MEPS

Research Findings #25

Trends in the Pharmaceutical Treatment of Hypertension, 1997 to 2003

AHRQ Advancing Excellence in Health Care

Agency for Healthcare Research and Quality
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ABSTRACT

This report uses nationally representative data from the Medical Expenditure Panel Survey (MEPS) to examine trends in the use of five classes of anti-hypertensive drugs (diuretics, beta blockers, calcium channel blockers, angiotensin-converting enzyme (ACE) inhibitors, and angiotensin II receptor blockers) from 1997 through 2003. The sample for the study is comprised of U.S. adults, ages 18 and older, who reported treatment for hypertension. We find that, from 1997 to 2003, the proportion of this population using a drug from at least one of the five classes in our study increased from 84.7 to 89.6 percent and the proportion using drugs from two or more classes increased from 40.6 to 53.3 percent. Among adults who used at least one of the five drug classes, the proportion using beta blockers increased from 30.4 percent in 1997 to 40.8 percent in 2003, the proportion using diuretics increased from 47.0 to 50.6 percent, and the proportion using the newly introduced angiotensin II receptor blockers more than quadrupled from 4.4 to 21.0 percent. In contrast to these trends, the proportion using ACE inhibitors did not change and the proportion using calcium channel blockers fell from 40.3 to 33.0 percent over the period of our study. In addition to aggregate trends, this report also examines trends within and differences across subgroups of the population. Some of the most marked and potentially important differences in antihypertensive drug use were observed across groups defined by age and by race/ethnicity.

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The estimates in this report are based on the most recent data available at the time the report was written. However, selected elements of MEPS data may be revised on the basis of additional analyses, which could result in slightly different estimates from those shown here. Please check the MEPS Web site for the most current file releases.

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The Medical Expenditure Panel Survey (MEPS)

Background

The Medical Expenditure Panel Survey (MEPS) is conducted to provide nationally representative estimates of health care use, expenditures, sources of payment, and insurance coverage for the U.S. civilian noninstitutionalized population. MEPS is cosponsored by the Agency for Healthcare Research and Quality (AHRQ), formerly the Agency for Health Care Policy and Research, and the National Center for Health Statistics (NCHS).

MEPS comprises three component surveys: the Household Component (HC), the Medical Provider Component (MPC), and the Insurance Component (IC). The HC is the core survey, and it forms the basis for the MPC sample and part of the IC sample. Together these surveys yield comprehensive data that provide national estimates of the level and distribution of health care use and expenditures, support health services research, and can be used to assess health care policy implications.

MEPS is the third in a series of national probability surveys conducted by AHRQ on the financing and use of medical care in the United States. The National Medical Care Expenditure Survey (NMCES) was conducted in 1977, the National Medical Expenditure Survey (NMES) in 1987. Beginning in 1996, MEPS continues this series with design enhancements and efficiencies that provide a more current data resource to capture the changing dynamics of the health care delivery and insurance system.

The design efficiencies incorporated into MEPS are in accordance with the Department of Health and Human Services (DHHS) Survey Integration Plan of June 1995, which focused on consolidating DHHS surveys, achieving cost efficiencies, reducing respondent burden, and enhancing analytical capacities. To accommodate these goals, new MEPS design features include linkage with the National Health Interview Survey (NHIS), from which the sample for the MEPS-HC is drawn, and enhanced longitudinal data collection for core survey components. The MEPS-HC augments NHIS by selecting a sample of NHIS respondents, collecting additional data on their health care expenditures, and linking these data with additional information collected from the respondents' medical providers, employers, and insurance providers.

Household Component

The MEPS-HC, a nationally representative survey of the U.S. civilian noninstitutionalized population, collects medical expenditure data at both the person and household levels. The HC collects detailed data on demographic characteristics, health conditions, health status, use of medical care services, charges and payments, access to care, satisfaction with care, health insurance coverage, income, and employment.

The HC uses an overlapping panel design in which data are collected through a preliminary contact followed by a series of five rounds of interviews over a two and a half year period. Using computer-assisted personal interviewing (CAPI) technology, data on medical expenditures and use for two calendar years are collected from each household. This series of data collection rounds is launched each subsequent year on a new sample of households to provide overlapping panels of survey data and, when combined with other ongoing panels, will provide continuous and current estimates of health care expenditures.

The sampling frame for the MEPS-HC is drawn from respondents to NHIS, conducted by NCHS. NHIS provides a nationally representative sample of the U.S. civilian noninstitutionalized population, with oversampling of Hispanics and blacks.

Medical Provider Component

The MEPS-MPC supplements and validates information on medical care events reported in the MEPS-HC by contacting medical providers and pharmacies identified by household respondents. The MPC sample includes all hospitals, hospital physicians, home health agencies, and pharmacies reported in the HC. Also included in the MPC are all office-based physicians:

- Providing care for HC respondents receiving Medicaid.
- Associated with a 75 percent sample of households receiving care through an HMO (health maintenance organization) or managed care plan.
- Associated with a 25 percent sample of the remaining households. Data are collected on medical and financial characteristics of medical and pharmacy events reported by HC respondents, including:
- Diagnoses coded according to ICD-9 (9th Revision, International Classification of Diseases) and DSMIV (Fourth Edition, Diagnostic and Statistical Manual of Mental Disorders).
- Physician procedure codes classified by CPT-4 (Current Procedural Terminology, Version 4).
- Inpatient stay codes classified by DRG (diagnosis related group).
- Prescriptions coded by national drug code (NDC), medication names, strength, and quantity dispensed.
- Charges, payments, and the reasons for any difference between charges and payments.

The MPC is conducted through telephone interviews and mailed survey materials.

Insurance Component

The MEPS-IC collects data on health insurance plans obtained through private and public sector employers. Data obtained in the IC include the number and types of private insurance plans offered, benefits associated with these plans, premiums, contributions by employers and employees, and employer characteristics.

Establishments participating in the MEPS-IC are selected through three sampling frames:

- A list of employers or other insurance providers identified by MEPS-HC respondents who report having private health insurance at the Round 1 interview.
- A Bureau of the Census list frame of private sector business establishments.
- The Census of Governments from the U.S. Census Bureau.

To provide an integrated picture of health insurance, data collected from the first sampling frame (employers and other insurance providers) are linked back to data provided by the MEPS-HC respondents. Data from the other three sampling frames are collected to provide annual national and State estimates of the supply of private health insurance available to American workers and to evaluate policy issues pertaining to health insurance. Since 2000, the Bureau of Economic Analysis has used national estimates of employer contributions to group health insurance from the MEPS-IC in the computation of Gross Domestic Product (GDP).

The MEPS-IC is an annual panel survey. Data are collected from the selected organizations through a prescreening telephone interview, a mailed questionnaire, and a telephone follow-up for nonrespondents.

Survey Management

MEPS data are collected under the authority of the Public Health Service Act. They are edited and published in accordance with the confidentiality provisions of this act and the Privacy Act. NCHS provides consultation and technical assistance.

As soon as data collection and editing are completed, the MEPS survey data are released to the public in staged releases of summary reports and microdata files. Summary reports are released as printed documents and electronic files. Microdata files are released on CD-ROM and/or as electronic files.

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Trends in the Pharmaceutical Treatment of Hypertension, 1997 to 2003

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Introduction

Since 1972, the National High Blood Pressure Education Program Coordinating Committee (NHBPEP CC) has worked to increase awareness, prevention, treatment, and control of hypertension in the United States. Progress in each of these areas over the last three decades has contributed to reductions in morbidity and mortality from stroke, coronary artery disease, and other cardiovascular conditions (JNCVI). Periodically, the NHBPEP CC has directed the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC) to produce and disseminate reports summarizing the current state of knowledge about hypertension. A central component of these guidelines is specific recommendations for the pharmaceutical treatment of hypertension.

Previous studies have used data from the National Health and Nutrition Examination Survey (NHANES) and other data sources to investigate the impact, if any, that the JNC guidelines have had on the pharmaceutical treatment of hypertension.[1] In this report, we use nationally representative data from the Medical Expenditure Panel Survey (MEPS) for the years 1997 through 2003 to examine antihypertensive drug use among adults in the U.S. civilian noninstitutionalized population. The frame of reference for our report comes from JNC VI guidelines, which were issued in 1997, and JNC VII guidelines, which were issued in 2003.[2]

The JNC VI and JNC VII guidelines both focus on five commonly used classes of antihypertensive drugs: diuretics, beta blockers (BBs), calcium channel blockers (CCBs), angiotensin-converting enzyme inhibitors (ACEIs), and angiotensin II receptor blockers (ARBs). Both reports recommend diuretics as first-line antihypertensives. JNC VI recommends that treatment of persons with uncomplicated hypertension should begin with diuretics or BBs. JNC VII recommends that diuretics should be used, alone or in combination with other drugs, for most patients with uncomplicated hypertension.[3] JNC VII also advises that most patients will require two or more antihypertensive agents to achieve goal blood pressure.

In addition to investigating aggregate trends in use, we examine trends and differences in antihypertensive drug use across subgroups of the U.S. adult population. In most cases, the JNC VI and JNC VII guidelines do not vary across sex, age, or other demographic characteristics. An important exception is race/ethnicity. JNC VII notes that the prevalence and severity of hypertension are increased in African Americans who

[1] See for example Hajjar and Kotchen (2003) and Muntner et al. (2002).
[2] Since JNC guidelines are based on reviews of recent publications, the JNC VII report represents the evolving state of knowledge about hypertension during the time period of our study.
[3] JNC VI recommends the use of diuretics while JNC VII makes a more specific recommendation of thyazide-diuretics. In this report, we do not distinguish between thyazide-diuretics and other types of diuretics.

demonstrate somewhat better blood pressure responses to monotherapy with diuretics or CCBs compared with BBs, ACEIs, or ARBs. In addition to clinical factors, cost may be an important consideration in the choice of antihypertensive medications since diuretics and BBs are typically less expensive than newer classes of antihypertensive drugs.

The sample for our study of antihypertensive drug use is comprised of adults, age 18 and older, who reported treatment for hypertension during the year. We examine several measures of use and expenditures. First, we examine the proportion who used a drug from at least one and the proportion who used drugs from two or more of the five antihypertensive drug classes included in our study. Next, we limit our sample to adults who used at least one class of antihypertensives and examine the percentage that used each of the five specific classes included in our study. Finally, we examine average annual per capita and per user expenditures for each class of antihypertensive drug.

Throughout this report only differences in estimates that are statistically significant at the $p < .05$ level are discussed in the text. The technical appendix provides substantial detail on the sample of antihypertensive adults and the definitions of measures used in this report.

Findings

Percentage Reporting Hypertension

Overall

Table 1 presents trends from 1997 to 2003 in the proportion and total number of adults reporting treatment for hypertension and selected comorbidities. Over this period, the proportion of adults reporting treatment for hypertension increased from 14.8 to 19.1 percent and the total number reporting treatment for hypertension jumped from 29.6 to 41.5 million. Although population growth played a role, the increase in the proportion of adults who reported treatment for hypertension was primarily responsible for this increase of nearly 12 million persons.

In addition to the level of blood pressure, comorbidities and target organ damage are important risk factors for persons with hypertension (JNCVI). Among adults reporting treatment for hypertension, the proportion who reported treatment for hyperlipidemia (high cholesterol) more than doubled from 15.0 percent in 1997 to 30.3 percent in 2003 and the proportion reporting treatment for diabetes increased from 16.7 to 21.2 percent. The proportion reporting treatment for heart conditions, by contrast, did not change as approximately one in four adults in our sample reported treatment for an acute myocardial infarction, coronary atherosclerosis, cardiac dysrhythmias, congestive heart failure, or other heart conditions in both 1997 and 2003.

In interpreting these results, it is important to note that a large portion of hypertensive adults are not aware that they have high blood pressure and that awareness of this condition has changed over time.[4] Our estimates, which are based on adults who report treatment for hypertension, therefore, should not be interpreted as measuring the

[4] Estimates from the NHANES show that from 1976–80 to 1998–91, the percentage of persons with hypertension who were aware that they had high blood pressure increased from 51 to 73 percent (JNCVI).

prevalence of this condition. Further, it is not possible to determine to what extent the observed increase in the proportion of the population reporting treatment for hypertension is due to changing awareness of this condition and to what extent the increase results from changes in health or other factors. Changing awareness of hyperlipidemia, as statins were more widely marketed and used, may also have played a role in the rapid increase in reported treatment of this condition.

By Selected Population Characteristics

Table 2 presents information on the percentage and total number of adults reporting treatment for hypertension in 1997 and 2003 by selected population characteristics. Over this time period, both measures increased in many subgroups of the population we examined. Overall, the proportion of adults reporting treatment for hypertension grew by 4.3 percentage points from 1997 to 2003. The elderly (those 65 and older) had a somewhat larger increase of 9.3 percentage points; and the largest increase, for any group examined in our study, was a 14.4 percentage point increase in the proportion of the elderly with Medicare only insurance who reported treatment for hypertension.

In addition to trends, table 2 provides information on differences across groups in the proportion reporting treatment for hypertension. Since these differences are fairly stable over the time period of our study, the following text reports only results for 2003.

Age. The proportion of persons reporting treatment for hypertension increased with age as 4.9 percent of young adults (those ages 18 to 44), 25.6 percent of older adults (those ages 45 to 64), and 49.6 percent of the elderly (those 65 and older) reported treatment for this condition in 2003.

Race/ethnicity. In 2003, black non-Hispanics were more likely (25.5 percent) than any other race/ethnicity group to report treatment for hypertension. There were also differences across the other three race/ethnicity groups as 19.8 percent of white non-Hispanics, 15.7 percent of other non-Hispanics, and 11.0 percent of Hispanics reported treatment for hypertension. The 30.3 million white non-Hispanics who reported treatment for hypertension comprised almost three-quarters (73.0 percent) of all persons who reported treatment for this condition in 2003.

Sex. In 2003, women (20.3 percent) were more likely than men (17.8 percent) to report treatment for hypertension.

Income. The near poor (25.5 percent) and persons with low incomes (22.1 percent) were more likely than the poor (19.0 percent), persons with middle incomes (18.8 percent), and persons with high incomes (17.7 percent) to report treatment for hypertension. The 28.2 million middle and high income persons who reported treatment for hypertension, however, accounted for a little more than two-thirds (68.0 percent) of all persons reporting treatment for this condition.

Health insurance status. In the non-elderly population (those less than 65), people who were covered by public insurance only were more likely (20.0 percent) than persons with any private insurance (13.3 percent) or the uninsured (7.0 percent) to report treatment for hypertension in 2003. In the elderly population, by contrast, there were no statistically significant differences across groups as about one-half of persons in each insurance category reported treatment for hypertension in 2003.

Education. The proportion of persons reporting treatment for hypertension was inversely related to the level of education as 22.4 percent of persons with less than a high school education, 20.5 percent of persons with a high school education, and 16.7 percent of persons with at least some college reported treatment for this condition in 2003.

Perceived health status. Persons in fair or poor health were much more likely (37.8 percent) to report treatment for hypertension than persons in excellent, very good, or good health (16.2 percent) in 2003. The 10.7 million persons reporting fair or poor health accounted for about one-quarter (25.8 percent) of persons who reported treatment for hypertension.

Metropolitan statistical area (MSA). Persons who live in an MSA (18.4 percent) were less likely to report treatment for hypertension than persons living in non-MSAs (21.4 percent). The 32.3 million persons living in an MSA who reported treatment for hypertension, however, accounted for more than three-quarters (77.8 percent) of the persons reporting treatment for this condition.

Census region. Persons living in the West were less likely (16.0 percent) than persons in other regions of the United States to report treatment for hypertension.

Percentage Using One or More, Two or More, Classes of Antihypertensive Drugs

Overall

Table 3 presents aggregate trends from 1997 to 2003 in antihypertensive drug use among adults who reported treatment for hypertension. The measures of use presented are the proportion of adults that used a drug from at least one and the proportion who used drugs from two or more of the five major antihypertensive drug classes included in our study. The former measure provides information on the propensity to initiate pharmaceutical treatment with at least one of the JNC-recommended classes of antihypertensives. The latter measure provides information on the intensity of this treatment as some adults require more than one class of antihypertensive to bring their blood pressure under control.

Among adults who reported treatment for hypertension, the proportion who used a drug from at least one of the five antihypertensive drug classes increased from 84.7 percent in 1997 to 89.6 percent in 2003. The intensity of drug treatment also increased over this period as the proportion who used drugs from two or more of the five classes grew from 40.6 to 53.3 percent.

By Selected Population Groups

Table 4 examines the use of antihypertensive drugs in 1997 and in 2003 by selected population characteristics. Among adults who reported treatment for hypertension, the proportion who used a drug from at least one of the five classes increased from 1997 to 2003 in most subgroups. In absolute terms, the largest increases in the proportion using at least one class were a 8.3 percentage point increase for persons with at least some college and a 7.8 percentage point increase for persons living in the Northeast.

The proportion of persons who used drugs from two or more of the five classes increased from 1997 to 2003 in nearly every subgroup examined in our study.[5] In absolute terms, the largest increases in the proportion using two or more classes were a 20.1 percentage point increase for blacks and a 19.1 percentage point increase for persons with Medicare and other public coverage.

In addition to trends, table 4 provides information on differences across groups in the percentage of persons who used drugs from one class and the percentage of persons who used drugs from two or more of the antihypertensive drug classes included in our study. Since these differences are fairly stable over the time period of our study, the following text reports results only for 2003. There were no statistically significant differences across income groups or by MSA status, and few differences by insurance status or education.

Age. By both measures, antihypertensive drug use increased with age across the three age categories in our study in 2003. Among adults who reported treatment for hypertension, a little less than three-quarters (72.8 percent) of young adults (ages 18 to 44) used at least one class of drugs compared with 90.2 percent of older adults (ages 45 to 64) and 94.1 percent of the elderly (age 65 and older). Patterns across age groups were similar for the intensity of use. About one-third (32.6 percent) of young adults used two or more classes of drugs compared with about half (50.3 percent) of older adults and 62.5 percent of the elderly.

Race/ethnicity. Among adults who reported treatment for hypertension in 2003, whites were more likely (90.6 percent) to use at least one class of antihypertensive drug than Hispanics (85.9 percent). Whites (53.9 percent) and blacks (58.5 percent) were both more likely than Hispanics (45.1 percent) and other non-Hispanics (41.6 percent) to use two or more classes of drugs.

Sex. Women who reported hypertension in 2003 were more likely to use one class of hypertensive drug and to use two classes of antihypertensive drugs than men.

Health insurance status. In 2003, uninsured adults less than 65 years old were less likely (74.7 percent) to use at least one class of drugs than those with any private insurance (87.6 percent) or those with public insurance only (84.8 percent).

Education. Among adults who reported treatment for hypertension in 2003, persons with less than a high school education were more likely (57.5 percent) than persons with a high school education (52.8 percent) and persons with at least some college (51.4 percent) to use two or more classes of antihypertensive drugs.

Perceived health status. In 2003, 60.8 percent of persons in fair or poor health who reported treatment for hypertension used at least two classes of antihypertensive drugs, a higher percentage than for persons who reported excellent, very good, or good health (51.0 percent).

[5] The exceptions were the near poor, adults ages 18 to 44, and persons less than 65 years old who were either publicly insured or uninsured.

Census region. Among adults who reported treatment for hypertension in 2003, those living in the West were less likely than adults in the other three census regions to use at least one class or to use two or more classes of antihypertensive drugs.

Percentage Using Specific Classes of Antihypertensive Drugs

Overall

Table 5 presents trends in the proportions of persons who used a diuretic, BB, CCB, ACEI, or ARB. The sample is limited to adults who reported treatment for hypertension and who used at least one of these five classes of antihypertensive drugs.[6] Table 5, therefore, provides information on the choice of medication, conditional on the decision to initiate pharmaceutical treatment of hypertension with one of the JNC recommended classes of medications.

In 1997, JNC VI recommended diuretics and BBs as initial treatment for uncomplicated hypertension and use of both classes increased from 1997 to 2003. Among adults who initiated pharmaceutical treatment of hypertension, the proportion using BBs increased from 30.4 percent in 1997 to 40.8 percent in 2003 and the proportion using diuretics showed a somewhat smaller increase from 47.0 to 50.6 percent. The JNC VI guidelines also raised some concerns about the use of CCBs, and we find that the proportion using these drugs declined from 40.3 to 33.0 percent. ARBs, which were introduced just prior to 1997, have effects that are similar to ACEIs, but they avoid dry cough, which is a side effect of ACEIs (JNC VI). In 1997, JNC VI advised that in the absence of data documenting equal long-term cardiac and renal protection in patients with these conditions, ARBs should primarily be used for patients for whom ACEIs are indicated, but not well tolerated. From 1997 to 2003, we find that the proportion of persons using the newly introduced ARBs more than quadrupled from 4.4 to 21.0 percent. Over the same period, there was no statistically significant change in the proportion using ACEIs.

By Selected Population Groups

Table 6 extends the analysis in table 5 by presenting trends within and differences across selected groups in the use of specific classes of antihypertensive drugs. Differences in use are fairly stable over the time period of our study, so the following text reports results only for 2003. Results are presented separately for each class of drugs beginning with the oldest class, diuretics, and ending with the newest class, ARBs.

Diuretics

The JNC VI and JNC VII guidelines both recommend that pharmacological treatment for uncomplicated hypertension should begin with diuretics; and, when more than one class of drugs is required to control blood pressure, JNC VII recommends that treatment should usually include a diuretic. Diuretics lower blood pressure by causing salt and water to move out of the body (Phibbs). The most commonly purchased diuretics,

[6] Some drugs are antihypertensive combinations that contain active ingredients from more than one class. We do not separately record use of combinations, but we record use of the specific classes within each combination drug. For example, a person who used a diuretic-ACEI combination would be recorded as using both a diuretic and an ACEI.

hydrochlorothiazide and furosemide, were approved by the Food and Drug Administration (FDA) in 1959 and 1966, respectively.

Among adults who used at least one of the five classes of drugs to treat hypertension, the proportion using diuretics increased from 1997 to 2003 in about one-third of the 31 subgroups we examined. There were no statistically significant changes for the remaining groups. In absolute terms, the largest increases in the proportion using diuretics occurred among the poor and among persons living in the Northeast.

Among adults who used at least one of the five classes of drugs in 2003, there were a number of differences across groups in the proportion with diuretic use.

Age. The proportions with use increased with age as 36.7 percent of young adults (those ages 18 to 44), 48.4 percent of adults ages 45 to 64, and 55.8 percent of the elderly (those 65 and older) used diuretics.

Race/ethnicity. Blacks (60.8 percent) were more likely than any other race/ethnicity group to use diuretics, and whites (50.4 percent) were more likely to use these drugs than Hispanics (40.5 percent) or other non-Hispanics (37.7 percent).

Sex. Women (54.4 percent) were more likely to use diuretics than men (45.7 percent).

Income. Adults with low incomes (57.5 percent) were more likely to use diuretics than the near poor (47.6 percent) and those with middle incomes (49.2 percent) or high incomes (48.1 percent). Poor adults (54.8 percent) were also more likely to use a diuretic than those with high incomes.

Education. Adults with less than a high school education were more likely (55.7 percent) to use diuretics than adults with a high school education (49.0 percent) or adults with at least some college (49.1 percent).

Perceived health status. Adults who reported fair or poor health were more likely (56.7 percent) to use diuretics than adults who reported excellent, very good, or good health (48.5 percent).

Beta blockers

In 1997, the JNC VI guidelines recommended BBs as initial treatment for patients with uncomplicated hypertension. In 2003, BBs were still recommended for "compelling indications" but were no longer recommended as first-line drugs. The two most commonly purchased beta blockers in our data, atenolol and metoprolol, were approved by the FDA in 1981 and 1978, respectively.

Among adults who used at least one of the five classes of drugs, the proportion who used a BB increased from 1997 to 2003 in nearly every subgroup examined in our study.[7] The largest increase, in absolute terms, was a 24.4 percentage point increase for persons with Medicare and other public insurance.

[7] The three exceptions were adults ages 18 to 44, adults less than 65 with private insurance, and adults living in the Northeast.

Among adults who used at least one of the five classes of drugs in 2003, there were a number of differences across groups in the proportion with BB use.

Age. The elderly (43.6 percent) were more likely to use a BB than adults ages 18 to 44 (37.1 percent) or adults ages 45 to 64 (38.8 percent).

Race/ethnicity. Blacks (32.5 percent) were less likely than whites (42.6 percent) or other non-Hispanics (43.1 percent) to use a BB. Hispanics (37.6 percent) were also less likely to use BBs than whites.

Income. The poor (34.7 percent) were less likely to use BBs than adults with low incomes (45.7 percent) or adults with high incomes (42.0 percent). Middle income adults (39.1 percent) were also less likely to use BBs than those with low incomes.

Education. Adults with less than a high school education (43.0 percent) and adults with a high school education (43.3 percent) were both more likely than adults with at least some college (37.7 percent) to use a BB.

Perceived health status. Adults in fair or poor health (43.9 percent) were more likely to use a BB than adults who reported excellent, very good, or good health (39.7 percent).

Census region. Adults living in the Midwest (44.7 percent) and West (43.2 percent) were both more likely than those living in the South (37.4 percent) to use a BB.

Calcium channel blockers

CCBs block the movement of calcium ions, which dilates the smaller arteries and lowers blood pressure (Phibbs). In 1997, the JNC VI guidelines raised concerns about the safety of some CCBs and warned that one CCB, immediate-release nifedipine, should be used only with great caution. The most commonly purchased CCBs in our data—amlodipine, diltiazem, and verapamil—were approved by the FDA in 1992, 1982, and 1981, respectively.

Among adults who used at least one of the five classes of drugs, the proportion who used a CCB decreased from 1997 to 2003 in nearly every subgroup examined in our study.[8] The uninsured (-18.6 percentage points) and adults less than 65 with public insurance (-18.9 percentage points) had the largest absolute declines in the proportion using CCBs.

Among adults who used at least one of the five classes of drugs in 2003, there were a number of differences across groups in the proportion with CCB use.

Age. Elderly adults were more likely (38.7 percent) to use CCBs than adults ages 45 to 64 (29.0 percent) and adults ages 18 to 44 (24.8 percent).

Race/ethnicity. Blacks (45.4 percent) were about 50 percent more likely to use a CCB than whites (31.2 percent), other non-Hispanics (30.1 percent), or Hispanics (28.8 percent).

[8] The exceptions were blacks, persons with less than a high school education, persons living in the Northeast, and persons with Medicare only or Medicare and any private insurance.

Income. Poor adults (38.9 percent) were more likely than those with middle incomes (32.4 percent) or high incomes (29.6 percent) to use a CCB. Low income adults (36.8 percent) were also more likely to use CCBs than those with high incomes.

Health insurance status. Among those less than 65 years old, adults with public insurance were more likely (33.4 percent) to use a CCB than the uninsured (24.1 percent).

Education. Adults with less than a high school education (37.9 percent) and adults with a high school education (34.2 percent) were both more likely to use a CCB than adults with at least some college (29.2 percent).

Perceived health status. Adults who reported fair or poor health were more likely (36.0 percent) to use a CCB than adults who reported excellent, very good, or good health (31.9 percent).

Census region. Adults living in the West (28.2 percent) were less likely to use a CCB than adults living in the Northeast (36.0 percent) or the South (33.8 percent).

Angiotensin-converting enzyme inhibitors

ACEIs block the formation of angiotensin II, which relaxes the smaller arteries and lowers blood pressure. The most commonly purchased ACEIs in our data were lisinopril and quinapril, which were approved by the FDA in 1987 and 1991, respectively.

Among adults who used at least one of the five classes of drugs, there was not a statistically significant change from 1997 to 2003 in the overall proportion who used an ACEI. For two groups—blacks and persons with a high school education—the proportion of adults with ACEI use increased from 1997 to 2003. There were no other changes from 1997 to 2003 in ACEI use in any of the other groups examined in this study.

Among adults who used at least one of the five classes of drugs in 2003, there were a few differences across groups in the proportion with ACEI use.

Race/ethnicity. Hispanics (51.5 percent) were more likely to use an ACEI than whites (43.2 percent), blacks (40.0 percent), or other non-Hispanics (40.5 percent).

Sex. Men (48.0 percent) were more likely to use an ACEI than women (39.3 percent).

Income. Poor adults were more likely (47.5 percent) to use an ACEI than those with high incomes (41.5 percent).

Health insurance status. Among adults less than 65, those with public coverage (52.3 percent) were more likely to use an ACEI than the privately insured (42.6 percent).

Perceived health status. Nearly half (48.1 percent) of adults who reported fair or poor health used an ACEI. This was a larger percentage than for persons who reported excellent, good, or very good health (41.5 percent).

Census region. Adults who lived in the West were more likely (47.3 percent) to use an ACEI than those who lived in the South (41.5 percent).

Angiotensin II receptor blockers

ARBs have similar effects to ACEIs, but they avoid dry cough, a side effect of ACEIs (JNC VI). The most commonly purchased ARBs in our data were losartan, which was approved by the FDA in 1995, and valsartan, which was approved in 1996.

Among adults who used at least one of the five classes of drugs, the proportion who used an ARB increased from 1997 to 2003 in every subgroup examined in our study. The largest increase, in absolute terms, was a 21.6 percentage point increase for blacks and the smallest was a 10.3 percentage point increase for the uninsured.

Among adults who used at least one of the five classes of drugs in 2003, there were a few differences across groups in the proportion with ARB use.

Race/ethnicity. Whites (20.9 percent) were more likely to use ARBs than Hispanics (17.8 percent).

Health insurance status. Among adults less than 65 years old, the privately insured were more likely (21.5 percent) to use ARBs than the uninsured (12.2 percent); and, among adults 65 and older, those with a private supplementary policy were more likely (24.6 percent) to use ARBs than those who were covered by Medicare only (16.5 percent).

Census region. Adults living in the South (24.3 percent) and in the Northeast (22.3 percent) were more likely than those living in the West (15.4 percent) to use an ARB, and those living in the Midwest were less likely (18.6 percent) to use an ARB than those living in the South.

Average Annual Expenditures for Antihypertensive Drugs

Table 7 presents trends in per capita and per user expenditures for each of the five classes of antihypertensive drugs in our study, and for drugs that contain a combination of active ingredients from two or more of these classes.[9] Drug expenditures for all years are expressed in constant dollars by inflating them to 2003 U.S. dollars using the Consumer Price Index for all items averaged across all U.S. cities (CPI-U).

Among adults who reported treatment for hypertension, the average annual per capita expenditure for antihypertensive drugs in our study increased from $348 in 1997 to $486 in 2003. Average annual per capita expenditures increased for diuretics, BBs, ACEIs, ARBs, and combinations. Changes in average annual per capita expenditures reflect changes in both the proportion of persons with use and changes in expenditures per user. Not surprisingly, given the decline in the proportion of the population that used CCBs, we find that average per capita expenditures for this class of drugs decreased from $133 in 1997 to $110 in 2003.

[9] It was not possible to divide the total expenses for a given combination drug (i.e., a diuretic-ACEI) into expenses for diuretics and expenses for ACEIs. Instead, we report expenditures for combination drugs separately.

The first row in the bottom panel of table 7 shows that, among persons who used at least one of the five classes of drugs or a combination drug, the average annual expenditure per user increased from $410 in 1997 to $542 in 2003. This change in expenditure per user, where expenditures are summed across all six types of antihypertensive drugs, reflects changes in the proportion of persons who used more than one class of antihypertensive drugs and changes in expenditures per user within a given class.

The remaining rows in the bottom panel of table 7 show changes in average annual expenditures per user within a given class.[10] For two classes—CCBs and ARBs—there was no statistically significant change in expenditures per user from 1997 to 2003. By contrast, per user expenditures did increase for the other four types of drugs over this period: for diuretics, $71 to $92 per user; for BBs, $237 to $282 per user; for ACEIs, $297 to $356 per user; for combinations, $212 to $402 per user.

In addition to clinical factors, differences in the average expenditure per user across the classes of antihypertensive drugs may affect the choice of medication. By 2003, per user expenditures for combination drugs were higher than for any classes of drugs except for CCBs and ARBs. Combination drugs, however, are not directly comparable to the other classes since they deliver active ingredients from two or more classes of antihypertensive medications. Most antihypertensive combinations contain a diuretic along with a BB, ACEI, ARB, or another diuretic.

In 2003, CCBs ($421) and ARBs ($393) had higher average annual expenditures per user than the other classes of drugs in our study. Next most expensive were ACEIs, with an average annual expense per user of $356, and then BBs, which had an average per user expenditure of $282. Finally, diuretics were the least expensive class of antihypertensive drugs, with an average per user expenditure of $92, less than one-fourth of the per user expenditure for CCBs.

Summary and Conclusions

This report uses nationally representative data from the MEPS to examine trends in the use of antihypertensive drugs from 1997 through 2003. The sample for the study is comprised of U.S. adults, ages 18 and older, who reported treatment for hypertension. Over the period of our study, the proportion of U.S. adults who reported treatment for hypertension increased from 14.8 to 19.1 percent and the total number reporting this condition increased from 29.6 to 41.5 million persons. Changing awareness of hypertension over the period of our study may have contributed to this trend.
Recent JNC guidelines for the pharmaceutical treatment of hypertension focus on the use of five classes of drugs: diuretics, beta blockers (BBs), calcium channel blockers (CCBs), angiotensin-converting enzyme inhibitors (ACEIs), and angiotensin II receptor blockers (ARBs). Among adults who reported treatment for hypertension, we find that, from 1997 to 2003, the proportion using a drug from at least one of these classes increased from 84.7 to 89.6 percent and the proportion using drugs from two, or more, classes increased from 40.6 to 53.3 percent. Increased use of multiple classes may reflect findings from recent clinical trials that the majority of patients require two or more antihypertensive drugs to control their blood pressure (JNC VII).

[10] Since per user averages are calculated for all persons with at least one purchase of a given class of drugs, they understate the cost of receiving constant treatment over a 12-month period.

Next, we examined trends in the use of specific classes of antihypertensives. In 1997, JNC VI recommended diuretics and BBs as initial treatment for uncomplicated hypertension and use of both classes increased from 1997 to 2003. Among adults who reported treatment for hypertension and who used at least one of the five drug classes in our study, the proportion using BBs increased from 30.4 percent in 1997 to 40.8 percent in 2003 and the proportion using diuretics showed a somewhat smaller increase from 47.0 to 50.6 percent. The proportion using CCBs fell from 40.3 to 33.0 percent over the period of our study. In 1997, JNC VI guidelines noted some concerns about the use of CCBs that may have contributed to this decline. The final two classes of drugs, ACEIs and ARBs, have similar mechanisms of action making them close substitutes. From 1997 to 2003, the proportion using the newly introduced ARBs more than quadrupled from 4.4 to 21.0 percent while the proportion using ACEIs did not change.

In addition to aggregate trends, this report also examines trends within and differences across subgroups of the population. Some of the most marked and potentially important differences in antihypertensive drug use were observed across groups defined by age and by race/ethnicity. Among adults who reported treatment for hypertension in 2003, the elderly were more likely than younger adults to use at least one class, and to use two or more classes of drugs to treat this condition. Further, among adults who used at least one class of drugs, the elderly were more likely to use diuretics, BBs, and CCBs than younger adults. JNC VII reports research showing that African Americans demonstrate somewhat better blood pressure responses to monotherapy with diuretics or CCBs compared with BBs, ACEIs, or ARBs. Our results appear to reflect this finding. Among adults who used at least one class of drugs, we find that blacks were much more likely to use diuretics and CCBs than any other race/ethnicity group and less likely to use BBs than whites and other non-Hispanics. Blacks were also the only race/ethnicity group that did not show a decline from 1997 to 2003 in the proportion of adults who used CCBs.

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Table 1. Percentage and total number of adults ages 18 and older reporting treatment for hypertension and comorbid conditions, United States, 1997 to 2003

	1997	1998	1999	2000	2001	2002	2003
Population size (number in millions)	199.4	201.1	203.8	205.9	211.3	215.4	217.6
Population reporting treatment for hypertension							
Percent	14.8	15.2	15.5	16.3	16.9	18.2	19.1
Number in millions	29.6	30.6	31.6	33.6	35.7	39.3	41.5
Among persons reporting treatment for hypertension, percent reporting:							
Hyperlipidemia	15.0	17.4	18.9	22.4	24.6	28.1	30.3
Diabetes	16.7	17.7	18.7	19.2	18.9	20.9	21.2
Heart disease	25.1	22.9	22.6	23.7	23.1	25.0	24.4

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997–2003.

Table 2. Percentage and total number of adults ages 18 and older reporting treatment for hypertension, by selected population characteristics, United States, 1997 and 2003

	1997			2003		
	Total population (in millions)	Percent reporting hypertension	Total reporting hypertension (in millions)	Total population (in millions)	Percent reporting hypertension	Total reporting hypertension (in millions)
Total	199.4	14.8	29.6	217.6	19.1	41.5
Age in years						
18 to 44	108.9	3.5	3.8	111.1	4.9	5.5
45 to 64	56.3	21.3	12.0	69.8	25.6	17.8
65 and over	34.2	40.3	13.8	36.7	49.6	18.2
Race/ethnicity[1]						
White	148.7	14.9	22.2	153.0	19.8	30.3
Black	22.8	19.8	4.5	24.3	25.5	6.2
Other	7.9	11.6	0.9	13.4	15.7	2.1
Hispanic	19.9	9.9	2.0	26.9	11.0	2.9
Sex						
Male	95.8	13.0	12.5	104.8	17.8	18.6
Female	103.5	16.5	17.1	112.8	20.3	22.9
Income						
Poor/negative	22.1	16.8	3.7	23.9	19.0	4.6
Near poor	8.3	18.1	1.5	8.9	25.5	2.3
Low income	27.1	16.3	4.4	29.4	22.1	6.5
Middle income	65.4	14.9	9.7	66.2	18.8	12.4
High income	76.4	13.3	10.2	89.3	17.7	15.8
Health insurance status						
Less than 65						
Any private	126.7	9.8	12.4	134.9	13.3	17.9
Public only	12.9	15.6	2.0	16.3	20.0	3.3
Uninsured	25.5	5.4	1.4	29.7	7.0	2.1
65 and over						
Medicare and private	21.7	40.9	8.9	21.8	49.0	10.7
Medicare and other public	3.4	45.9	1.6	4.1	52.2	2.1
Medicare only	8.5	36.4	3.1	10.3	50.8	5.2
Education						
Less than high school	36.5	22.1	8.1	44.2	22.4	9.9
High school	66.1	15.9	10.5	69.7	20.5	14.3
At least some college	96.5	11.3	10.9	102.2	16.7	17.0
Perceived health status						
Excellent/very good/good	172.6	12.2	21.0	188.5	16.2	30.6
Fair/poor	26.7	31.9	8.5	28.4	37.8	10.7
Metropolitan statistical area (MSA)						
MSA	157.9	14.0	22.0	175.2	18.4	32.3
Non-MSA	38.8	17.8	6.9	40.1	21.4	8.6
Census region						
Northeast	39.5	14.5	5.7	41.3	19.6	8.1
Midwest	46.1	14.7	6.8	49.2	18.7	9.2
South	70.2	16.4	11.5	77.9	21.0	16.3
West	43.6	12.8	5.6	49.2	16.0	7.9

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997–2003.

[1] Beginning in 2002, the data reflect the respondents' ability to identify with multiple race groups. The race/ethnicity characteristics for 2003 actually reflect Hispanic; non-Hispanic, white, no other race indicated; non-Hispanic, black, no other race indicated; and non-Hispanic, other single races and multiple races. Hence, estimates by race/ethnicity for 2003 are not directly comparable to those in previous years (i.e., 1997–2001 versus 2003).

Table 3. Percentage of adults ages 18 and older using one or more, two or more, classes of antihypertensive drugs, among adults reporting treatment for hypertension, United States, 1997 to 2003

	1997	1998	1999	2000	2001	2002	2003
Population reporting hypertension (number in millions)	29.6	30.6	31.6	33.6	35.7	39.3	41.5
Among persons reporting hypertension, percent using:							
At least one of the five classes[1]	84.7	85.3	88.4	87.4	90.4	90.0	89.6
Two or more of the five classes	40.6	42.0	47.3	49.2	52.1	53.4	53.3

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997–2003.

[1] The five classes are diuretics, beta blockers, calcium channel blockers, angiotensin converting enzyme (ACE) inhibitors, and angiotensin II receptor blockers.

Table 4. Percentage of adults ages 18 and older using one or more, two or more, classes of antihypertensive drugs, among adults reporting treatment for hypertension, by selected population characteristics, United States, 1997 and 2003

	Percent with use in 1997		Percent with use in 2003	
	At least one of the five classes[1]	Two or more of the five classes	At least one of the five classes	Two or more of the five classes
Total	84.7	40.6	89.6	53.3
Age in years				
18 to 44	69.0	27.6	72.8	32.6
45 to 64	84.8	37.6	90.2	50.3
65 and over	88.9	46.8	94.1	62.5
Race/ethnicity[2]				
White	86.4	42.0	90.6	53.9
Black	82.3	38.4	87.4	58.5
Other	a	a	87.6	41.6
Hispanic	79.7	34.7	85.9	45.1
Sex				
Male	83.3	38.8	88.0	51.4
Female	85.7	41.9	90.9	54.9
Income				
Poor/negative	84.0	41.5	88.3	54.1
Near poor	82.7	43.5	89.0	51.1
Low income	85.6	40.2	89.3	57.3
Middle income	87.3	46.0	90.1	52.6
High income	82.3	34.8	89.8	52.4
Health insurance status				
Less than 65				
Any private	81.5	33.5	87.6	45.7
Public Only	81.8	44.8	84.8	50.6
Uninsured	75.1	35.8	74.7	43.2
65 and over				
Medicare Only	87.1	43.4	94.3	58.1
Medicare and Private	90.6	48.7	94.3	64.3
Medicare and Other Public	87.0	46.1	93.3	65.2
Education				
Less than high school	86.1	43.0	89.4	57.5
High school	86.1	41.3	88.6	52.8
At least some college	82.5	38.3	90.8	51.4
Perceived health status				
Excellent/very good/good	83.8	37.1	89.5	51.0
Fair or poor	87.7	49.6	90.9	60.8
Metropolitan statistical area (MSA)				
MSA	84.4	40.1	89.5	53.0
Non-MSA	87.7	43.1	91.2	54.7
Census region				
Northeast	83.3	38.3	91.1	56.0
Midwest	87.5	41.7	90.6	54.2
South	86.4	42.5	90.4	54.4
West	79.2	37.9	85.3	47.4

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997–2003.

a Insufficient data to support reliable estimates.

[1] The five classes are diuretics, beta blockers, calcium channel blockers, angiotensin converting enzyme (ACE) inhibitors, and angiotensin II receptor blockers.

[2] Beginning in 2002, the data reflect the respondents' ability to identify with multiple race groups. The race/ethnicity characteristics for 2003 actually reflect Hispanic; non-Hispanic, white, no other race indicated; non-Hispanic, black, no other race indicated; and non-Hispanic, other single races and multiple races. Hence, estimates by race/ethnicity for 2003 are not directly comparable to those in previous years (i.e., 1997–2001 versus 2003).

Table 5. Percentage of adults ages 18 and older using specific classes of antihypertensive drugs, among adults using at least one of five classes,[1] United States, 1997 to 2003

	1997	1998	1999	2000	2001	2002	2003
Total population using at least one of five classes (number in millions)	25.0	26.1	27.9	33.6	35.7	39.3	37.2
Among persons reporting drug use for hypertension, percent using:							
Diuretic	47.0	48.4	51.6	49.8	50.4	50.2	50.6
Beta blockers (BBs)	30.4	31.2	35.1	36.9	36.8	39.9	40.8
Calcium channel blockers (CCBs)	40.3	37.2	36.0	35.2	36.2	34.0	33.0
Angiotensin-converting enzyme inhibitors (ACEIs)	40.8	42.2	41.8	45.6	45.1	44.4	43.2
Angiotensin II receptor blockers (ARBs)	4.4	7.6	10.4	11.7	13.3	17.5	21.0

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997–2003.

[1] Adults who reported hypertension and used a drug from at least one of the following classes: diuretics, beta blockers, calcium channel blockers, angiotensin converting enzyme (ACE) inhibitors, angiotensin II receptor blockers.

Table 6. Percentage of adults ages 18 and older using specific classes of antihypertensive drugs, among adults using at least one of five classes,[1] by selected population characteristics, United States, 1997 and 2003

	Percent with use									
	1997	2003	1997	2003	1997	2003	1997	2003	1997	2003
	Diuretics		BBs[2]		CCBs		ACEIs		ARBs	
Total	47.0	50.6	30.4	40.8	40.3	33.0	40.8	43.2	4.4	21.0
Age in years										
18 to 44	37.7	36.7	32.3	37.1	35.5	24.8	39.1	39.5	6.0	20.8
45 to 64	41.5	48.4	32.4	38.8	37.4	29.0	42.2	45.1	4.2	20.0
65 and over	53.5	55.8	28.4	43.6	43.8	38.7	39.9	42.2	4.3	22.0
Race/ethnicity[3]										
White	46.8	50.4	33.5	42.6	38.1	31.2	41.0	43.2	4.9	20.9
Black	54.7	60.8	20.3	32.5	50.4	45.4	32.4	40.0	2.5	24.1
Other	a	37.7	a	43.1	a	30.1	a	40.5	a	18.5
Hispanic	34.9	40.5	21.1	37.6	49.0	28.8	54.9	51.5	4.1	17.8
Sex										
Male	41.2	45.7	30.7	41.3	39.2	32.2	46.8	48.0	4.1	19.7
Female	51.1	54.4	30.2	40.4	41.1	33.7	36.5	39.3	4.7	22.0
Income										
Poor/negative	45.4	54.8	27.9	34.7	47.2	38.9	42.1	47.5	3.5	20.5
Near poor	48.5	47.6	27.9	40.0	46.4	37.7	42.7	40.2	2.9	22.8
Low income	51.4	57.5	27.3	45.7	43.8	36.8	37.9	42.3	3.8	18.0
Middle income	50.5	49.2	31.8	39.1	41.2	32.4	40.8	44.8	4.8	20.7
High income	41.8	48.1	31.7	42.0	34.4	29.6	41.3	41.5	4.9	22.4
Health insurance status										
Less than 65										
Any private	39.1	44.8	33.7	37.3	34.0	27.6	41.0	42.6	5.1	21.5
Public only	48.0	48.6	27.7	42.4	52.3	33.4	44.8	52.3	3.0	17.0
Uninsured	45.2	54.8	26.7	43.2	42.7	24.1	42.0	42.9	1.9	12.2
65 and over										
Medicare only	48.7	56.8	29.7	40.0	45.1	39.2	37.5	44.8	3.3	16.5
Medicare and private	55.7	55.5	29.5	44.8	42.1	38.7	40.8	40.6	4.7	24.6
Medicare and other public	50.6	56.1	20.9	45.3	51.2	39.0	38.6	44.7	3.8	22.4
Education										
Less than high school	51.4	55.7	26.7	43.0	41.9	37.9	40.8	43.5	4.1	21.8
High school	47.3	49.0	32.0	43.3	42.1	34.2	38.2	43.0	3.8	19.6
At least some college	43.3	49.1	31.7	37.7	37.3	29.2	43.3	43.1	5.2	21.8
Perceived health status										
Excellent/very good/good	44.7	48.5	30.7	39.7	37.0	31.9	38.9	41.5	4.6	21.0
Fair or poor	52.3	56.7	29.8	43.9	48.3	36.0	45.4	48.1	4.0	21.2
Metropolitan statistical area (MSA)										
MSA	46.0	50.3	29.4	40.4	40.2	32.7	41.6	43.8	4.7	20.6
Non-MSA	49.1	50.6	33.7	42.3	40.3	33.7	38.2	41.6	3.9	23.1
Census region										
Northeast	40.1	48.8	37.0	41.1	36.9	36.0	39.5	41.8	7.9	22.3
Midwest	47.5	52.5	29.4	44.7	40.6	32.8	40.6	44.1	3.2	18.6
South	50.6	52.1	27.6	37.4	43.7	33.8	40.1	41.5	3.7	24.3
West	45.8	46.9	30.9	43.2	36.1	28.2	43.8	47.3	3.9	15.4

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997–2003.

a Insufficient data to support reliable estimates.

[1] Adults who reported hypertension and used a drug from at least one of the following classes: diuretics, beta blockers, calcium channel blockers, angiotensin converting enzyme (ACE) inhibitors, angiotensin II receptor blockers.

[2] BBs (beta blockers), CCBs (calcium channel blockers), ACEIs (angiotensin-converting enzyme inhibitors), ARBs (angiotensin II receptor blockers).

[3] Beginning in 2002, the data reflect the respondents' ability to identify with multiple race groups. The race/ethnicity characteristics for 2003 actually reflect Hispanic; non-Hispanic, white, no other race indicated; non-Hispanic, black, no other race indicated; and non-Hispanic, white, other single races and multiple races. Hence, estimates by race/ethnicity for 2003 are not directly comparable to those in previous years (i.e., 1997–2001 versus 2003).

Table 7. Average per capita and per user expenditures[1] for antihypertensive drugs, among adults ages 18 and older reporting treatment for hypertension, United States, 1997 to 2003

	1997	1998	1999	2000	2001	2002	2003
Population reporting hypertension (millions)	29.6	30.6	31.6	33.6	35.7	39.3	41.5
			Per capita expenditures				
Drug Class							
All therapeutic classes	$348	$366	$432	$399	$455	$450	$486
Diuretics	$18	$24	$25	$23	$27	$31	$28
Beta blockers (BBs)	$54	$57	$63	$60	$73	$87	$93
Calcium channel blockers (CCBs)	$133	$138	$140	$118	$131	$116	$110
Angiotensin-converting enzyme inhibitors (ACEIs)	$93	$89	$115	$111	$117	$109	$116
Angiotensin II receptor blockers (ARBs)	$11	$16	$24	$28	$41	$44	$55
Combinations[2]	$38	$42	$66	$60	$68	$63	$84
			Per user expenditures				
Drug Class							
All therapeutic classes	$410	$429	$489	$457	$504	$500	$542
Diuretics	$71	$92	$93	$88	$93	$109	$92
Beta blockers (BBs)	$237	$241	$253	$221	$255	$275	$282
Calcium channel blockers (CCBs)	$400	$453	$455	$411	$430	$419	$421
Angiotensin-converting enzyme inhibitors (ACEIs)	$297	$278	$349	$325	$338	$318	$356
Angiotensin II receptor blockers (ARBs)	$389	$335	$328	$375	$471	$378	$393
Combinations	$212	$220	$294	$268	$306	$286	$402

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality; Medical Expenditure Panel Survey, 1997–2003.

[1] Drug expenditures for all years are CPI-U adjusted to 2003 U.S. dollars.

[2] Combination drugs include two or more of the listed classes.

Technical Appendix

The data used in this report were obtained from interviews conducted as part of the Household Component of the Medical Expenditure Panel Survey (MEPS) for 1997–2003. MEPS is an ongoing, annual survey of the U.S. civilian noninstitutionalized population. MEPS collects detailed information on health care use and expenditures (including sources of payment); health insurance; and health status, access, and quality. It also collects detailed demographic and economic information on the persons and households surveyed. More information about MEPS can be found at http://www.meps.ahrq.gov. For a detailed description of the survey and its methodology, also see J. Cohen (1997) and S. Cohen (1997, 2000).

Survey Design

Each year, the MEPS sample is drawn from households that completed the prior year's National Health Interview Survey (NHIS). Households selected for participation in the 1996 MEPS completed interviews in the 1995 NHIS, the 1997 MEPS sample was drawn from the 1996 NHIS, and so on. Because NHIS is used as a sampling frame, the MEPS design is not only nationally representative of the civilian noninstitutionalized population but also includes an oversampling of Hispanics and blacks. MEPS collects data in an overlapping panel design. Each household completes five interviews ("rounds" of data collection) over a period of two and a half years, providing data for two full calendar years of estimates. Data from Rounds 1, 2, and 3 provide information for the first year of estimation, and data from Rounds 3, 4, and 5 provide data for the second year of estimates. For example, estimates for 2001 are derived by combining Rounds 3, 4, and 5 of the 2000 panel and Rounds 1, 2, and 3 of the 2001 panel.

Definitions

Hypertension. In this report, hypertensive adults were identified using household-reported information on conditions that is recorded in the 1997–2003 MEPS conditions files. Persons with a condition file record where CCCODEX = 98 (Essential hypertension) or CCCODEX = 99 (Hypertension with complications and secondary complications) were categorized as hypertensive. Hypertensive adults were primarily identified using information on conditions that was reported in connection with health care use (e.g., when a person was reported to have purchased a drug the household respondent was asked what condition(s) the drug was intended to treat). Approximately 95 percent of the hypertensive adults identified in this report were reported to have purchased drugs, visited a doctor's office, or had other health services to treat their high blood pressure during the year. Hypertensive adults were also identified through responses to a general question that asks whether a person had been bothered by any condition or whether any condition had resulted in a bed day or lost workday during the survey round. About 5 percent of the hypertensive adults in this report were identified only through this question; that is, they were not reported to have received any health services to treat their high blood pressure during the year. (Patterns of reporting were similar for the comorbid conditions—hyperlipidemia, diabetes, and heart disease—included in this report.) In this report, questions that ask whether a doctor had ever told a person that they had hypertension were not used to identify hypertensive adults because these questions were not available in MEPS prior to 2000.

Comorbid conditions. Whether or not a person reported treatment for hyperlipemia, diabetes, or heart disease was determined using the MEPS Condition Files and the CCCODEX variable. The following CCCODEX values were used to define each of the three comorbid conditions:

Hyperlipidemia
53 Disorders of lipid metabolism

Diabetes
49 Diabetes mellitus without complications
50 Diabetes mellitus with complications

Heart conditions
96 Heart valve disorders
97 Peri-, endo-, and myocarditis, cardiomyopathy (except that caused by tuberculosis or sexually transmitted disease)
100 Acute myocardial infarction
101 Coronary atherosclerosis and other heart disease
102 Nonspecific chest pain
103 Pulmonary heart disease
104 Other and ill-defined heart disease
105 Conduction disorders
106 Cardiac dysrhythmias
107 Cardiac arrest and ventricular fibrillation
108 Congestive heart failure, nonhypertensive

Antihypertensive medications. Each drug that was listed as purchased or otherwise obtained in the MEPS Prescribed Medicines (PMED) Files (HC-016A, HC-026A, HC-033A, HC-051A, HC-059A, HC-067A) was assigned to a major therapeutic class by linking the PMED file to the Multum Lexicon database, a product of Cerner Multum, Inc. The Multum therapeutic classification system is designed to replicate the type of organizational schemes used in practice by physicians and pharmacists. This information was used to identify the six therapeutic classes of hypertension medications considered in the report (i.e., diuretics, beta blockers, calcium channel blockers, angiotensin converting enzyme (ACE) inhibitors, angiotensin II receptor blockers, and combination therapies).

Utilization. Indicator variables were created to identify people who received each of the six classes of hypertension medications. If combination therapy was indicated, the drug names were examined and the person was identified as having had each medication comprising the combination therapy. For example, if a person had combination therapy and the agents were of the ACE inhibitor and calcium channel blocker classes, the person was identified as having had each of the individual medications and as having had combination therapy. Utilization estimates are presented as the proportion of persons receiving each of the classes of hypertension medication.

Expenditures. Expenditures include all amounts paid for each therapeutic class from any source (e.g., private insurance, public, out-of-pocket). Expenditures for each year were adjusted using the Consumer Price Index (CPI) and all estimates in this report are reported in 2003 dollars.

Age. In this report, age is the last available age for the sampled person.

Race/ethnicity. Classification by race and ethnicity was based on information provided by the household respondent for each household member. From 1997 to 2001, the respondent was asked if each person's race was best described as black, white, Asian or Pacific Islander, American Indian, or Alaska Native. Beginning in 2003, the respondent was able to describe each person's race by specifying any combination of races that applied (i.e., multiracial). In 2003, as in all previous years, the respondent was also asked if each person's main national origin or ancestry was Puerto Rican, Cuban, Mexican, Mexicano, Mexican American, or Chicano; other Latin American; or other Spanish. Persons claiming a main national origin or ancestry in one of these Hispanic groups, regardless of racial background, were classified as Hispanic. Since the Hispanic grouping can include persons of any race, the race categories of black, white, and other exclude Hispanics. The other category includes people with single races other than white and black as well as people who report multiple races.

Income. In MEPS, personal income from all household members is summed to create family income. Potential income sources asked about in the survey interview include annual earnings from wages, salaries, bonuses, tips, and commissions; business and farm gains and losses; unemployment and Workers' Compensation payments; interest and dividends; alimony, child support, and other private cash transfers; private pensions; individual retirement account (IRA) withdrawals; Social Security and Department of Veterans Affairs payments; Supplemental Security Income and cash welfare payments from public assistance, TANF (Temporary Assistance for Needy Families; formerly known as Aid to Families with Dependent Children, or AFDC); gains or losses from estates, trusts, partnerships, S corporations, rent, and royalties; and a small amount of "other" income.

People were classified according to their family's income in terms of poverty status. In this report, poverty status is the ratio of the family's income to the Federal poverty thresholds, which control for the size of the family and the age of the head of the family. The following classification of poverty status was used:

- Poor or negative income: Persons in families with income of 100 percent of the poverty line or less, including those who reported negative income.
- Near poor: Persons in families with income from over 100 percent through 125 percent of the poverty line or less.
- Low income: Persons in families with income from over 125 percent through 200 percent of the poverty line.
- Middle income: Persons in families with income from over 200 percent through 400 percent of the poverty line.
- High income: Persons in families with income over 400 percent of the poverty line.

Health insurance status. Individuals under age 65 were classified in the following three insurance categories, based on household responses to health insurance status questions:

- Any private health insurance: Individuals who, at any time during the year, had insurance that provides coverage for hospital and physician care (other than Medicare, Medicaid, or other public hospital/physician coverage) were classified as having private insurance. Coverage by TRICARE (Armed Forces–related coverage) was also included as private health insurance. Insurance that provides coverage for a single service only, such as dental or vision coverage, was not included.

- Public coverage only: Individuals were considered to have public coverage only if they met both of the following criteria: 1) they were not covered by private insurance at any time during the year, and 2) they were covered by one of the following public programs at any point during the year: Medicare, Medicaid, or other public hospital/physician coverage.
- Uninsured: The uninsured were defined as people not covered by private hospital/physician insurance, Medicare, TRICARE, Medicaid, or other public hospital/physician programs at any time during the entire year or period of eligibility for the survey.

For individuals 65 and older, the following insurance categories were used:

- Medicare plus private (including TRICARE): Individuals who at any time during the year, were covered by TRICARE or a supplemental private insurance policy in addition to Medicare.
- Medicare plus other public coverage: Individuals were considered to have Medicare plus other public coverage if they met both of the following criteria: 1) they were not covered by TRICARE or a supplemental private policy at any time during the year 2) they were covered by Medicaid or other public hospital/physician coverage in addition to Medicare.
- Medicare HMO/Medicare only: This group includes adults who did not report any private or public supplemental insurance coverage and were enrolled in Medicare HMOs or had Medicare fee-for-service coverage only. For analytic purposes, this classification also includes a very small number of persons ages 65 and over who did not report Medicare coverage.

Perceived health status. During each round of interviewing, the household respondent was asked to rate the health of each person in the family according to the following categories: excellent, very good, good, fair, or poor. For this report, the response categories “excellent,” “very good,” and “good” were collapsed, as were “fair” and “poor.”

Metropolitan statistical area (*MSA).* Individuals were identified as residing either inside or outside an MSA as designated by the U.S. Office of Management and Budget, which applied 1990 standards using population counts from the 1990 U.S. census. An MSA is a large population nucleus combined with adjacent communities that have a high degree of economic and social integration with the nucleus. Each MSA has one or more central counties containing the area’s main population concentration. In New England, metropolitan areas consist of cities and towns rather than whole counties.

Census region. Each MEPS sampled person was classified as living in one of the following four regions as defined by the U.S. Census Bureau:

- Northeast: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania.
- Midwest: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, South Dakota, North Dakota, Nebraska, and Kansas.
- South: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.
- West: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska, and Hawaii.

Sample Design and Accuracy of Estimates

The statistics presented in this report are affected by both sampling error and sources of nonsampling error, which include nonresponse bias, respondent reporting errors, interviewer effects, and data processing misspecifications. The MEPS person-level estimation weights include nonresponse adjustments and post-stratification adjustments to population estimates derived from the Current Population Survey based on cross-classifications by region, MSA, age, race/ethnicity, and sex. The overall MEPS response rate reflects response to both the MEPS and NHIS interviews. The sample size and annual response rates are

Calendar year	Sample size	Pooled annual response rate
1997	32,636	66.4
1998	22,953	67.9
1999	23,565	64.3
2000	23,839	65.3
2001	32,122	66.3
2002	37,418	64.7
2003	32,681	64.5

Rounding

Because of rounding and some missing data, some of the subpopulation estimates presented in the tables will not sum exactly to the overall population total. Standard errors are presented in tables A–G.

Table A. Standard errors for percentage and total number of adults ages 18 and older reporting treatment for hypertension and comorbid conditions, United States, 1997 to 2003

Corresponds to Table 1

	1997	1998	1999	2000	2001	2002	2003
Population size (number in millions)							
Population reporting treatment for hypertension							
Percent	0.36	0.41	0.40	0.49	0.36	0.38	0.36
Number in millions	0.90	0.98	1.09	1.51	1.01	1.09	1.11
Among persons reporting treatment for hypertension, percent reporting:							
Hyperlipidemia	0.77	1.00	0.91	0.92	0.91	0.87	0.85
Diabetes	0.74	1.06	0.84	0.89	0.71	0.76	0.71
Heart disease	0.92	1.14	1.06	0.96	0.87	0.74	0.81

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997–2003.

Table B. Standard errors for percentage and total number of adults ages 18 and older reporting treatment for hypertension, by selected population characteristics, United States, 1997 and 2003

Corresponds to Table 2

	1997			2003		
	Total population (in millions)	Percent reporting hypertension	Total reporting hypertension (in millions)	Total population (in millions)	Percent reporting hypertension	Total reporting hypertension (in millions)
Total		0.36	0.90		0.36	1.11
Age in years						
18 to 44		0.22	0.25		0.23	0.29
45 to 64		0.69	0.47		0.67	0.65
65 and over		1.08	0.57		1.12	0.69
Race/ethnicity[1]						
White		0.41	0.78		0.45	0.95
Black		1.04	0.29		0.84	0.35
Other		1.45	0.14		1.08	0.19
Hispanic		0.58	0.15		0.67	0.23
Sex						
Male		0.43	0.48		0.48	0.62
Female		0.47	0.57		0.42	0.63
Income						
Poor/negative		0.87	0.24		0.80	0.24
Near poor		1.35	0.13		1.72	0.19
Low income		0.88	0.27		0.88	0.30
Middle income		0.67	0.49		0.59	0.52
High income		0.52	0.48		0.55	0.62
Health insurance status						
Less than 65						
Any private		0.34	0.50		0.40	0.71
Public only		0.98	0.16		1.10	0.22
Uninsured		0.45	0.12		0.50	0.16
65 and over						
Medicare and private		1.32	0.45		1.43	0.51
Medicare and other public		2.57	0.14		2.57	0.18
Medicare only		1.98	0.23		1.79	0.31
Education		0.00				
Less than high school		0.80	0.40		0.76	0.41
High school		0.55	0.42		0.58	0.55
At least some college		0.43	0.46		0.52	0.70
Perceived health status						
excellent/very good/good		0.33	0.71		0.36	0.88
fair/poor		1.08	0.38		1.04	0.45
Metropolitan statistical area (MSA)						
MSA		0.38	0.70		0.39	1.01
Non-MSA		0.89	0.55		0.84	0.45
Census region						
Northeast		0.64	0.33		0.67	0.42
Midwest		0.57	0.37		0.88	0.56
South		0.76	0.66		0.62	0.70
West		0.69	0.36		0.70	0.54

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997-2003.

[1] Beginning in 2002, the data reflect the respondents' ability to identify with multiple race groups. The race/ethnicity characteristics for 2003 actually reflect Hispanic, non-Hispanic, white, no other race indicated; non-Hispanic, black, no other race indicated; non-Hispanic, other single races and multiple races. Hence, estimates by race/ethnicity for 2003 are not directly comparable to those in previous years (i.e., 1997–2001 versus 2003).

Table C. Standard errors for percentage of adults ages 18 and older using one or more, two or more, classes of antihypertensive drugs, among adults reporting treatment for hypertension, United States, 1997 to 2003

Corresponds to Table 3

	1997	1998	1999	2000	2001	2002	2003
Population reporting hypertension (number in millions)							
Among persons reporting hypertension, percent using:							
At least one of the five classes[1]	0.70	0.83	0.81	0.70	0.56	0.53	0.54
Two or more of the five classes	0.98	1.13	1.09	1.03	0.98	0.86	0.93

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997–2003.

[1] The five classes are diuretics, beta blockers, calcium channel blockers, angiotensin converting enzyme (ACE) inhibitors, and angiotensin II receptor blockers.

Table D. Standard errors for percentage of adults ages 18 and older using one or more, two or more, classes of antihypertensive drugs, among adults reporting treatment for hypertension, by selected population characteristics, United States, 1997 and 2003

Corresponds to Table 4

	Percent with use in 1997		Percent with use in 2003	
	At least one of the five classes[1]	Two or more of the five classes	At least one of the five classes	Two or more of the five classes
Total	0.70	0.98	0.54	0.93
Age in years				
18 to 44	2.92	2.72	2.38	2.35
45 to 64	1.02	1.36	0.75	1.23
65 and over	1.04	1.60	0.68	1.47
Race/ethnicity[2]				
White	0.79	1.20	0.63	1.17
Black	1.73	2.09	1.60	2.14
Other	a	a	2.23	3.70
Hispanic	1.96	3.12	1.77	2.46
Sex				
Male	1.21	1.58	0.93	1.37
Female	0.94	1.23	0.72	1.11
Income				
Poor/negative	1.71	2.44	1.44	2.46
Near poor	2.97	3.77	2.13	4.29
Low income	1.91	2.72	1.38	2.24
Middle income	1.36	1.81	0.88	1.81
High income	1.34	1.70	1.01	1.43
Health insurance status				
Less than 65				
Any private	1.25	1.51	0.93	1.27
Public only	2.31	2.98	1.90	2.55
Uninsured	3.31	4.28	2.92	3.31
65 and over				
Medicare only	2.60	3.37	1.32	2.73
Medicare and private	1.31	2.00	0.74	1.86
Medicare and other public	2.44	3.48	1.49	2.74
Education				
Less than high-school	1.28	1.83	0.97	1.73
High-school	1.15	1.68	1.00	1.69
At least some college	1.41	1.78	0.83	1.50
Perceived health status				
Excellent/very good/good	0.92	1.19	0.63	1.08
Fair or poor	1.08	1.70	0.98	1.75
Metropolitan statistical area (MSA)				
MSA	0.86	1.19	0.61	1.08
Non-MSA	1.08	1.82	1.18	1.85
Census region				
Northeast	1.54	1.86	1.19	2.41
Midwest	1.22	2.12	1.17	2.10
South	1.04	1.59	0.82	1.24
West	2.15	2.32	1.34	2.30

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997–2003.

[1] The five classes are diuretics, beta blockers, calcium channel blockers, angiotensin converting enzyme (ACE) inhibitors, and angiotensin II receptor blockers.

[2] Beginning in 2002, the data reflect the respondents' ability to identify with multiple race groups. The race/ethnicity characteristics for 2003 actually reflect Hispanic; non-Hispanic, white, no other race indicated; non-Hispanic, black, no other race indicated; non-Hispanic, other single races and multiple races. Hence, estimates by race/ethnicity for 2003 are not directly comparable to those in previous years (i.e., 1997–2001 versus 2003).

Table E. Standard errors for percentage of adults ages 18 and older using specific classes of antihypertensive drugs, among adults using at least one of five classes,[1] United States, 1997 to 2003

Corresponds to Table 5

	1997	1998	1999	2000	2001	2002	2003
Total population using at least one of five classes (number in millions)							
Among persons reporting drug use for hypertension, percent using:							
Diuretics	1.11	1.35	1.21	1.12	0.96	0.83	0.89
Beta blockers (BBs)	1.09	1.07	1.21	1.06	0.90	0.88	0.90
Calcium channel blockers (CCBs)	1.13	1.25	1.21	1.26	0.95	0.89	0.79
Angiotensin-converting enzyme inhibitors (ACEIs)	1.04	1.20	1.23	1.13	0.89	0.88	0.88
Angiotensin II receptor blockers (ARBs)	0.41	0.71	0.77	0.70	0.67	0.75	0.79

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997–2003.

[1] Adults who reported hypertension and used a drug from at least one of the following classes: diuretics, beta blockers, calcium channel blockers, angiotensin converting enzyme (ACE) inhibitors, angiotensin II receptor blockers.

Table F. Standard errors for percentage of adults ages 18 and older using specific classes of antihypertensive drugs, among adults using at least one of five classes,[1] by selected population characteristics, United States, 1997 and 2003

Corresponds to Table 6

	Percent with use									
	1997	2003	1997	2003	1997	2003	1997	2003	1997	2003
	Diuretics		BBs[2]		CCBs		ACEIs		ARBs	
Total	1.11	0.89	1.09	0.90	1.13	0.79	1.04	0.88	0.41	0.79
Age in years										
18 to 44	3.52	2.57	3.30	2.73	3.06	2.26	3.27	3.22	1.80	2.54
45 to 64	1.66	1.22	1.60	1.37	1.65	1.25	1.58	1.40	0.59	1.13
65 and over	1.62	1.29	1.65	1.41	1.52	1.32	1.68	1.18	0.60	1.16
Race/ethnicity[3]										
White	1.35	1.03	1.37	1.10	1.35	0.96	1.25	1.05	0.51	0.79
Black	2.23	2.25	2.01	1.94	2.51	2.01	2.24	2.18	0.74	0.96
Other	a	4.29	a	4.01	a	3.43	a	3.61	a	2.27
Hispanic	6.39	2.61	3.02	2.25	3.82	2.38	3.74	2.73	1.28	3.47
Sex										
Male	1.67	1.25	1.68	1.42	1.79	1.29	1.84	1.38	0.59	1.18
Female	1.38	1.11	1.32	1.05	1.42	1.11	1.22	1.12	0.58	0.98
Income										
Poor/negative	2.43	2.45	2.28	2.13	2.43	2.50	2.70	2.51	0.94	2.07
Near poor	4.61	3.69	3.94	3.38	5.07	4.97	4.86	3.33	1.16	2.67
Low income	2.83	2.60	2.49	2.42	2.84	2.45	2.74	2.48	1.17	1.85
Middle income	1.93	1.84	2.01	1.71	1.97	1.58	2.01	1.68	0.71	1.54
High income	1.87	1.50	1.88	1.60	2.00	1.37	1.91	1.40	0.81	1.39
Health insurance status										
Less than 65										
Any private	1.78	1.32	1.68	1.42	1.74	1.24	1.68	1.45	0.76	1.26
Public only	3.31	3.19	2.82	2.77	3.53	2.77	3.54	3.01	1.36	2.48
Uninsured	4.75	3.76	4.26	4.05	4.54	3.20	4.74	4.20	1.03	2.37
65 and over										
Medicare only	3.53	2.40	3.21	2.61	3.32	2.22	3.62	2.49	1.07	2.13
Medicare and Private	1.99	1.82	2.06	1.92	2.08	1.75	1.92	1.69	0.80	1.61
Medicare and other public	3.67	3.23	3.90	3.29	3.74	3.10	3.89	3.15	1.15	2.42
Education										
Less than high-school	2.23	1.74	1.97	1.70	1.84	1.73	2.13	1.69	0.74	1.65
High-school	1.85	1.62	1.84	1.79	1.91	1.50	1.63	1.55	0.67	1.41
At least some college	2.05	1.47	1.76	1.41	1.97	1.26	2.01	1.42	0.79	1.28
Perceived health status										
Excellent/very good/good	1.25	0.97	1.33	1.09	1.39	0.92	1.37	1.04	0.49	0.94
Fair or poor	2.06	1.84	1.76	1.73	1.80	1.70	1.86	1.73	0.77	1.53
Metropolitan statistical area (MSA)										
MSA	1.36	1.03	1.24	1.08	1.28	0.90	1.16	1.05	0.51	0.94
Non-MSA	1.96	1.55	2.32	1.66	2.49	1.72	2.47	1.54	0.79	1.64
Census region										
Northeast	2.29	2.27	2.58	2.39	2.48	1.56	2.17	2.43	1.34	2.12
Midwest	2.28	1.67	2.06	1.73	2.55	1.83	2.33	1.59	0.78	1.46
South	1.87	1.24	1.86	1.18	1.76	1.33	1.64	1.37	0.51	1.20
West	2.37	2.37	2.49	2.42	2.35	1.63	2.43	1.77	0.88	1.72

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997-2003.

[1] Adults who reported hypertension and used a drug from at least one of the following classes: diuretics, beta blockers, calcium channel blockers, angiotensin converting enzyme (ACE) inhibitors, angiotensin II receptor blockers

[2] BBs (beta blockers), CCBs (calcium channel blockers), ACEIs (angiotensin-converting enzyme inhibitors), ARBs (angiotensin II receptor blockers).

[3] Beginning in 2002, the data reflect the respondents' ability to identify with multiple race groups. The race/ethnicity characteristics for 2003 actually reflect Hispanic; non-Hispanic, white, no other race indicated; non-Hispanic, black, no other race indicated; non-Hispanic, white, other single races and multiple races. Hence, estimates by race/ethnicity for 2003 are not directly comparable to those in previous years (i.e., 1997–2001 versus 2003).

Table G. Standard errors for average per capita and per user expenditures[1] for antihypertensive drugs, among adults ages 18 and older reporting treatment for hypertension, United States, 1997 to 2003

Corresponds to Table 7

	1997	1998	1999	2000	2001	2002	2003
Population reporting hypertension (millions)							
				Per capita expenditures			
Drug Class							
All therapeutic classes	8.00	13.00	13.00	9.00	10.00	9.00	10.00
Diuretics	1.00	2.00	2.00	2.00	2.00	1.00	1.00
Beta blockers (BBs)	4.00	3.00	4.00	3.00	4.00	4.00	4.00
Calcium channel blockers (CCBs)	6.00	11.00	9.00	6.00	5.00	4.00	5.00
Angiotensin-converting enzyme inhibitors (ACEIs)	4.00	4.00	6.00	6.00	4.00	4.00	5.00
Angiotensin II receptor blockers (ARBs)	2.00	2.00	2.00	3.00	4.00	3.00	3.00
Combinations[2]	3.00	3.00	4.00	4.00	4.00	3.00	5.00
				Per user expenditures			
Drug Class							
All therapeutic classes	9.00	15.00	14.00	11.00	11.00	9.00	11.00
Diuretics	5.00	5.00	6.00	5.00	5.00	5.00	4.00
Beta blockers (BBs)	14.00	9.00	11.00	8.00	10.00	9.00	9.00
Calcium channel blockers (CCBs)	13.00	31.00	23.00	14.00	12.00	10.00	13.00
Angiotensin-converting enzyme inhibitors (ACEIs)	10.00	10.00	14.00	13.00	9.00	8.00	11.00
Angiotensin II receptor blockers (ARBs)	44.00	26.00	24.00	35.00	33.00	16.00	14.00
Combinations	13.00	11.00	15.00	12.00	14.00	10.00	17.00

Source: Center for Financing, Access, and Cost Trends, Agency for Healthcare Research and Quality, Medical Expenditure Panel Survey, 1997–2003.

[1] Drug expenditures for all years are CPI-U adjusted to 2003 U.S. dollars.

[2] Combination drugs include two or more of the listed classes.