Compliance with Antihypertensive Therapy among Elderly Medicaid Enrollees: The Roles of Age, Gender, and Race

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ABSTRACT

Objectives. This study measured compliance and related demographic factors in a retrospective cohort of 4068 elderly outpatients newly starting antihypertensive therapy from 1982 through 1988.

Methods. Logistic regression modeling of data from the New Jersey Medicaid program was used.

Results. These patients filled antihypertensive prescriptions covering an average of only 179 days in the 365-day follow-up period (49%). Good compliance ($\geq$ 80%) was associated with advanced age (odds ratio [OR] = 2.12, for patients 85 or older) and White race (OR = 0.55 for Blacks). There was no relationship between compliance and gender.

Conclusions. Despite the efficacy of antihypertensive therapy in preventing cardiovascular morbidity, such high rates of noncompliance may contribute to suboptimal patient outcomes. (*Am J Public Health.* 1996; 86:1805–1808)

Introduction

The prevalence of hypertension in the elderly approaches 50% in the United States,[1] and its management has become the most common reason for patients to visit a physician and to receive medications.[2,3] Yet blood pressure control is less than optimal in society[4,5]: a major barrier to hypertension management is drug noncompliance.

Horwitz[6] and other investigators[7–11] found that compliance rates for all drug therapies range between 40% and 50%. Risk factors for noncompliance have varied from study to study, without clear identification of age, gender, race, socioeconomic status, or level of education as predictors.[12–14] Nonetheless, the elderly are of particular concern in this regard because of their use of multiple drugs, which has been associated with noncompliance,[15] and because of their greater vulnerability to the sequelae of undertreatment as well as overtreatment.

Previous research in this area has been limited by several important factors. Patients over 65 have often not been included in adequate numbers in study samples, and many compliance research studies have been of relatively short duration (most under 3 months). Larger trials on antihypertensive therapy[16–19] have focused on groups of healthy volunteers, and other studies have studied "survivors," those who stay with their regimens over time, and thus may underestimate the true frequency of noncompliance.

The goals of this project were (1) to measure rates of compliance with antihypertensive medications among a population-based sample of typical elderly outpatients newly initiated on therapy and (2) to determine the association of demographic factors with compliance rates in this population.

Methods

The study data were drawn from the state of New Jersey's Medicaid and Medicare programs for the years 1982 through 1988. Enrollment in these programs was ascertained through the Medicaid enrollment file, which identifies persons who are eligible to receive Medicaid benefits, the dates of coverage, and demographic characteristics, including age, gender, and race as well as information on nursing home residency and date of death.

Selection of Study Subjects

We identified all Medicaid recipients who filled a prescription for an antihypertensive agent during the study years. Potential study subjects were Medicaid enrollees aged 65 or older who had filed a new claim for an antihypertensive drug during the study period: new users could have no claim for any antihypertensive agent in the 365 days prior to their first (index) claim. In addition, these subjects were required to be (1) continuously eligible in the Medicaid program in the year before and in the year after the first claim for an antihypertensive agent and (2) active users of the Medicaid program, as demonstrated by filling at least one prescription for any drug in each 4-month period in the year before and in the year after their first antihypertensive prescription.

The initial screen identified 9468 new users of at least one antihypertensive drug. Of these potential study subjects, we excluded patients in the hospital (n = 52) or a nursing home (n = 773) at the time of

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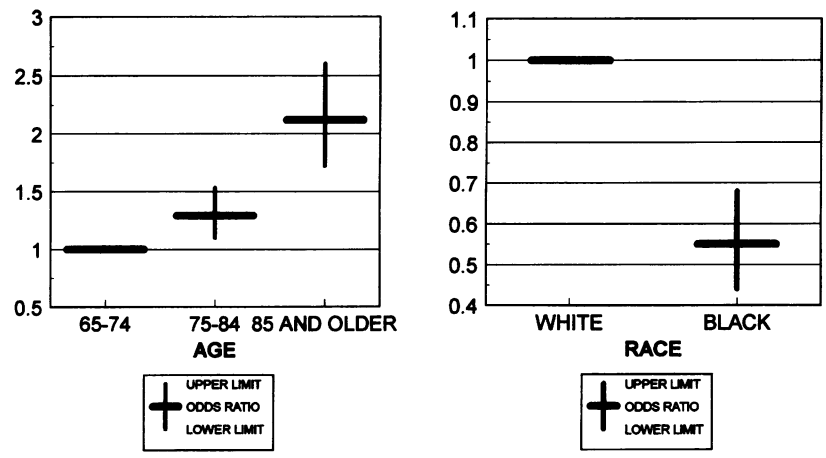
This paper was accepted May 17, 1996.

TABLE 1—Characteristics of the Study Population Taking Antihypertensive Medications: Elderly Medicaid Recipients (n = 4068) in New Jersey

Variable	%
Demographics	
Age	
65–74	51
75–84	33
85+	16
Gender	
Female	78
Male	22
Race	
White	64
Black	18
Other	18
Year of therapy	
1982–1984	53
1985–1986	22
1987–1988	25
Drug class	
Diuretics	55
Beta-adrenergic blockers	12
Calcium-channel blockers	6
ACE inhibitors	3
Other	24
Health care utilization in the 120 days before antihypertensive therapy	
No. prescriptions	
0–3	25
4–7	40
8+	35
No. of physician visits	
0–3	43
4–7	33
8+	24
No. pharmacies	
1	80
>1	20
Hospital stay	
No	91
Yes	9



Note. Factors (age and race) associated with compliance of 80% or greater with antihypertensive medications, adjusted for year of therapy as well as for the number of antihypertensive medications, class of antihypertensive medication, number of other prescriptions, number of pharmacies, number of physician visits, and number of hospitalized days in the 120 days preceding the initial antihypertensive prescription. For each variable, the odds ratio is indicated by the horizontal line and the 95% confidence interval is indicated by the vertical line.

FIGURE 1—Demographic factors associated with ≥80% compliance with antihypertensive therapy: elderly Medicaid recipients (n = 4068) in New Jersey.

their first antihypertensive prescription. To be certain that such drugs as thiazides or calcium-channel blockers were being used as antihypertensives, we defined a core group that excluded patients who had any diagnosis of coronary artery disease or congestive heart failure (n = 3244). Patients who filled only one prescription for an antihypertensive agent were likewise omitted from this core group (n = 1331). The final number of study subjects was 4068.

Definitions of Compliance

We calculated compliance using the "quantity dispensed" and "days' supply" data on all antihypertensive prescriptions filled, in order to measure the number of days a patient had antihypertensive medication available during the 365-day study period ("days covered"). This method of calculating compliance has been previously described in detail.[20,21] Data from the quantity dispensed and days' supply fields correlated well with standard dosing regimens described in reference works for nearly all prescriptions.[22,23] To avoid mislabeling patients as noncompliant if their antihypertensive treatment was switched from one agent to another, such alternations in therapy counted towards compliance. Days spent in the hospital counted as days of full compliance. In the case of overlapping prescriptions, the duration of the second prescription was calculated from its dispensing date, rather than from the day when the first prescription was estimated to be finished; the number of days covered was not duplicated.

Two outcome definitions of compliance were used in this study. The first definition described the number of days each patient had antihypertensive medication available in the 1-year follow-up period. The second definition categorized study subjects into two groups: 80% or more of days covered during the study year vs fewer than 80% of days covered.

Statistical Analysis

The odds ratio for 80% or greater compliance with the antihypertensive medication regimen was estimated from odds ratios calculated through unconditional logistic regression.[24,25] Potential predictors of compliance tested in the logistic regression model included age, race, gender, year of initiation of therapy, number of antihypertensive medications, class of antihypertensive medication, and number of pharmacies used. Descriptions of intensity of medical care in the 120 days before the first antihypertensive prescription included number of prescriptions filled for any drug, number of physician visits, and hospital stay.

Confidence intervals for the estimated odds ratios and significance tests for differences from the null value were calculated through the use of the estimated standard errors.[26,27] Tests for possible interactions among independent variables were performed.[28]

Results

The characteristics of the study population (n = 4068) are summarized in

Table 1. Subjects had a mean age of 75.8 (± 7.9) years, and were predominately White (64%) and female (78%). In the 120 days before the first antihypertensive prescription, subjects had an average of seven filled prescriptions and five physician visits, while 9% had a hospital stay during this period.

Diuretics were the most commonly prescribed initial agents, accounting for 55% of first prescriptions, followed by beta-adrenergic blockers (12%): 86% of all patients used antihypertensive agents prescribed once or twice a day. In the 12 months following an initial antihypertensive prescription, the average patient had antihypertensive medication available for only 179 days of the year (49% of days). Of patients started on therapy, only 23% achieved good levels of compliance, defined as 80% or greater as measured by the refill record based on quantities prescribed and physicians' instructions for use.

In the logistic regression model predicting compliance of 80% or greater, after adjustment for potential confounding, old age was associated with better compliance: as compared with patients aged 65 through 74, patients aged 75 through 84 were more compliant (odds ratio [OR] = 1.29; 95% confidence interval [CI] = 1.10, 1.53), and the oldest group of patients (≥ 85 years) were 2.12 (95% CI = 1.72, 2.60) times as likely to achieve good compliance levels (Figure 1). Blacks (OR = 0.55; 95% CI = 0.44, 0.68) were significantly less likely than Whites to achieve compliance rates of 80% or greater. There was no significant relationship between gender and compliance (OR = 1.10; 95% CI = 0.91, 1.32). Compliance was related to year of initiation of therapy, with compliance increasing during the later years of the study (test for trend, $P < .02$). These relationships were adjusted for the effects of number and class of antihypertensive agents, other drug use, number of pharmacies used, number of physician visits, and prior hospitalization. When analyses were conducted on a larger group of patients (i.e., without excluding those who had a diagnosis of coronary artery disease or congestive heart failure or those who filled only one prescription), the findings were virtually identical.

Discussion

The *Healthy People 2000 Report* stated a goal of increasing to at least 50% the proportion of hypertensive Americans whose condition is well controlled.[29] The findings of this study suggest that simply prescribing therapy will not accomplish that goal, as antihypertensive compliance averaged 49%, and only 23% of the cohort had good compliance levels of 80% or higher. Yet the consequences of noncompliance with antihypertensive drug therapy include poor blood pressure control,[9] hospital admission,[30–32] and nursing home placement[33] in elderly patients. In our community-based elderly cohort of 4068, the largest study to date to examine compliance with antihypertensive agents, younger age and Black race were associated with lower levels of drug utilization.

Medicaid and Medicare data offer important advantages, including the ability to document all health care service use without recall bias or incomplete history information. However, the limitations of this claims-based information must be considered.[34] It is possible that patients discontinued use of their drugs on the advice of their doctors because of side effects; however, it is expected that these physicians would start therapy with another antihypertensive medication. Therapeutic substitution was taken into account to avoid misclassification of a patient as noncompliant. In 1988[35] and again in 1993,[36] the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure called for "attempts to decrease the dosage and number of antihypertensive drugs" after 1 year of well-controlled hypertension, but it is unlikely that tapering was initiated in the group of new users in the time interval studied.[37,38]

All subjects demonstrated active use of Medicaid benefits, which cover all outpatient medications in full, so it is unlikely that prescription drugs or medical services would have been obtained outside of these programs. Previous studies have demonstrated the high validity of pharmacy claims in computerized Medicaid tapes when compared with paper pharmacy records[39] and the low variability of pharmacy claims month to month.[40] Our earlier experience with these data for studies of medication use[20,21,41–44] indicates that the methods outlined above represent a practical and efficient means to study such questions in very large populations.

What are the potential mechanisms relating compliance with age and race? The health belief model[45] predicts that the oldest patients, with greater severity of illness, are more motivated to comply; in addition, the very old are more likely to have caregivers at home to assist with drug use. Such patients may also represent a survivor cohort because of their successful compliance behavior. Differences in educational levels, communication, and access to care (even within Medicaid) may explain the racial findings in this study: other investigations have noted that Blacks use less ambulatory service for coronary artery disease,[46–48] and receive lower levels of treatment after adjustment for severity of illness.[49] Previous studies have found compliance differences in regimens of three times a day or greater, but not between once-a-day and twice-a-day regimens[15,50]: in our data, there were not enough patients on three-times-a-day or greater regimens to explain this difference. While clinical trials, with their careful patient selection and close supervision, have found no difference in compliance rates by age and race, these outcomes may not be generalizable to routine outpatient care as described in this manuscript.

As with all epidemiologic observational studies, our results will require replication in other settings. Follow-up trials targeted towards those at risk for poor compliance represent an important next step, with the goal of improving antihypertensive drug use and blood pressure control in the short term and of preventing stroke and myocardial infarction in subsequent years. □

Acknowledgments

This work was supported by grants from the American Heart Association Grant-in-Aid program (Massachusetts Affiliate) and the National Institute on Aging, Bethesda, Md, grant AG08812. Dr Monane and Dr Gurwitz are recipients of Clinical Investigator Awards, from the National Institute on Aging, K08 AG00642-01, and K08 AG00510-01, respectively.

The authors wish to thank Drs Mark Beers and Thomas Graboys for their thoughtful reviews of the manuscript, and Rita Bloom and Sharon Hawley for their assistance in the preparation of the manuscript.

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