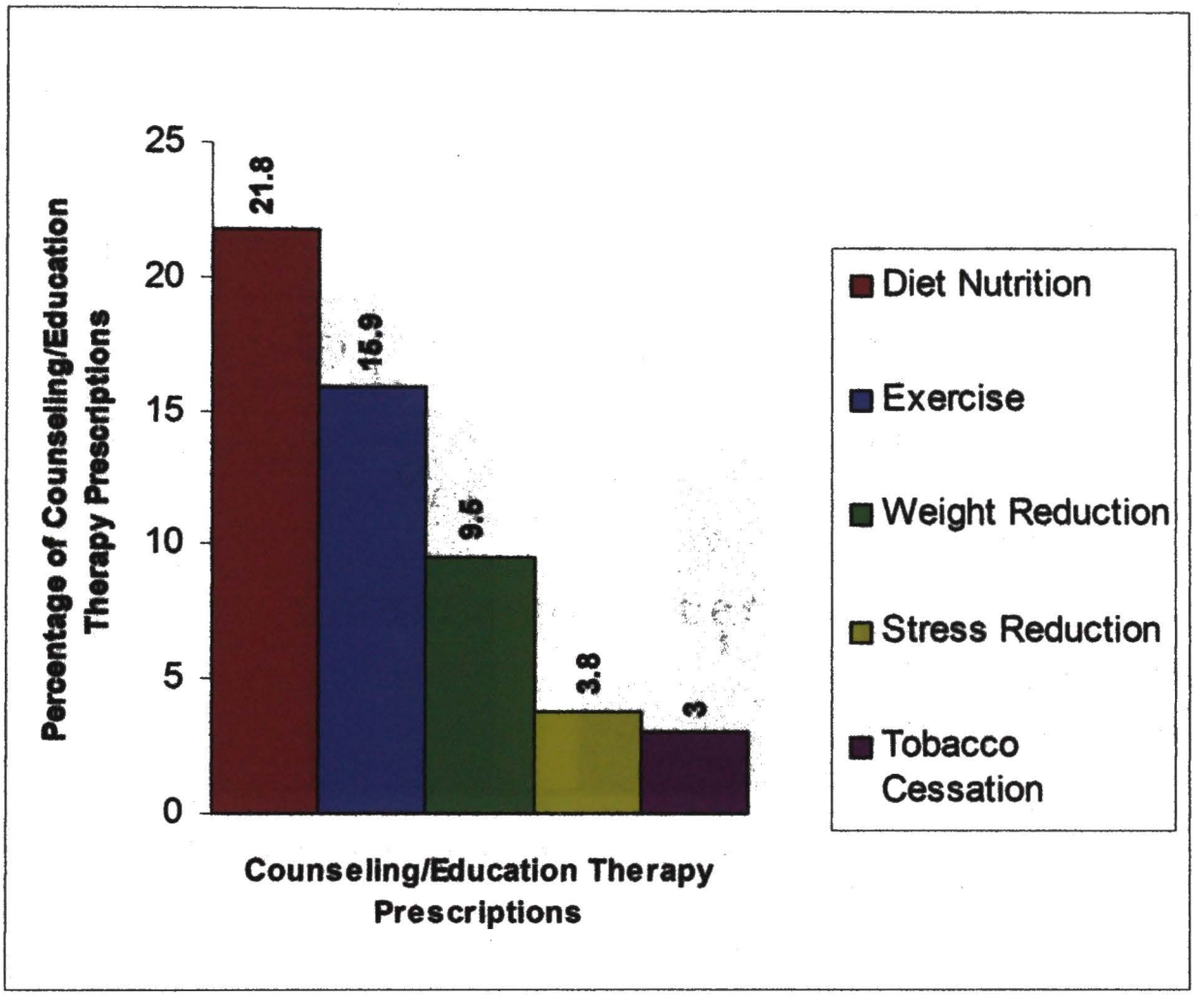
Table 1. Weighted patient demographics for ambulatory subjects diagnosed with essential hypertension by U.S. physicians in 2001. (Estimated total of 67,818,911 patient office visits)

Subject Characteristic	N (%)
Sex	
Female	37,896,512 (55.9)
Male	29,922,399 (44.1)
Age Groups	
<1-24 years	739,617 (1.1)
25-44 years	7,774,289 (11.5)
45-64 years	24,085,182 (35.5)
65-74 years	17,486,443 (25.8)
75 years and over	17,733,380 (26.1)
Race Groups	
White	58,690,543 (86.5)
Black	6,598,864 (9.7)
Other	2529504 (3.7)
Ethnic Groups	
Not Hispanic/Latino	48,726,779 (71.8)
Hispanic/Latino	4,063,229 (6.0)
Blank	15,028,903 (22.2)
Payment Type	
Medicare	30,684,581 (45.2)
Private Insurance	28,358,078 (41.8)
Medicaid	2,439,987 (3.6)
Self-Pay	1,009,763 (1,5)
Blank, Other and Unknown	5,326,502 (7.8)
Physician Specialty	
Internal medicine	29,007,101 (42.8)
General/family practice	23,769,618 (35.0)
Cardiovascular diseases	7,875,576 (11.6)
Other specialties	7,166,616 (10.6)
Region	
South	21,259,920 (31.3)
Northeast	16,685,706 (24.6)
West	15,298,300 (22.6)
Midwest	14,574,985 (21.5)
Tobacco Use	
No	42,673,888 (62.9)
Yes	5,686,765 (8.4)
Blank and Unknown	19,458,258 (28.7)
ESTIMATED TOTAL PATIENT OFFICE VISITS	**67,818,911 (100)**


Percentage of Diagnostic Screening Services Taken
100
90
80
70
60
50
40
30
20
10
0
88.1
17
16.9
9.6
7.7
Blood Pressure
CBC
Cholesterol
Urinalysis
EKG
Diagnostic Screening Services


25
20
15
10
5
0
21.8
15.9
9.5
3.8
3
Percentage of Counseling/Education Therapy Prescriptions
Counseling/Education Therapy Prescriptions
Diet Nutrition
Exercise
Weight Reduction
Stress Reduction
Tobacco Cessation

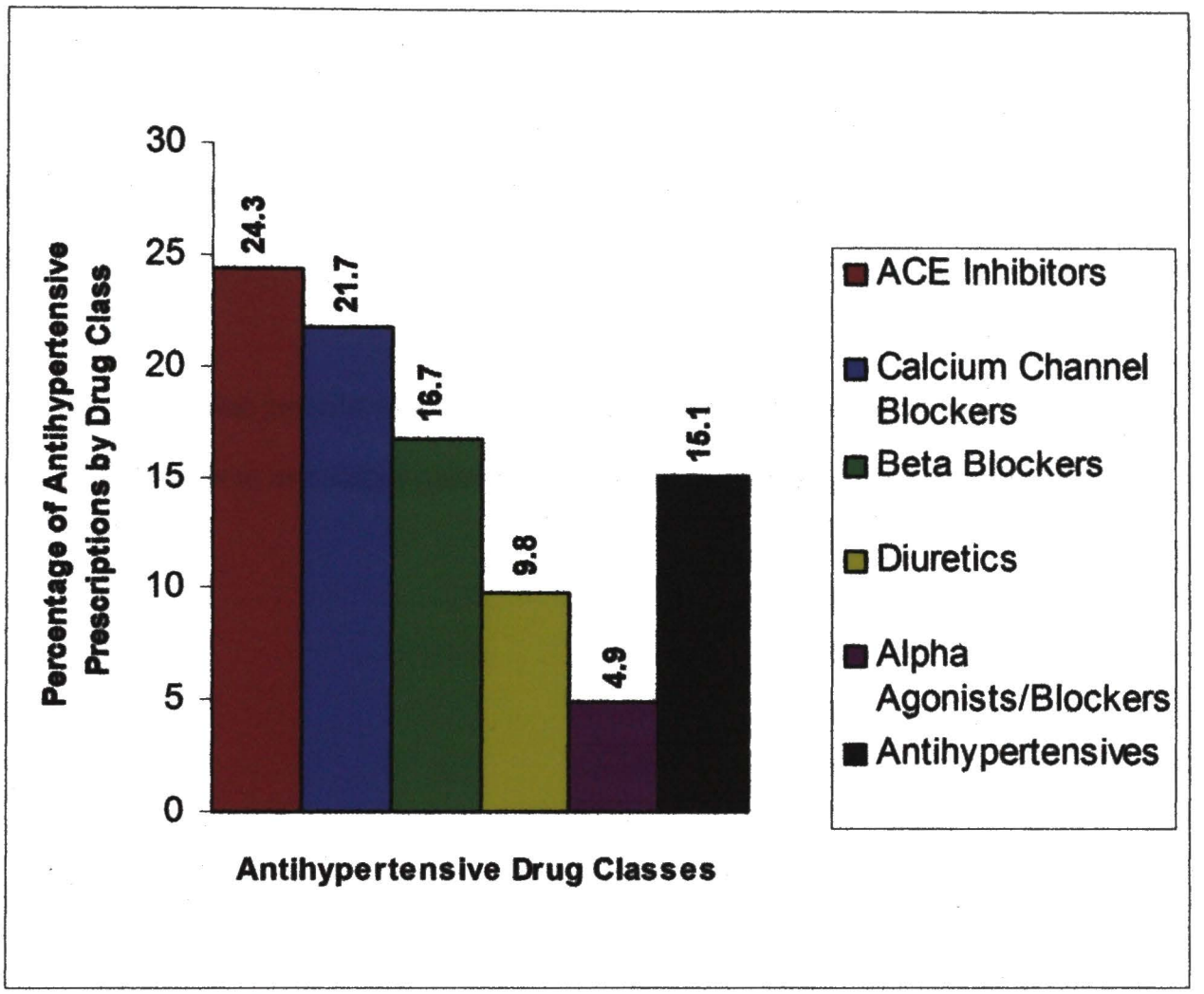

Percentage of Antihypertensive Prescriptions by Drug Class
30
25
20
15
10
5
0
24.3
21.7
16.7
9.8
4.9
15.1
Antihypertensive Drug Classes
ACE Inhibitors
Calcium Channel Blockers
Beta Blockers
Diuretics
Alpha Agonists/Blockers
Antihypertensives

Figure 1. Diagnostic Screening Services by percent of weighted antihypertensive patient office visits by U.S. physicians to ambulatory patients diagnosed with essential hypertension in 2001.

Figure 2. Educational counseling sessions prescribed by percent of weighted antihypertensive patient office visits by U.S. physicians to ambulatory patients diagnosed with essential hypertension in 2001.

Figure 3. Drug class prescriptions by percent of weighted antihypertensive patient office visits by U.S. physicians to ambulatory patients diagnosed with essential hypertension in 2001.