

Appointment-Keeping Behavior is Not Related to Medication Adherence in Hypertensive African Americans

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OBJECTIVE: The relationship between appointment-keeping behavior, medication adherence (ADH), and systolic and diastolic blood pressure (SBP and DBP) was assessed in 153 hypertensive African Americans followed in a community-based practice.

METHODS: ADH was assessed with a self-report questionnaire. BP was obtained from electronic medical records and appointment attendance was determined from the log of all appointments made during the 12-month study period. Nonadherence rates were compared across appointment attendance categories with chi-square. Logistic regression was used to assess the relationship between ADH and appointment attendance, whereas multivariate analysis of covariance (MANCOVA) was used to examine the relationship between appointment attendance and BP.

RESULTS: Twenty-five percent of patients (87% women, mean age 52 years) did not miss any appointments, 44% missed 1–30%, and 31% missed greater than 30%. Adjusted nonadherence rates were similar for all 3 categories (70%, 66%, and 65%, respectively, $p=0.88$) as were adjusted mean SBP and DBP in the MANCOVA model, [$F(4, 218)=1.13, p=.34$]. Logistic regression analysis did not indicate a significant relationship between appointment attendance and ADH.

CONCLUSIONS: Appointment-keeping behavior was not related to ADH or BP among hypertensive African Americans. It should not be used as a proxy for ADH in this patient population.

KEY WORDS: appointment attendance; medication adherence; blood pressure; African American.

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INTRODUCTION

Scheduled clinic appointments are an important aspect of medical care, and several investigators have indicated a positive relationship between clinic appointment attendance

and health outcomes in patients with chronic diseases.^{1–3} An accepted approach in the care of hypertensive patients requires lifelong adherence to prescribed antihypertensive medications and regular clinic visits.⁴ Appointment attendance is often used as a proxy for medication adherence in clinical trials and practice.^{5–10} However, there is little published empiric evidence to support this assertion. Therefore, we assessed the relationship between appointment-keeping behavior, medication adherence, and blood pressure (BP) in ambulatory hypertensive African American patients.

METHODS

Design, Participants, and Setting. This cross-section study was embedded within a larger clinical trial, designed to evaluate the effect of a behavioral intervention on medication adherence in hypertensive African Americans followed in a community health center in New York City. Details of the methods are described elsewhere.¹¹ Briefly, eligible patients were identified via electronic medical records (EMR) if they carry a diagnosis of hypertension; self-identified as black or African American; age >18 years; fluent in English; and taking at least 1 antihypertensive medication. Patients were approached to participate in the study during regular clinic visits. The Institutional Review Board of Columbia University Medical Center approved the study.

Data collection. Upon enrollment, trained research assistants conducted baseline interviews on all patients before randomization and initiation of the behavioral intervention. Information collected included demographics; insurance status; socioeconomic status; medical comorbidity¹²; number of antihypertensive medications; and self-reported medication adherence. Data on appointment-keeping behavior, antihypertensive medications, and clinic BP readings were extracted from patients' EMR for the 12-month period before enrollment.

Measures. Medication adherence was assessed with the validated four-item questionnaire of Morisky et al., which asks patients to respond *yes/no* to the following questions: (1) Have you ever forgotten to take your BP medication? (2) Are you careless at times about taking your BP medication? (3) Do

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you sometimes stop taking your BP medication when you feel well? (4) Do you sometimes stop taking your BP medication when you feel worse?^{13,14} Patients who responded *yes* to any 1 item were categorized as *nonadherent*. In 1 study of 88 hypertensive patients, it had a sensitivity of 72% and a specificity of 74% for adherence to at least 80% of prescribed medications.¹³ Similarly, this measure had an alpha of 0.9 in a sample of 202 minority hypertensive patients.¹⁴ Clinic appointment attendance was obtained via review of EMR of all appointments made in the 12 months before enrollment. Kept and missed appointments were routinely entered into the EMR by the administrative staff. This analysis focused only on primary-care-related visits. Canceled appointments were excluded because this behavior is different from not attending a scheduled appointment.² To minimize the confounding effects of individual variations in the frequency of scheduled appointments, we assessed missed appointment rates rather than the total number of appointments.^{2,15} Missed appointment rate was defined as the ratio of broken appointments to the total number of scheduled appointments for the 12-month study period. Following the methodology by Karter et al., missed appointment rates were then grouped into 3 categories 0%, 1–30%, and >30%.^{2,15} Clinic BP for each patient was calculated as the average of all BP readings for the 12-month study period.

Data analysis was performed with SPSS version 14.0. The distribution of demographics, clinical variables, hypertension characteristics, and medication adherence was assessed for the categories of appointment attendance. Unadjusted analyses were performed using analysis of variance (ANOVA) for continuous variables and chi-square test for categorical variables. Proportion of nonadherent patients was compared across appointment attendance categories with chi-square. Logistic regression was used to assess the relationship between medication adherence and appointment attendance, whereas adjusting for potential confounders including comorbidity, demographics, insurance status, education, total number of appointments, and number of antihypertensive medications. MANCOVA was used to assess the relationship between appointment attendance and BP after adjusting for the confounders listed above. Significance level was set at $p < .05$ for all analyses.

RESULTS

For the parent trial, 529 patients were screened, 330 of which met eligibility criteria and 190 were enrolled. Reasons for exclusion included incomplete BP data ($n=43$), controlled BP ($n=59$), not prescribed antihypertensive medications ($n=25$),

Table 1. Patient Characteristics

Characteristic	All patients (N=153)	Percent of missed appointments			p or χ^2
		None missed (n=39)	1–30% missed (n=68)	>30% missed (n=46)	
Female: n (%)	130 (85)	34 (87.2)	60 (88.2)	36 (78.3)	.31
Mean age (SD)	52 (11.27)	54 (12.6)	51 (11.5)	52 (9.9)	.61
Marital status: n (%)					
Never Married	72 (47.1)	18 (46.2)	30 (44.1)24	24 (52.2)	
Married	28 (18.3)	9 (23.1)	13 (19.1)	6 (13)	.87
Divorced/Separated	47 (30.1)	10 (25.6)	23 (33.8)	14 (30.4)	
Widowed	6 (3.9)	2 (5.1)	2 (2.9)	8 (4.3)	
Education: n (%)					
Elementary	36 (23.5)	7 (17.9)	16 (23.5)	13 (28.3)	.54
≥ High School	117 (76.5)	32 (82.1)	52 (76.5)	33 (71.7)	
Unemployed: n (%)	118 (77.1)	27 (69.2)	53 (77.9)	38 (82.6)	
Income: n (%) (N=125)					
<\$20,000	97 (77.6)	22 (64.7)	44 (80)	31 (86.1)	.09
>\$20,000	28 (22.4)	12 (35.3)	11 (20)	5 (13.9)	
Insurance status: n (%)					
Medicare	11 (7.2)	2 (5.1)	6 (8.8)	3 (6.5)	
Medicaid	122 (79.7)	31 (79.5)	55 (80.9)	36 (78.3)	
HMO/Self	20 (13.1)	6 (15.4)	7 (10.3)	7 (15.2)	.87
Conditions: n (%) (N=150)					
CHF	11 (7.3)	2 (5.3)	5 (7.5)	4 (8.9)	.82
Stroke	17 (11.3)	5 (13.2)	7 (10.4)	5 (11.1)	.91
Diabetes	43 (28.7)	8 (21.1)	22 (32.8)	13 (28.9)	.44
Kidney disease	5 (3.3)	0 (0)	5 (7.5)	0 (0)	.04
Comorbidity: n (%) (N=150)					
0	33 (22)	10 (22.2)	16 (23.9)	7 (18.4)	
1	32 (21.3)	8 (17.8)	14 (20.9)	10 (26.3)	.59
2	20 (13.3)	3 (6.7)	11 (16.4)	6 (15.8)	
3 or more	65 (43.3)	24 (53.3)	26 (38.8)	15 (39.5)	
Mean SBP (SD) (N=153)	143.2 (19.1)	141 (19.02)	145.6 (18.5)	140.98 (20)	.35
Mean DBP (SB) (N=153)	86.42 (11.17)	83.56 (10.37)	87.3 (10.63)	87.52 (12.4)	.1
Mean number of appointments (SD) (N=152)	9.62 (6.35)	3.64 (2.99)	13.31 (6.22)	9.24 (4.41)	<.001
Mean # anti-hypertensive Medications (SD)	1.61 (0.82)	1.38 (0.63)	1.71 (0.83)	1.65 (0.92)	.13
Proportion non-adherent: n (%) (N=151)	100 (66.9)	26 (70.3)	45 (66.2)	30 (65.2)	.88

too ill ($n=53$), and refusal to participate ($n=19$). Eighteen percent of enrollees were excluded from this analysis because of incomplete BP data. These patients had greater comorbidity than those included in the analysis, but there was no significant difference between both groups in the proportion of nonadherent patients ($p=.144$).

As illustrated in Table 1, the distribution of demographics, clinical variables, comorbidity, and the number and type of prescribed antihypertensive medications were similar for all 3 categories of appointment attendance. Majority of the patients were middle-aged, unemployed women with high school/college education. Forty-three percent had Charlson Score >3 with a mean SBP/DBP of 143.2/86.95 mmHg. The mean number of anti-hypertensive medications was 1.61, with diuretics being the most frequently prescribed. Twenty-five percent did not miss any clinic appointment; almost half missed 1-30%, whereas a third missed $>30\%$ of their appointments. The mean number of clinic appointments was 9.62, with the highest number noted for the 1-30% missed appointment category ($F(2, 152)=45.84, p<.000$). Nonadherence rates were similar for the 3 categories of appointment attendance ($p=.88$). As illustrated in Table 2, logistic regression analysis (adjusted for potential confounders) did not yield any significant relationship between medication adherence and appointment attendance, except for age (odds ratio [OR]=1.05; 95% CI 1.01-1.09). Similarly, adjusted mean SBP and DBP in the MANCOVA model were similar for all 3 categories [141.5 (SE=3.42)/85.6 (2.48) mmHg for the 0% missed appointment category; 141.1 (2.53)/85.7(1.83) mmHg for the 1-30% category, and 147.9 (2.88)/89.9 (2.1) mmHg for the $>30\%$ category, $F(4, 218)=1.13, p=.34$.

Table 2. Adjusted Odds Ratios for Adherence by Appointment Attendance ($n=122$)*

Variables	Adjusted OR (95% CI)
Age†	1.05 (1.01 to 1.09)
Gender	.75 (0.22 to 2.51)
Employment status	2.04 (0.76 to 5.50)
Income	1.29 (0.39 to 4.26)
Education	1.22 (0.44 to 3.37)
Insurance status	.499 (0.17 to 1.49)
HMO/Self-pay	1.00
Medicaid	6.49 (0.60 to 69.77)
Medicare	.81 (0.17 to 3.75)
Comorbidity group	.85 (0.59 to 1.21)
0 Comorbid illness	1.00
1 Comorbid illness	.35 (0.09 to 1.35)
2 Comorbid illnesses	.71 (0.15 to 3.49)
3 or more comorbid illnesses	.48 (0.15 to 1.53)
Number of Medications	1.33 (0.77 to 2.30)
Number of Appointments	.98 (0.90 to 1.07)
Appointment Attendance	
Appt. group 1 (0% missed)	1.00
Appt. group 2 (1-30% missed)	2.65 (0.73 to 9.65)
Appt. group 3 ($>30\%$ missed)	1.66 (0.43 to 6.47)
Constant	0.03

*Male (Gender); Unemployed (Employment status); <20 K (Income); $<HS$ education (Education); HMO/Self-pay (Insurance status); 0 Comorbid illness (Comorbidity group); Appt. group 1 (Appointment attendance) were the reference groups. Adjusted for age, gender, education, employment status, income, education, insurance status, number of comorbid conditions, number of medications, number of appointments over study period. †Age was the only significant predictor of adherence, $p=.026$. 95% CI: 95% confidence intervals

DISCUSSION

We did not find any relationship between appointment-keeping behavior, medication adherence, and blood pressure in hypertensive African Americans followed in a community-based primary care practice. To our knowledge, this is the first study to investigate the relationship between medication adherence and appointment-keeping behavior in ambulatory hypertensive patients. Although regular clinic visits is an important aspect of care, our findings suggest that clinic appointment attendance should not be used as proxy for nonadherence to prescribed antihypertensive medications in hypertensive African Americans, given the lack of correlation between these 2 constructs. There are several other reasons why patients may not keep their scheduled clinic appointments that may not be related to medication adherence in this patient population.

Several factors may explain our findings. First, patients may have significant difficulties with keeping their clinic appointments,² especially poor patients who could not afford transportation to the practice, as is the case in our study where majority of the patients are unemployed but yet take their medications as prescribed because of the expectation that it is helpful for controlling their BP.¹⁶ Second, it is not uncommon to have prescriptions with refills for longer periods of time with fewer patients relying on clinic appointments for medication refills. Third, the asymptomatic nature of hypertension may reduce the motivation for patients to keep their clinic appointments. Our findings resonate with those of other investigators who suggested that clinic appointment attendance is not an accurate proxy for medication-taking behavior.^{15,17,18} For example, in the study by Landers et al., attendance at a worksite hypertension program was not associated with the number of medication changes or reported medication side-effects.¹⁵ Similarly, data from 622 epileptic patients involved in a clinical trial indicated that 60% of the patients who were nonadherent with prescribed anti-seizure medications recorded 100% appointment-keeping behavior.¹⁷ Finally, in a study of acne patients, McEvoy et al. found no relationship between appointment-keeping behavior and adherence to prescribed acne medication. Almost one-third of the 144 patients in this study continued to take their medications despite missing significant numbers of appointments.¹⁸

Several limitations should be noted: first, our findings may not be generalized to a broader population because these patients were predominantly African-American women. Second, patients who participate in clinical trials may be more adherent than those who do not, although nonadherence rates reported in our study is reflective of that reported by other investigators.^{14,19,20} Third, we assessed medication adherence via self-report, which may overestimate adherence compared to objective electronic monitoring systems.

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