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WHICH PATIENTS RETURN TO ANTIHYPERTENSIVE DRUG THERAPY AFTER DISCONTINUATION?

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

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IN

PHARMACY ADMINISTRATION

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APPROVED:

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ABSTRACT

Objective: Using a self-administered questionnaire, the objectives of this study were : (1) to identify the predictors that discriminate between the patients who consider returning to antihypertensive therapy and those who indicate that they will not return to drug therapy; (2) to compare the predictors of returning to antihypertensive drug therapy in a North American population (United States, and Canada) with a European (France, Germany, and Italy) population.

Design: Cross-sectional study.

Data Collection: An existing dataset was obtained from Bristol Myers Squibb (BMS), New Jersey. BMS recruited patients with a diagnosis of hypertension from five different countries (USA, Canada, France, Germany, and Italy) (n=731). Trained interviewers administered the questionnaire in one-on-one interview sessions at a research facility, interviewer's home, or patient's home.

Methodology: Required variables were extracted from the dataset using SAS (Statistical Analysis System). The patients who said that they were already taking their antihypertensive medication as directed were deleted from the study. Therefore the final sample of 439 patients was used for the analyses. Independent variables were divided into four groups and logistic regression analyses were carried out separately for each sets of variables. The significant variables from each set of variables were identified and combined to develop a final logistic regression model. Finally, the study sample was divided into North American population and European population. A final logistic regression model was developed separately for these two populations.

Results: The number of physician visits for blood pressure problems, number of medication additions to the ones that patients were already taking for their blood pressure, patients' satisfaction towards the assistance they received from their health care provider in managing high blood pressure, and patients' satisfaction with the medications that were available to use to manage their blood pressure were identified as significant predictors in the final model. The European population showed two significant predictors that include number of physician visits for blood pressure problems and patients' satisfaction with the medications that were available to use in manage their blood pressure. However, North American population showed only one significant predictor that is number of medication additions to the ones that patients were already taking to manage their blood pressure. No interaction terms were found to be significant. The model worked best for the set of psychological variables.

Conclusion: The treatment of hypertension remains a difficult task. A frequent reason is poor adherence to the drug regimen. The results indicate that an increase in the number of physician visits for blood pressure problems may improve the odds of reinitiating drug therapy. The increase in number of physician visits for blood pressure problems may help patients to consider reinitiating antihypertensive drug therapy

The difference of predictors in North American and European population necessitates further investigation in separate geographical areas. The identification of predictors in each location may help in customizing the compliance improvement strategy.

Continued research in this area is vital because once the predictors of adherence to drug therapy are identified, effective interventions can be implemented to improve it. The interventions could be followed by its assessment. The feedback from assessment will help in modifying the interventions.

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INTRODUCTION

A. Importance of compliance in antihypertensive drug therapy

Hypertension is one of the most prevalent cardiovascular diseases in the United States, afflicting about 50 million people. [1] The results of a survey conducted in the United States, Canada, the United Kingdom and western European countries indicate that no more than 30% of patients maintain target blood pressure levels while on medication. [2] Another survey recently conducted in the US indicated that only 27 % of hypertensive patients had their systolic and diastolic blood pressure below 140mm and 90mm of Hg, respectively. [3] Although this can't be attributed to a single factor, in one study treatment failure is attributed by 70% of respondent physicians to a problem with adherence to therapy. [4] According to a study by a team of researchers from the University of Lausanne, Switzerland, as many as half of "failures" of treatment to lower blood pressure to normal levels may be due to noncompliance by patients in taking antihypertensive drugs as prescribed. Another study conducted on a random sample of 243 hypertensive patients indicated that 30-46% of the patients were noncompliant with their antihypertensive drug regimens. [5]

It is estimated that only 50-74% of hypertensive patients are currently receiving drug therapy and that the drug controls the condition in only 50% of patients receiving therapy. [6] Outpatient costs for treating hypertension were $13.9 billion in 1997. Half of this amount was spent on antihypertensive medication despite the low overall rates of use. [7] Although drug therapy has proven to be an effective form of control for high blood pressure, poor adherence to therapy drastically decreases its effectiveness. [8] It is

estimated that 30-50% of hypertensive patients withdraw from their prescribed regimen within one year of diagnosis and, of the remainder; nearly 33% administer insufficient medication to facilitate an adequate reduction in blood pressure. [9,10] Untreated hypertension carries a significant risk of cerebrovascular accidents (CVA), heart disease and renal disease. Each year, 100,000 people suffer their first CVA, with a total of 63,407 British deaths (12% of national mortality) being attributed to CVA in 1989. [11]

In a study conducted by Michel Brunier, MD, and colleagues, there was a strong association between lapses in compliance and increases in blood pressure. They also reported a significant inverse correlation between measured compliance and ambulatory diastolic blood pressure. [2]

The Healthy People 2000 report set a goal of increasing the proportion of hypertensive Americans whose condition is well controlled to at least 50%. [12] A study conducted by Mark Monane et al. indicates that antihypertensive compliance averaged 49%, and only 23% of the cohort had good compliance levels of 80% or higher. [13] The consequences of noncompliance with antihypertensive drug therapy include poor blood pressure [14], hospital admission [9] and nursing home placement. [15] It is necessary for patients to tale more than 80% of their antihypertensive drugs to maintain adequate blood pressure control. [16] The review of previous studies suggests that noncompliance with prescribed drug regimens is a widespread problem in the medical field. [17]

Because of noncompliance, many patients require extra care that results in a cost of billions of dollars to health care each year. [18,19] The results from a prospective study notes that poor compliance is probably the major reason for the low impact of antihypertensive drugs in the real world ('effectiveness') as compared to those enrolled in drug studies ('efficacy'). [20] A withdrawal syndrome caused by abrupt discontinuation of β-adrenoceptor blocking agents may include tachycardia, malaise, tremor and anxiety. [21] Cases of exacerbation of acute angina, myocardial infarction and sudden death have been reported in patients with ischemic heart disease who discontinued β blockers. [22] A dangerous, sometimes fatal increase in blood pressure may occur as a result of clonidine withdrawal. [23] Discontinuation of centrally acting antihypertensive drugs such as methyldopa and clonidine may also result into withdrawal syndromes. [24] In general, the abrupt cessation of antihypertensive medication is usually without immediate consequences. However, it maybe associated with symptoms and signs of enhanced sympathetic activity, severe hypertension, morbid ischemic cardiovascular events or death. [25] A retrospective analysis of 1.2 million patients concluded that low rates of continuation with a newly prescribed antihypertensive drug exist regardless of which drug is prescribed. [26] This conclusion generates several questions about the possible reasons of such a high rate of discontinuation of treatment from newly prescribed antihypertensive drugs.

B. Determinants of compliance

Researchers have determined many factors associated with compliance. Some of these factors include the patient's knowledge concerning medical regimens, the seriousness of

the disease, and the consequences of untreated disease. [27,28]. The other factors include a patient's belief about the effectiveness of the medication [29], family/social support [30], cost of medications [19], number of medications being taken by the patient. [31]

A retrospective cohort of 4068 elderly outpatients newly starting antihypertensive therapy from 1982 through 1988 was utilized to measure compliance and related demographic factors. It indicated that younger age and black race were associated with lower levels of drug utilization. [11] A cross-sectional retrospective study of ambulatory population was conducted at the University of Rhode Island to find the factors associated with compliance problems. The study indicated that a patient's level of understanding of both medication instructions and the drug therapy is associated with compliance problems. The other factors associated include length of time since last physician visit, length of time on medication, total number of medications and number of drug allergies. The class of medication taken was also found to be a significant predictor of excess risk. The age and sex appeared to have little association. [18] The literature review indicates that angiotensin-converting-enzyme (ACE) inhibitors have had the highest compliance rates, followed by calcium-channel blockers, β-blockers and diuretics. [32-35]

The health belief model predicts that the oldest patients, with greater severity of disease, are more motivated to comply. [10] In addition, very old patients are more likely to have caregivers at home to assist with medication use. A pilot study was conducted in which a questionnaire was devised and administered to a random sample

of 243 hypertensive patients of the adult ambulatory care clinic to understand the incidence of noncompliance and contributing factor. It indicated that that employment, use of home remedies, age, experience of side effects, level of concern with missed doses and cost are associated with noncompliance. [42]

Previous research indicates that noncompliance is a problem. However, there is inconsistency in the reasons for noncompliance. [5] Continued research in this area is essential because once the predictors of noncompliance have been found, effective interventions can be implemented to improve compliance.

C. Assessment of compliance

There is no ideal method for measuring drug compliance. [36,37] The methods that are commonly used to measure compliance include follow-up, outcome of therapy, prescription refills, direct questioning, pill counts, drug assays, and electronic medication monitoring.

Follow-up appointments: The physician may get some information on his/her patient compliance by looking at the way he/she keeps the appointment. In many countries, the patient is allowed to choose his doctors. Therefore, patient who does not show up any more may still be compliant and seeking the treatment from another doctor.

Outcome of therapy: Whether patient shows a good control of blood pressure or not is used as an indicator of compliance. However, this is a weak indicator. Any medication

taken regularly is not effective in approximately half of hypertensive patients. [38] A patient may be compliant and unresponsive to multiple therapies.

Prescription refills: The compliance can be evaluated by monitoring the prescription. This technique is especially useful in a community of hypertensive patient, for example, those belonging to a given medical care system. It can hardly be done in the individual patient if the prescriber and dispenser of the medication are different. [38]

Direct questioning: This method is commonly used because it is relatively simple and inexpensive. In a clinical setting, the easiest way to evaluate compliance is to interview the patient about his habits of taking the prescribed treatment. Previous studies have shown that about 15-50 % of noncompliant patients can be identified by interview. Direct questioning is of little help in individual patients. However, when considering a group of hypertensive patients, there exist some link between blood pressure normalization rate and the reported degree of compliance. [39]

Pill count: It has been traditionally used to monitor compliance in antihypertensive drug trials. However, this method tends to overestimate compliance. This is mainly because patients may discard tablets before returning the container to their doctor. [36] There is some evidence that compliance assessed by pill count must be 80% or more on order to obtain significant blood pressure reduction. [40]

Drug assays: This method utilizes plasma and urine concentration to measure compliance. The accuracy of this method partly depends on half-life of the drug. It is very inconvenient and can be expensive. The patient may be reluctant to give blood sample.

Medication Event Monitoring System (MEMS): It utilizes a computer chip in the cap of the medicinal bottle. Information is recorded each time the bottle is open. It allows calculation of the compliance rate, prescribed frequency, and prescribed interval.

D. Hypotheses

For the purpose of this study, we had proposed the following hypotheses:

1) Demographic characteristics such as age, race, gender, education level, medical insurance coverage, income and employment affect reinitiating antihypertensive drug therapy after discontinuation.
2) Psychological factors such as mood status, patient' perception about general health status and patient satisfaction affect reinitiating antihypertensive drug therapy after discontinuation.
3) Disease related factors such as physical functioning, # of hospitalizations, # of ER visits, # of physician visits, # of Nurse/Physician Assistant/Nurse Practitioner visits affect reinitiating antihypertensive drug therapy after discontinuation.
4) The prescribing patterns of physician and medication type affect reinitiating antihypertensive drug therapy after discontinuation.

5) The predictors of returning to antihypertensive drug therapy for North American population (United States and Canada) differ from European population (Germany, France and Italy).

METHODOLOGY

Study sample

An existing data set was obtained from Bristol Myers Squibb (BMS). The objectives of this study were: (1) to identify the predictors that discriminate between the patients who consider returning to antihypertensive therapy and those who indicate that they will not return to drug therapy; (2) to compare the predictors of returning to antihypertensive drug therapy in a North American population (United States, and Canada) with a European (France, Germany, and Italy) population. The data were recorded such that subjects cannot be identified directly or through identifiers linked to the subjects. BMS recruited the patients with a diagnosis of hypertension from five different countries (US, Canada, France, Germany and Italy) (n=731). Patients were identified primarily through physicians, pharmacists, patient networks and newspaper advertisements. Professional recruiters contacted each patient to determine eligibility. All patients were required to have been prescribed an antihypertensive agent from 3-18 months prior to the interview, and to have never been diagnosed or treated for angina, ischemic heart disease, arrhythmia, arteriosclerosis, cardiac bypass surgery, angioplasty, myocardial infarction or stroke. Individuals who were prescribed medication, but had never taken it, or individuals who had discontinued their medication were over-recruited to ensure an adequate distribution of those who were non-compliant. Only those patients diagnosed as being hypertensive after 1991 were considered for this study. Therefore, the data on 718 patients were used for the purpose of this study. The dependent variable was dichotomized to reflect whether a study participant was considering reinitiating their medication or not. We were only interested in the patients that had stopped taking their

medications. The patients who said that they were completely taking medications as directed were deleted from the study. Therefore, the final sample of 439 patients was left for the analyses.

Data collection

Trained interviewers explained that the purpose of the study was to understand attitudes about having high blood pressure, and that all the answers would be kept confidential, and that no one, including the patient's physician, would be able to identify their responses. The questionnaire was administered in a one-on-one interview session at a research facility, interviewer's home, or patient's home. The interviewer reviewed instructions for each section of the questionnaire and was able to answer questions as the patient completed the forms.

Measures and variables assessed

The questionnaire included measures of stage change for adherence, pros and cons of adherence, processes of change for adherence, temptation to skip medication, demographic and clinical variables, and self-reported adherence with medication for hypertension

The following **independent variables** were extracted from the database.

Demographic characteristics:

Age, race, gender, education level, medication payment type, income, employment were considered.

Physical functioning:

The scale was taken from the SHORT-FORM-36 HEALTH SURVEY developed by Rand Corporation and John E. Ware (1990). It was designed as a generic indicator of

health status for use in population surveys and evaluative studies of health policy. The SF-36 survey includes one multiple-item scale measuring each of eight general health concepts: physical functioning (PF), role limitations due to physical health problems (RP), bodily pain (BP), general health perceptions (GH), vitality (VT), social functioning (SF), role limitations due to emotional problems (RE), and mental health (MH). The questions were measured on a six point likert scale from none of the time (score of one) to all of the time (score of 6). The questions for physical functioning include:

a. Did you have problem in performing vigorous activities such as running, lifting heavy objects, and strenuous sports?
b. Did you have problem in performing moderate activities such as moving a table, vacuuming, and bowling?
c. Did you have problem in lifting or carrying groceries?
d. Did you have problem in climbing several flights of stairs?
e. Did you have problem in climbing one flight of stairs?
f. Did you have problem in bending, kneeling or stooping.?
g. Did you have problem in walking more than a mile?
h. Did you have problem in walking several blocks?
i. Did you have problem in walking one block?
j. Did you have problem in bathing or dressing yourself?

Likert's method for summated ratings scale was used to score each SF-36 scale. The score for few items were either recalibrated or reversed so that higher scores always indicate better health states. These scores for item responses were summed. A missing

scale score was assigned if more than half of the items in each scale were missing. If one-half or fewer items in each scale were missing, mean of the non-missing items was substituted for the missing items. Finally all the scales were linearly transformed to a 0 to 100 scale, with 100 indicating the most favorable health scale, 0 the least favorable, and scores in between representing the percent of the total possible score achieved. The following formula was used for transformation:

$$\text{Transformed score} = \frac{(\text{actual} - \text{lowest possible score})}{\text{Possible raw score range}} * 100$$

Patient visits:

Number of hypertension related hospitalizations, number of ER (emergency room) visits for blood pressure problems, number of physician visits for problems, and number of nurse/physician assistant/nurse practitioner visits for problems were considered.

Mood status:

The scale was taken from the SHORT-FORM-36 HEALTH SURVEY developed by Rand Corporation and John E. Ware (1990). The questions for mental health scale include:

a. Have you been a nervous person?
b. Have you felt so down in the dumps that nothing could cheer you up?
c. Have you felt calm and peaceful?
d. Have you felt downhearted and blue?
e. Have you been a happy person?

The detailed procedure is described above in physical functioning scale.

General health status:

Excellent to poor scale was considered.

Patient satisfaction:

Patient satisfaction towards health care provider, self-management, degree of control, medications, and other services were considered.

Prescribing patterns of physicians:

Number of dosage changes, number of medication additions, number of medication deletions, and number of medication switches were considered.

Medication type:

Medication/medications prescribed for the first time for the high blood pressure, current medication/medications being used for high blood pressure were considered.

Dependent variable:

Patients' current feeling about reinitiating drug therapy as directed was treated as a dependent variable. This variable was dichotomized based upon the following responses:

- No, right now I am not considering taking my high blood pressure medication as directed.
- Yes, right now I am considering or planning to start taking my high blood pressure medication as directed.

Data analysis

Statistical analysis:

The data were analyzed using the Statistical Analysis System (SAS) Version 8.0 on the IBM compatible computer at the University of Rhode Island. Proc LOGISTIC was utilized to perform the analysis for all logistic regression models. All independent variables were divided into 4 separate categories that include demographic variables,

disease related variables, psychological variables, and medication related variables. This strategy was used to avoid too many numbers of variables in a single model. PROC LOGISTIC was utilized for these primary models. Important independent variables were identified from the model using Chi-square test. The important variables were inserted as interaction terms in these models. The analysis was repeated to identify significant interactions. The variables with significant regression coefficient were identified from each model. These variables were combined to develop a final model. This stepwise approach helped us to reduce the number of independent variables in the final model. Finally, participants were divided into two groups that included North American population (USA, and Canada), and European population (France, Germany, and Italy) The final logistic regression model was carried out separately for these two groups.

The variables were coded as following.

Demographic characteristics:

Age: continuous

Race:

White – 1

Nonwhite – 2

Gender: categorical

Male – 1

Female – 2

Education level: categorical

< High school degree – 1

>= High school degree – 2

Medical payment type: categorical

Not reimbursed – 1

Reimbursed – 2

Income: categorical

<30k – 1

>=30k – 2

Employment: categorical

Full time/part time – 1

Unemployed/homemaker/student/retired – 2

Disease related characteristics:

Physical functioning scale: continuous

Number of hypertension related patient visits: continuous

Number of ER visits for blood pressure problems: continuous

Number of physician visits for problems: continuous

Number of nurse/physician assistant/nurse practitioner visits for problems: continuous

Psychological characteristics:

Mental health scale: continuous

General health status: ordinal

Poor – 1

Fair – 2

Good – 3

Very good – 4

Excellent – 5

Patients' satisfaction towards health care: ordinal

Very dissatisfied to Very satisfied – 1 to 10

Patients' satisfaction towards self-management: ordinal

Very dissatisfied to Very satisfied – 1 to 10

Patients' satisfaction towards degree of blood pressure control: ordinal

Very dissatisfied to Very satisfied – 1 to 10

Patients' satisfaction towards medications: ordinal

Very dissatisfied to Very satisfied – 1 to 10

Patients' satisfaction towards other services: ordinal

Very dissatisfied to Very satisfied – 1 to 10

Medication related variables:

Number of dosage changes: continuous

Number of medication additions: continuous

Number of medication deletions: continuous

Number of medication switches: continuous

Medication/medications prescribed for the first time for high blood pressure: categorical

Diuretics – 1

Nondiuretics – 0

Medication/medications currently being used for high blood pressure: categorical

Diuretics – 1

Nondiuretics – 0

Logistics regression model for demographic characteristics:

1. Patients' current feeling about reinitiating drug therapy = age + education level + employment + income + medical payment type + race + gender.
2. Patients' current feeling about reinitiating drug therapy = age + education level + employment + income + medical payment type + race + gender + marital status.
3. Patients' current feeling about reinitiating drug therapy = age + education level + employment + income + medical payment type + race + gender + relatives with health problems.
4. Patients' current feeling about reinitiating drug therapy = age + education level + employment + income + medical payment type + race + gender + race*gender + medical payment type*race.

Logistics regression model for disease related characteristics:

1. Patients' current feeling about reinitiating drug therapy = physical functioning scale + number of hypertension related hospitalizations + number of ER visits for problems + number of nurse/physician assistant/nurse practitioner visit for problems.
2. Patients' current feeling about reinitiating drug therapy = physical functioning scale + number of hypertension related hospitalizations + number of ER visits for problems + number of nurse/physician assistant/nurse practitioner visit for problems + physical functioning scale*number of physician visits for problems.

Logistics regression model for psychological characteristics:

1. Patients' current feeling about reinitiating drug therapy = mental health scale + general health status + patients' satisfaction towards health care provider + patients' satisfaction towards self-management+ patients' satisfaction towards degree of control + patients' satisfaction towards medication + patients' satisfaction towards other services.
2. Patients' current feeling about reinitiating drug therapy = mental health scale + general health status + patients' satisfaction towards health care provider + patients' satisfaction towards self-management+ patients' satisfaction towards degree of control + patients' satisfaction towards medication + patients' satisfaction towards other services + patients' satisfaction towards health care provider*patients' satisfaction towards self-management + patients' satisfaction towards self-management*patients' satisfaction towards medications + patients' satisfaction towards health care provider*patients' satisfaction towards medications.

Logistics regression model for medication related characteristics:

1. Patients' current feeling about reinitiating drug therapy = medication prescribed for the first time for high blood pressure + current medication being used for high blood pressure + number of dosage changes + number of medication additions + number of medication deletions + number of medication switches.
2. Patients' current feeling about reinitiating drug therapy = medication prescribed for the first time for high blood pressure + number of dosage changes + number

of medication additions + number of medication deletions + number of medication switches.

Final logistic regression models:

1. Patients' current feeling about reinitiating drug therapy = race + number of physician visits for high blood pressure problems + patients' satisfaction towards health care provider + patients' satisfaction towards high blood pressure medication + number of high blood pressure medication deletions.

Final logistic regression model for North American population:

2. Patients' current feeling about reinitiating drug therapy = race + number of physician visits for high blood pressure problems + patients' satisfaction towards health care provider + patients' satisfaction towards high blood pressure medication + number of high blood pressure medication deletions.

Final logistic regression model for North American population:

3. Patients' current feeling about reinitiating drug therapy = race + number of physician visits for high blood pressure problems + patients' satisfaction towards health care provider + patients' satisfaction towards high blood pressure medication + number of high blood pressure medication deletions.

RESULTS

A total of 731 patients were enrolled in the study. Among all, 439 patients met our study criteria.14% of the patients were less than 40 years of age. More than half (55%) of the participants were male. Most of the patients were white (95%) and only 3.4 % black. Most of the participants (81%) had a total household annual income of $50000 and above. More than half (61%) of the study population lived in Europe (France, Germany, and Italy), and rest in North America (USA, and Canada). 66% of the participants had at least a high school degree. Half of the study population was employed (full time/part time), while 36 % were retired.70% of the population were government/work reimbursed. Only 12% were without any reimbursement.

Relationship between patients' willingness to reinitiate drug therapy and demographic characteristics (Table 2-5, and Table 15):

The likelihood ratio test shows that all logistic regression models for demographic variables are significant. Medical payment type (Chi-square = 6.1608, p = 0.0131), and race (Chi-square = 5.7563, p = 0.0164) showed a significant effect on reinitiating of antihypertensive therapy at 0.05 significance level. Both the variables reported significant adjusted odds ratios (Table 15). The interaction terms (race*gender, and medical payment type*race) were not significant (Table 5). The exploratory variable; marital status (Table 3) was not significant. Relatives' health status was found to be significant (Chi-square = 6.7026, p = 0.0096). This variable had 159 missing observations. Therefore, it was not considered in the final logistic regression model.

Relationship between patients' willingness to reinitiate drug therapy and disease

related characteristics (Table 6-7 and Table 16):

Physician health scale (Chi-square = 8.0292, p = 0.0046) and number of physician visits for problems (Chi-square = 7.7352, p = 0.0054) had a significant effect at 0.05 level of significance. Both the variables did not show significant odds ratio (Table 16).

Relationship between patients' willingness to reinitiate drug therapy and psychological characteristics (Table 8-9 and Table 17):

The overall models were significant (chi-square = 70.9671. p < 0.0001). Patients' satisfactions towards their health acre provider (chi-square = 14.8340, p = 0.0001), self management (chi-square 9.0428, p = 0.0026), and medications (chi-square = 23.7400, p < 0.0001) were found to have significant effect at 0.05 level of significance. No interaction terms were significant (Table 9).

Relationship between patients' willingness to reinitiate drug therapy and medication related characteristics (Table 10-11 and Table 18):

My original logistic regression model for medication related characteristics (chi-square = 9.9055, p = 0.1287, Table 10) were not significant. However, the second model without a variable for current medication being taken (Table 11) was significant (chi-square = 35.8503, p < 0.0001). The number of medication addition (chi-square = 8.4624, p = 0.0036) was found to be significantly associated with the dependent variable at 0.05 significance level. The odds of reinitiating drug therapy increased by 1.77 units with one unit increase in number of medication additions (OR 2.77, 95% CI 1.394 to 5.5020, Table 18).

Relationship between patients' willingness to reinitiate drug therapy and final set of independent variables (Table 12 and Table 19):

The number of physician visits for blood pressure problems, patients' satisfaction with the assistance from health care provider in managing their high blood pressure, patients' satisfaction with the medication they were taking for high blood pressure, and number of medication additions (Table 12) showed a significant effect on the dependent variable. Only number of medication additions reported a significant odds ratio (OR 1.746, 95% CI 1.097 to 2.777, Table 19).

Relationship between patients' willingness to reinitiate drug therapy and final set of independent variables for North American Population (Table 13 and Table 20): Only number of medication additions to the ones that patients were already taking for high blood pressure (Table 13) showed a significant effect on the dependent variable. It reported a significant odds ratio (OR 3.683, 95% CI 1.313, 10.331). The odds of reinitiating antihypertensive drug therapy increased by 2.683 units with one unit increase in the number of medications for high blood pressure.

Relationship between patients' willingness to reinitiate drug therapy and final set of independent variables for European Population (Table 15 and Table 22): The model was found to be significant (chi-square 63.625, $p < 0.0001$). The number of physician visits for problems, patients' satisfaction with the medications that are available to use for managing their high blood pressure had a significant effect on the dependent variable (Table 15). None of these two variables reported a significant odds ratio (Table 21).

DISCUSSION

This study examined four sets of variables that were hypothesized to be predictors of willingness to reinitiate antihypertensive drug therapy. The factors examined included demographic characteristic, disease related characteristics, psychological characteristics, and medication related characteristics.

Demographic characteristics:

All the demographic characteristics that include race,age, gender, education level, medical payment type, income, and employment status could not predict patients' willingness to reinitiate drug therapy. This is consistent with most of the studies. However, other studies indicate that age, gender, employment, medical payment type are associated with medication compliance in antihypertensive patients. [10,18,41,42] There seem to be inconsistency in different studies. This necessitates further investigation of demographic characteristics as the predictors of compliance.

Disease related characteristics:

Among all the number of physician visits for blood pressure problems was found to be the only significant predictor. One study reported that good compliance in antihypertensive therapy is significantly associated with multiple physician visits. This consistent finding may signify the importance of patients' education by physician. More number of physician visits for blood pressure problem may have added opportunity for education of patients to reinitiate antihypertensive drug therapy. Physical health scale, number of hypertension related hospitalizations, number of ER visits and number of nurse/physician assistant/nurse practitioner visits for problems were not significantly

associated with the adherence to drug therapy. Previous study reports that number of hospitalizations was not significantly associated with compliance. [34]

The variables such as limitation in moderate activities, limitation in climbing flight upstairs were replaced with a single variable called physical health scale for making the model simple and interpretable.

Psychological characteristics:

Patients' satisfaction with the assistance they receive from their health care provider in managing their high blood pressure and patients' satisfaction with the medications that were available to use for high blood pressure were significantly associated with reinitiating of antihypertensive drug therapy. This is a significant finding since previous studies have not reported information on these types of characteristics. This may suggest that increase in the assistance from health care provider in managing high blood pressure will increase the odds of patients reinitiating antihypertensive drug therapy. It indicates the importance of health care provider's role in medication compliance. As expected, increased satisfaction with the medications that are available to use in managing high blood pressure increased the odds of reinitiating antihypertensive drug therapy.

Although patients' satisfaction with their ability to help themselves (self-management) in managing their blood pressure was a significant predictor in the primary model, it was not considered in the final model. This is because we thought that this variable may obscure the relationship of other variables with patients willingness to reinitiate drug

therapy (dependent variable). To avoid large a number of variables, mood status variables were replaced with one variable called mental health scale.

Medication related characteristics:

Surprisingly, the number of medication additions to the ones that patients were already taking for their high blood pressure was positively associated with patients' willingness to reinitiate drug therapy. This is not consistent with previous studies. Two studies show the inverse association of number of medications with drug compliance. [18,34] Another study shows the number of medications to be an insignificant predictor. [42] Frequency of dosage changes, medication prescribed for the first time, number of medication deletions, and number of medication switches were not found to be significant predictors. Our literature review does not reveal studies of these characteristics on compliance of antihypertensive medications. Likelihood ratio test indicates that the set of psychological variables worked the best (Chi-square = 51.1384, $p<0.0001$). The number of medication additions was found to be the best predictor (OR = 1.746, 95% CI 1.097,2.777).

Final models for North America and European population:

The number of medication additions was found to be an important predictor in North American population. However, in European population number of physician visits for blood pressure problems and patients' satisfaction with the medications that are available to use in managing their high blood pressure were found to be significant predictors. Factors affecting compliance may vary across populations. [43] No study reports the comparison of predictors in different population using the same compliance

evaluation method. This study shows the difference between the predictors in the North American and European populations. Generally, the differences in the results of compliance studies may be because of the differences in definitions of compliance and health belief. [43] However the former does not apply in this study since same methods of compliance evaluation have been used in both the population. This suggests that the differences in health belief between North American and European population may be the reason for the differences in the predictors. This indicates the need to further define factors that might affect the compliance in a population before implementing interventions to improve compliance. This customized approach will also avoid misuse of the resources for interventions to improve compliance.

Interactions:

We attempted to identify different interaction terms in this study. The selection of interaction terms was based upon theory and/or significance of the variable in preliminary analyses.

Limitations:

Self-reported data: people may be inaccurate in reporting their behavior. There may be multiple influences on them in terms of their ability and desire to provide a valid response. These factors may include clarity of questions, setting, memory, literacy, mood status etc.

Measurement: There seems to be no "gold standard" or satisfactory way to measure compliance. However the questionnaire has been designed to cover every aspect of

patient's mood, disease status, coping, demographics etc. that can help in identifying the predictors of noncompliance.

Generalizabiltiy: Factors such as mood status or the clinical condition of a particular patient limit the generalizability of the results to the entire hypertensive population. The study population was not randomly selected. This also puts limitation on extrapolating the results for the entire population.

CONCLUSION

The primary objective of this study was to identify the predictors that discriminate between the patients who consider returning to antihypertensive drug therapy and those who indicate that they will not return to drug therapy. The secondary objective was to examine whether there were any differences in the predictors of returning to antihypertensive drug therapy in North American population and European populations. Separate logistic regression models were run for four sets of variables. The predictors identified from each model were combined to run a final logistic regression model. The demographic variables such as race, age, education level, employment, income, gender, and medical payment type had little effect on patients' willingness to reinitiating drug therapy.

The number of physician visits for blood pressure problems was associated with the reinitiating of the drug therapy. Surprisingly, number of medication additions was positively associated with the patients' adherence to drug therapy. Patients' satisfaction with the assistance from health care provider in managing high blood pressure and patients' satisfaction with the medication that they were already taking in managing their blood pressure were also positively associated.

Finally, a logistic regression model was run separately for North American population and European population. The number of medication additions to the ones that patients were already taking for their high blood pressure was the only significant predictor in North American population. However, in the European population we noted that

number of physician visits for blood pressure problems and patients' satisfaction with the medications that they were taking to manage their high blood pressure were significant predictors.

The treatment of hypertension remains a difficult task. A frequent reason is poor adherence to the drug regimen. The results indicate that an increase in the number of physician visits for blood pressure problems may improve the odds of reinitiating drug therapy. The increase in number of physician visits for blood pressure problems may help patients to consider reinitiating antihypertensive drug therapy

The difference of predictors in North American and European population necessitates further investigation in separate geographical areas. The identification of predictors in each location may help in customizing the compliance improvement strategy. Continued research in this area is vital because once the predictors of adherence to drug therapy are identified, effective interventions can be implemented to improve it. The interventions could be followed by its assessment. The feedback from assessment will help in modifying the interventions.

TABLES

Table 1. Characteristics of the study population that have discontinued antihypertensive drug therapy (N=439)

Demographics	n (%)
Age	
0-25	10 (2.2)
26-40	51 (11.7)
41-64	280 (63.8)
65 and above	98 (22.3)
Gender	
Women	242 (45)
Men	197 (55)
Race	
White	417 (95)
Black	15 (3.4)
Hispanic	5 (1.1)
Asian	2 (0.5)
Income*	
<20k	104 (26.8)
20k to <30k	97 (25.0)
30k to <50k	111 (28.6)
50k to <75k	53 (13.7)
75k to <100k	17 (4.3)
>= 100k	5 (1.29)
Country	
USA	126 (28.7)
Canada	40 (9.2)
France	92 (20.9)
Germany	106 (24.2)
Italy	75 (17)
Education	
Elementary High School	55 (12.5)
Some High School	92 (21)
High School degree	91 (20.8)
BUS/TECH School degree	61 (14)
Some School	47 (10.7)
College degree	36 (8.2)
Some Grad School	24 (5.5)
Grad School degree	32 (7.3)
Employment Status	
Full-time	164 (38)
Part-time	50 (11.6)
Unemployed	21 (4.9)
Homemaker	39 (9)
Student	1 (0.2)
Retired	157 (36.3)
Medical Payment Type	
Not reimbursed	50 (12)
Government reimbursed	185 (43)
Work insurance reimbursed	116 (27)
Self insurance reimbursed	79 (18)

*: 52 missing records

Table 2: Logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficients, standard error, and chi-square for demographic characteristics[†] .

Variable	Estimate	Standard error	Chi-square	p
Intercept	-3.9822	1.1952	11.1008	0.0009*
Age	0.0115	0.0090	1.6083	0.2047
Education Level	0.2500	0.2068	1.4608	0.2268
Employment	-0.0032	0.2441	0.0002	0.9895
Income	-0.1641	0.2025	0.6561	0.4179
Medical Payment Type	0.7839	0.3225	5.9075	0.0151*
Race	1.2523	0.5117	5.9905	0.0144*
Gender	0.3377	0.1980	2.9074	0.0882

* Significant at small α probability (0.05 or less)

[†] Chi-square = 16.6039, P = 0.0201* (Likelihood Ratio Test)

Table 3: Logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficient, standard error, and chi-square for demographic characteristics including marital status[†].

Variable	Estimate	Standard Error	Chi-Square	p
Intercept	-4.0875	1.1999	11.6038	0.0007 *
Age	0.0120	0.0090	1.7493	0.1860
Education level	0.2237	0.2091	1.1447	0.2847
Employment	-0.0122	0.2444	0.0025	0.9601
Income	-0.1044	0.2133	0.2395	0.6245
Medical payment type	0.8037	0.3238	6.1608	0.0131 *
Race	1.2248	0.5105	5.7563	0.0164 *
Gender	0.3133	0.1999	2.4575	0.1170
Marital Status	0.2011	0.2247	0.8006	0.3709

* Significant at small α probability (0.05 or less)

[†] Chi-square = 17.4059, P = 0.0261* (Likelihood Ratio Test)

Table 4: Logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficient, standard error, and chi-square for demographic characteristics including relatives' health status[†].

Variable	Estimate	Standard error	Chi-square	p
Intercept	-3.0196	1.4560	4.3011	0.0381*
Age	0.0103	0.0112	0.8371	0.3602
Education level	0.0519	0.2620	0.0393	0.8429
Employment	-0.1543	0.3023	0.2606	0.6097
Income	0.1270	0.2605	0.2375	0.6260
Medical payment type	1.0649	0.4281	6.1876	0.0129*
Race	1.2927	0.5718	5.1110	0.0238*
Gender	0.1585	0.2540	0.3894	0.5326
Relatives' health status	-0.6683	0.2581	6.7026	0.0096*

* Significant at small α probability (0.05 or less)

† Chi-square = 16.3184, P = 0.0380 (Likelihood Ratio Test)

Table 5: Logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficient, standard error, and chi-square for demographic characteristics including interactions[†].

Variable	Estimate	Standard error	Chi-square	p
Intercept	-1.2337	3.0778	0.1607	0.6885
Age	0.0107	0.0091	1.3881	0.2387
Education level	0.2632	0.2078	1.6045	0.2053
Employment level	0.0100	0.2446	0.0017	0.9672
Income	-0.1769	0.2048	0.7460	0.3878
Medical payment type	-0.1891	1.2963	0.0213	0.8840
Race	-1.2750	2.6770	0.2269	0.6339
Gender	-0.3992	1.1459	0.1214	0.7275
Race*Gender	0.7073	1.0920	0.4196	0.5172
Medical payment type*Race	0.8434	1.1564	0.5968	0.4398

* Significant at small α probability (0.05 or less)

† Chi-square = 17.6068, P = 0.0400* (Likelihood Ratio Test)

Table 6: Table 6: Logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficient, standard error, and chi-square for disease related variables[†].

Variable	Estimate	Standard error	Chi-square	p
Intercept	1.5071	0.5809	6.7321	0.0095*
Physical health scale	-0.0332	0.0117	8.0292	0.0046*
Number of hypertension related hospitalizations	0.0376	0.4370	0.0074	0.9315
Number of ER visits for blood pressure problems	0.0297	0.4078	0.0053	0.9419
Number of physicians' visits for problems	0.1084	0.0390	7.7351	0.0054*
Number of nurse/physician assistant/nurse practitioner visits for problems	-0.0033	0.0520	0.0041	0.9488

* Significant at small α probability (0.05 or less)

† Chi-square = 23.0518, P = 0.0030* (Likelihood Ratio Test)

Table 7: Table 6: Logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficient, standard error, and chi-square for disease related variables[†].

Variable	Estimate	Standard error	Chi-square	p
Intercept	1.5189	0.6461	5.5271	0.0187*
Physical health scale (Pscale)	-0.0335	0.0132	6.4495	0.0111*
Number of hypertension related hospitalizations	0.0416	0.4462	0.0087	0.9257
Number of ER visits for blood pressure problems	0.0301	0.4077	0.0054	0.9412
Number of physicians' visits for problems (Phys)	0.0997	0.2102	0.2253	0.6350
Number of nurse/physician assistant/nurse practitioner visits for problems	-0.0031	0.0521	0.0037	0.9513
Pscale*Phys	0.0001	0.0044	0.0018	0.9666

* Significant at small α probability (0.05 or less)

† Chi-square = 23.0536, P = 0.008* (Likelihood Ratio Test)

Table 8: Logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficient, standard error, and chi-square for psychological variables[†].

Variable	Estimate	Standard error	Chi-square	p
Intercept	-0.4049	0.6397	0.4007	0.5267
Mental health scale	-0.0038	0.0120	0.1050	0.7459
General health status	-0.0720	0.1479	0.2371	0.6163
Patients' satisfaction towards health care provider	0.2187	0.0568	14.8340	0.0001*
Patients' satisfaction towards self-management	-0.2010	0.0668	9.0428	0.0026*
Patients' satisfaction towards degree of control	-0.0687	0.0745	0.8512	0.3562
Patients' satisfaction towards medications	0.2512	0.0516	23.7400	<0.0001 *
Patients' satisfaction towards other services	-0.0759	0.0515	2.1725	0.1405

* Significant at small α probability (0.05 or less)

[†] Chi-square = 70.9671, P = 0.0001* (Likelihood Ratio Test)

Table 9: Logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficient, standard error, and chi-square for psychological variables including interactions[†].

Variable	Estimate	Standard error	Chi-square	p
Intercept	-0.8450	0.1583	0.5321	0.4657
Mental health scale	-0.0030	0.0120	0.0623	0.8029
General health status	-0.0611	0.1502	0.1653	0.6843
Patients' satisfaction towards health care provider (A)	0.2896	0.1437	4.0645	0.0438*
Patients' satisfaction towards self-management (B)	0.0475	0.1541	0.0950	0.7579
Patients' satisfaction towards degree of control (C)	-0.1052	0.0776	1.8384	0.1751
Patients' satisfaction towards medications (D)	0.0818	0.1589	0.2650	0.6067
Patients' satisfaction towards other services (E)	-0.0719	0.0521	1.9022	1.1678
A*B	-0.0345	0.0183	3.5393	0.0599
B*D	-0.0004	0.0173	0.0008	0.9775
A*D	0.0264	0.0190	1.9287	0.1649

* Significant at small α probability (0.05 or less)

[†] Chi-square = 75.3419, P = 0.0010* (Likelihood Ratio Test)

Table 10: Logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficient, standard error, and chi-square for medication related variables[†].

Variable	Estimate	Standard error	Chi-square	p
Intercept	0.1808	0.5756	0.0986	0.7535
Medication prescribed for the first time	-0.3463	0.6217	0.3102	0.5775
Medication currently being taken	0.6241	0.7374	0.7164	0.3973
Frequency of dosage changes	0.0636	0.2817	0.0509	0.8215
Number of medication additions	1.2192	0.5139	5.6294	0.0177 *
Number of medication deletions	0.4893	0.4942	0.9803	0.3221
Number of medication switches	0.1365	0.4308	0.1004	0.7514

* Significant at small α probability (0.05 or less)

† Chi-square = 9.9055, P = 0.1287 (Likelihood Ratio Test)

Table 11: Logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficient, standard error, and chi-square for medication related variables without the variable for current medication being taken†.

Variable	Estimate	Standard error	Chi-square	p
Intercept	-0.1106	0.1412	0.6137	0.4334
Medication prescribed for the first time	-0.2704	0.2626	1.0606	0.3031
Frequency of dosage changes	0.2972	0.1525	3.7963	0.0514
Number of medication additions	1.0187	0.3502	8.4624	0.0036 *
Number of medication deletions	-0.2329	0.2063	2.4653	0.1164
Number of medication switches	0.2800	0.2407	1.3532	0.2449

* Significant at small α probability (0.05 or less)

† Chi-square = 35.8503, P < 0.0001* (Likelihood Ratio Test)

Table 12: Final logistic regression model without interactions for patients' current feeling about reinitiating drug therapy. Regression coefficients, standard error, and chi-square for the final set of variables[†].

Variable	Estimate	Standard error	Chi-square	p
Intercept	-2.8071	0.6576	18.2236	<0.0001*
Race	0.9663	0.5156	3.5129	0.0609
Number of physician visits for problems	0.1119	0.0437	6.5656	0.0104*
Patients' satisfaction towards health care provider	0.1061	0.0505	4.4088	0.0358*
Patients' satisfaction towards medications	0.1320	0.0443	8.8831	0.0029*
Number of medication additions	0.5570	0.2369	5.5276	0.0187*

* Significant at small α probability (0.05 or less)

† Chi-square = 51.1384, P < 0.0001* (Likelihood Ratio Test)

Table 13: Final logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficients, standard error, and chi-square for the final set of variables belonging to North American population[†].

Variable	Estimate	Standard error	Chi-square	p
Intercept	-2.8452	0.8282	11.8017	0.0006*
Race	0.8351	0.5526	2.2844	0.1307
Number of physician visits for problems	-0.0271	0.0666	0.1653	0.6843
Patients' satisfaction towards health care provider	0.1456	0.0775	3.5303	0.0603
Patients' satisfaction towards medications	0.1137	0.0706	2.5972	0.1071
Number of medication additions	1.3039	0.5262	6.1407	0.0132*

* Significant at small α probability (0.05 or less)

[†] Chi-square = 25.0264, P = 0.0001* (Likelihood Ratio Test)

Table 14: Final logistic regression model for patients' current feeling about reinitiating drug therapy. Regression coefficients, standard error, and chi-square for the final set of variables belonging to European population[†].

Variable	Estimate	Standard error	Chi-square	p
Intercept	-15.9527	858.6000	0.0003	0.9852
Race	13.9950	858.6000	0.0003	0.9870
Number of physician visits for problems	0.1858	0.0586	10.0376	0.0015*
Patients' satisfaction towards health care provider	0.1007	0.0704	2.0468	0.1525
Patients' satisfaction towards medications	0.1478	0.0603	6.0043	0.0143
Number of medication additions	0.3276	0.2275	2.0735	0.1499

* Significant at small α probability (0.05 or less)

† Chi-square = 35.8091, $P < 0.0001$* (Likelihood Ratio Test)

Table 15: Adjusted odds ratios and confidence intervals for demographic variables.

Variable	Adjusted odds ratio*	Confidence interval (95%)
Age	1.012	(0.994,1.013)
Education level	1.284	(0.856,1.926)
Employment	0.997	(0.618,1.608)
Income	0.849	(0.571,1.262)
Medical payment type	2.190	(1.164,4.121)
Race	3.499	(1.283,9.537)
Gender	1.402	(0.951,2.066)

*Adjusted odds ratios calculated using Mantel-Haenszel procedure.

Table 16: Adjusted odds ratios and confidence intervals for disease related variables.

Variable	Adjusted odds ratio*	Confidence interval (95%)
Physical health scale	0.967	(0.945-0.990)
Number of hypertension related hospitalizations	1.038	(0.441-2.445)
Number of ER visits for blood pressure	1.030	(0.463-2.291)
Number of physician visits for problems	1.114	(1.033-1.203)
Number of nurse/physician assistant/nurse practitioner	0.997	(0.900-1.104)

*Adjusted odds ratios calculated using Mantel-Haenszel procedure.

Table 17: Adjusted odds ratios and confidence intervals for psychological variables.

Variable	Adjusted odds ratio*	Confidence interval (95%)
Mental health scale	0.996	(0.973,1.020)
General health status	0.931	(0.696,1.243)
Patients' satisfaction towards health care provider	1.245	(1.113,1.391)
Patients' satisfaction towards self-management	0.818	(0.718,0.932)
Patients' satisfaction towards degree of control	0.934	(0.807,1.080)
Patients' satisfaction towards medication	1.286	(1.162,1.422)
Patients' satisfaction towards other services	0.927	(0.838,1.025)

*Adjusted odds ratios calculated using Mantel-Haenszel procedure.

Table 18: Adjusted odds ratios and confidence intervals for medication related variables.

Variable	Adjusted odds ratio*	Confidence interval (95%)
Medication/medications prescribed for the first time	0.763	(0.456,1.277)
Number of dosage changes	1.346	(0.998,1.815)
Number of medication addition	2.770	(1.394,5.502)
Number of medication deletions	0.723	(0.483,1.084)
Number of medication switches	1.323	(0.825,2.121)

*Adjusted odds ratios calculated using Mantel-Haenszel procedure.

Table 19: Adjusted odds ratios and confidence intervals for the final set of variables in overall population.

Variable	Adjusted odds ratio*	Confidence interval (95%)
Race	2.628	(0.957,7.219)
Number of physician visits for problems	1.118	(1.027,1.218)
Patients' satisfaction towards health care provider	1.112	(1.007,1.228)
Patients' satisfaction towards medications	1.141	(1.046,1.244)
Number of medication additions	1.746	(1.097,2.777)

*Adjusted odds ratios calculated using Mantel-Haenszel procedure.

Table 20: Adjusted odds ratios and confidence intervals for the final set of variables in North American population.

Variable	Adjusted odds ratio*	Confidence interval (95%)
Race	2.305	(0.780,6.808)
Number of physician visits for problems	0.973	(0.854,1.109)
Patients' satisfaction towards health care provider	1.157	(0.994,1.346)
Patients' satisfaction towards medications	1.120	(0.976,1.287)
Number of medication additions	3.683	(1.313,10.331)

*Adjusted odds ratios calculated using Mantel-Haenszel procedure.

Table 21: Adjusted odds ratios and confidence intervals for the final set of variables in European population.

Variable	Adjusted odds ratio*	Confidence interval (95%)
Race	>999.999	(<0.001,999.999)
Number of physician visits for problems	1.204	(1.073,1.351)
Patients' satisfaction towards health care provider	1.106	(0.963-1.270)
Patients' satisfaction towards medications	1.159	(1.030,1.305)
Number of medication additions	1.388	(0.888,2.167)

*Adjusted odds ratios calculated using Mantel-Haenszel procedure.

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APPENDIX

- SAS Program
- Questionnaire

SAS PROGRAM

```
libname prafulla 'h:\prafulla';

options nocenter;

  proc format;
    value yesno
      1='NO' 2='YES';
    value yesnorev
      1='YES' 2='NO';

    value q12fmt
      1='POOR' 2='FAIR' 3='GOOD' 4='VG' 5='EXC';
    value q39fmt
      1='NONE TIME' 2='LITTLE TIME' 3='SOME TIME'
      4='MOST TIME' 5='GOOD BIT TIME' 6='ALL OF TIME';
    value q56fmt
      1='WHITE' 2='BLACK' 3='HISPANIC' 4='ASIAN';
    value q57fmt
      1='NEVER MAR' 2='MARRIED' 3='LIVE W/PART'
      4='SEPARATED' 5='DIVORCED' 6='WIDOW(ER)';
    value q60fmt
      1='ELEM SCHOOL' 2='SOME H.S.' 3='H.S. DEGREE'
      4='BUS/TECH SCH DEGREE' 5='SOME COL' 6='COL DEGREE'
      7='SOME GRAD SCH' 8='GRAD SCH DEGREE';
    value q61fmt
      1='FULL-TIME' 2='PART-TIME' 3='UNEMPLOYED'
      4='HOMEMAKER' 5='STUDENT' 6='RETIRED';
    value q62fmt
      1='<20K' 2='20K TO <30K' 3='30K TO <50K'
      4='50K TO <75K' 5='75K TO <100K' 6='>=100K';
    value q63fmt
      1='NOT REIMBURSED' 2='GOVT REIMBURSED' 3='WORK INSUR REIMB'
      4='SELF INSUR REIMB';
    value q64fmt
      1='MALE' 2='FEMALE';
    value races
      1='WHITE' 2='NONWHITE';
    value marstats
      1='MAR' 2='NOT MAR';
    value educs
      1='< H.S. DEGREE' 2='>= H.S. DEGREE';
    value employs
      1='FULL/PART' 2='UNEMP/HOMAK/STU/RET';
    value incomes
      1='< 30K' 2='>= 30K';
    value medpays
      1='NOT REIMBURSED' 2='REIMBURSED';

    value medclass              /* ADD THIS TO READBM7.SAS */
      1='ACE INHIBITOR' 2='ACE+DIURETIC'
      3='AIIRA' 4='AIIRA+DIURETIC'
      5='BETA BLOCKER' 6='BB+DIURETIC'
      7='CCB' 8='DIURETIC' 9='OTHER';

    value visfmt            /* ADD THIS FMT TO READBM9.SAS */
      0='0' 1='1-2' 2='>2';
```

```
    value q29fmt    /* READBM11.SAS FORMATS */
      1='NEV SMK' 2='QUITSMK >3YRS' 3='QUITSMK <=3YRS' 4='CUR SMK';
    value smkstats
      1='NON/EX-SMK' 2='CUR SMK';
    value countrys
      1='USA' 2='CANADA' 3='FRANCE' 4='GERMANY' 5='ITALY';

    value stgfmt            /* TINAT2.SAS FMT */
      1='PC' 2='C' 3='P' 4='A' 5='M';

    value bplasts           /* READBM9B.SAS FMTS */
      0='NO' 1='YES';
    value ergps
      0='0' 1='>=1';
    value medchgps
      1='0' 2='1-2' 3='>2';
                                    /* CLINCOD.SAS FMTS */
    value stggps
      1='PRE-ACTION' 2='POST-ACTION';
    value hlth2fmt
      1='POOR/VAIR' 2='GOOD/VG/EXC';

    value medclfmt                      /* CLINCOD2.SAS FMTS */
      1='DIURETIC GP' 2='AIIRA GP'
      3='OTHER GP';

    value difmt                     /* CLINCOD3.SAS FMTS */
      0='NON-DIURETIC' 1='DIURETIC';

    value consider
      0='PC STG ONLY' 1='C OR P STG';

DATA a;

    label survdt='SURVEY DATE= 6/1/97';
    monsince=(survdt-datediag)/30.4;
    label monsince='NO. MONTHS SINCE 1ST DIAGNOSED';
    vispermo=q10a/monsince;
    label vispermo='# ROUTINE BP VIS PER MO SINCE DIAG';
    if qq23a in(2,4,6,8) then presc1di=1;
    else if qq23a in(1,3,5,7,9) then presc1di=0;
    else if qq23a=. then presc1di=.;
    label presc1di='MEDPRESC1 IS DIURETIC?';

    consider=.;
    if stage=1 then consider=0;
    if stage in(2,3) then consider=1;
    format consider consider.;


data a;
  set prafulla.sf12;
  keep iobs q13a q13b q14a q14b q15a q15b q17a q17b q17c;
proc sort out=a;
by iobs;
data b;
  set prafulla.bmsprt3;
```

```
proc sort out=b;
by iobs;
data prafulla.bmspraf;
  merge a(in=in1) b(in=in2);
  by iobs;
  if in2;
proc sort out=bmspraf;
  by iobs;

proc print data=bmspraf;
var q13a q21;
run;

libname Prafulla 'h:\Prafulla';
filename BMSPRT1 'h:\Prafulla\bmsprt1.txt';

options nocenter ls=72 ps=55 pageno=1;

data prafulla.bms1128;
  infile BMSPRT1 lrecl=429 n=1;
  input iobs 1-4 q11b 63-65 q28b 328-329 q28c 330-331 q28d 332-333
        q28e 334-335 ;

proc sort out=Prafulla.bms1128;
  by iobs;

proc contents;
  title 'CONTENTS OF BMS HTN PART 1 DATA FILE PRAFULLA.BMSPRT1
(N=731)';

run;

data a;
  set prafulla.sf12;
  keep iobs pcs12 mcs12;
proc sort out=a;
by iobs;
data b;
  set prafulla.bmsfinal;
proc sort out=b;
by iobs;
data prafulla.bmsfin;
  merge a(in=in1) b(in=in2);
  by iobs;
  if in2;

proc print data=prafulla.bmsfin;
var pcs12 mcs12;
run;

data a;
  set prafulla.bms1128;
  keep iobs q11b q28b q28c q28d q28e;
proc sort out=a;
by iobs;
data b;
```

```
  set prafulla.bmspraf;
proc sort out=b;
by iobs;
data prafulla.bmsfinal;
  merge a(in=in1) b(in=in2);
  by iobs;
  if in2;
proc sort out=bmsfinal;
  by iobs;
run;

proc freq data=a;
  table feeling*q56 feeling*q64 feeling*q56 feeling*q60
       feeling*q61 feeling*q62 feeling*q63 feeling*q60/ nopercent
nocol;
run;

data a;
  set prafulla.bmspraf;
  if q32 = 2 or q32 = 3 then feeling = 1;
  if q32 = 1 then feeling = 0;
  if q32 = 4 or q32 = . then delete;
  if q56 = 1 then races = 1;
  else races = 2;
  if q60 = 1 or q60 = 2 or q60 = 3 then educs = 1;
  else educs = 2;
  if q61 = 1 or q61 = 2 then employs = 1;
  else employs = 2;
  if q62 = 1 or q62 = 2 then incomes = 1;
  else incomes = 2;
  if q63 = 1 then medpays = 1;
  else medpays = 2;

proc freq;
 tables   races q64 incomes educs employs medpays q64*races;



proc logistic data=a descending ct;
model feeling = q55 educs employs incomes medpays  races q64 q64*races
/ printi lackfit CI;


title1 'LOGISTIC REGRESSION MODEL:DEP VAR IS FEELING';
title2 'INDEP VARS DEMOGRAPHIC CHARACTERISTICS';

run;
proc logistic data=a descending ct;
model feeling = q55 educs employs incomes medpays  races q64 marit/rl
printi lackfit CI;
run;

proc logistic data=a descending ct;
model feeling = q55 educs employs incomes medpays  races q64 q53/rl
printi lackfit CI;
run;
```

```
data a;
  set prafulla.bmspraf;
if qq23a = 2 or qq23a = 4 or qq23a = 6 or qq23a = 8 then medfirst = 1;
if qq23a = 1 or qq23a = 3 or qq23a = 5 or qq23a = 7 or qq23a = 9 then
medfirst = 0;
if qq24a = 2 or qq24a = 4 or qq24a = 6 or qq24a = 8 then medcurr = 1;
if qq24a = 1 or qq24a = 3 or qq24a = 5 or qq24a = 7 or qq24a = 9 then
medcurr = 0;
proc logistic data=a descending ct;
model feeling = medfirst medcurr  q19 q20 q21 q22 / printi lackfit CI;


title1 'LOGISTIC REGRESSION MODEL:DEP VAR IS FEELING';
title2 'INDEP VARS MEDICATION RELATED';

run;
data a;
  set prafulla.bmspraf;
proc logistic data=a descending ct;
model feeling = medfirst q19 q20 q21 q22 /rl printi lackfit CI;
run;




proc logistic data=a descending ct;
model feeling = q55 educs employs incomes medpays  races q64  / printi
lackfit CI ;

title1 'LOGISTIC REGRESSION MODEL:DEP VAR IS FEELING';
title2 'INDEP VARS DEMOGRAPHIC CHARACTERISTICS';

run;


proc corr;
var q55 educs employs incomes medpays  races q64  feeling;



proc logistic data=a descending ct;
model feeling = q55 educs employs incomes medpays  races q64
q55*employs q64*races /rl printi lackfit CI;


title1 'LOGISTIC REGRESSION MODEL:DEP VAR IS FEELING';
title2 'INDEP VARS DEMOGRAPHIC CHARACTERISTICS';

run;

proc logistic data=a descending ct;
model feeling = q55 educs employs incomes medpays  races q64
q55*employs  /rl printi lackfit CI;
run;

proc logistic data=a descending ct;
```

```
model feeling = q55 educs employs incomes medpays  races q64 q64*races
/rl printi lackfit CI;
run;

proc logistic data=a descending ct;
model feeling = q55 educs employs incomes medpays  races q64/rl printi
lackfit CI;
run;

proc logistic data=a descending ct;
model feeling =  medpays  races /rl printi lackfit CI;
run;

proc logistic data=a descending ct;
model feeling = q55 educs employs incomes medpays  races q64
races*medpays/rl printi lackfit CI;
run;

proc logistic data=a descending ct;
model feeling = q55 educs employs incomes medpays  races q64 q64*races
medpays*races  /rl printi lackfit CI;
run;

data a;
  set prafulla.bmsfinal;

  if q32 = 2 or q32 = 3 then feeling = 1;
  if q32 = 1 then feeling = 0;
  if q32 = 4 or q32 = . then delete;
  if q56 = 1 then races = 1;
  else races = 2;
  if q60 = 1 or q60 = 2 or q60 = 3 then educs = 1;
  else educs = 2;
  if q61 = 1 or q61 = 2 then employs = 1;
  else employs = 2;
  if q62 = 1 or q62 = 2 then incomes = 1;
  else incomes = 2;
  if q63 = 1 then medpays = 1;
  else medpays = 2;
if q13a = 3 or q13a = 2 then moderate = 1;
if q13a = 1 then moderate = 0;
if q13b = 3 or q13b = 2 then climbing = 1;
if q13b = 1 then climbing = 0;
proc logistic data=a descending ct;
model feeling = moderate climbing q14a q8b q9b q10b q11b  /rl printi
lackfit CI;
title1 'LOGISTIC REGRESSION MODEL:DEP VAR IS FEELING';
title2 'INDEP VARS DISEASE RELATED VARIABLES';
run;
data a;
  set prafulla.bmsfin;
proc logistic data=a descending ct;
model feeling = pcs12 q8b q9b q10b q11b  /rl printi lackfit CI;
run;

proc logistic data=a descending ct;
```

```
model feeling = pcs12 q8b q9b q10b q11b q7a q7b  /rl printi lackfit
CI;
run;

proc logistic data=a descending ct;
model feeling = pcs12 q8b q9b q10b q11b pcs12*q10b  /rl printi lackfit
CI;
run;

data a;
  set prafulla.bmsfinal;
proc logistic data=a descending ct;
model feeling = q17a q17b q17c q15a q12 q28a q28b q28c q28d /rl printi
lackfit CI;
run;

data a;
  set prafulla.bmsfin;
proc logistic data=a descending ct;
model feeling = mcs12 q12 q28a q28b q28c q28d q28e /rl printi lackfit
CI;
run;

data a;
  set prafulla.bmsfin;
proc logistic data=a descending ct;
model feeling = mcs12 q12 q28a q28b q28c q28d q28e q28a*q28b q28b*q28d
q28a*q28d /rl printi lackfit CI;
run;
```

HYPERTENSION STUDY

PATIENT QUESTIONNAIRE

Paragon Research & Consulting Paoli Executive Green II, Suite 301 43 Leopard Road Paoli, PA 19301-1517 (610) 889-7556 PLEASE NOTE: ALL INTERVIEWER DIRECTIONS ARE IN CAPS AND ARE NOT TO BE READ TO RESPONDENTS.	Job Number	196-181
	Respondent ID	
	City Code	
	Quota group: Male, 60 and under Male, 61 and over Female, 60 and under Female, 61 and over	 1 2 3 4

INTRODUCTION

Mr./Ms. _____, you may recall that we are conducting a study aimed at improving the services and products which support patients in their efforts to live with high blood pressure. To accomplish this, we'd like to know how you feel about your high blood pressure now, and how interested you might be in some potential services and products. Please remember that your answers will be kept strictly confidential. No one, including your doctor, will ever see them.

1. I'd like to start by focusing on the point when you were first diagnosed with high blood pressure. When did your doctor first tell you that you had high blood pressure? Please give me the month and year.

   (RECORD "DON'T KNOWS" AS 0 / 0)

MONTH/YEAR DIAGNOSED	/

2. What was your blood pressure at that time?

   (RECORD "DON'T KNOWS" AS 0 / 0)

BLOOD PRESSURE AT FIRST DIAGNOSIS	/

3. When your doctor first diagnosed you with high blood pressure, did he or she prescribe blood pressure medication for you during the same office visit?

YES	1
NO	2

(IF RESPONDENT ANSWERS "NO" TO QUESTION 3, ASK QUESTIONS 4 AND 5. OTHERWISE, SKIP TO QUESTION 6.)

4. When did your doctor first prescribe medication for your high blood pressure? Just give me the month and year.

(RECORD "DON'T KNOWS" AS 0 / 0)

MONTH/YEAR FIRST PRESCRIBED BP MED	/

5. What was your blood pressure at that time?

(RECORD "DON'T KNOWS" AS 0 / 0)

BLOOD PRESSURE AT FIRST PRESCRIPTION	/

6. When did your doctor last check your high blood pressure?

(RECORD "DON'T KNOWS" AS 0 / 0)

MONTH/YEAR OF VISIT	/

7. What was your blood pressure at that time? (LAST VISIT)

(RECORD "DON'T KNOWS" AS 0 / 0)

BLOOD PRESSURE AT LAST VISIT	/

8. How many times, if ever, have you been hospitalized for any reason since you were first diagnosed with high blood pressure?...(PAUSE TO RECORD ANSWER)...How many times were you hospitalized for your high blood pressure?

(RECORD "DON'T KNOWS" AS 999)

# OF HOSPITALIZATIONS (TOTAL)	
# OF HYPERTENSION-RELATED HOSPITALIZATIONS	

9. How many times, if ever, have you made a routine visit to an emergency room for your high blood pressure since you were first diagnosed? Please DO NOT include any visits you may have made to the emergency room for a problem related to your blood pressure...(PAUSE)...Now, how many visits have you made to an emergency room for problems related to your blood pressure since you were first diagnosed?

(RECORD "DON'T KNOWS" AS 999)

# OF ROUTINE ER VISITS FOR BLOOD PRESSURE	
# OF ER VISITS FOR BLOOD PRESSURE PROBLEMS	

10. How many ROUTINE visits for your blood pressure have you made to a doctor since you were first diagnosed?...(PAUSE)...How many times have you visited a doctor for PROBLEMS with your blood pressure?

(RECORD "DON'T KNOWS" AS 999)

# OF ROUTINE PHYSICIAN VISITS	
# OF PHYSICIAN VISITS FOR PROBLEMS	

11. How many ROUTINE visits for your blood pressure have you made to a nurse, physician's assistant, or nurse practitioner without seeing a doctor since you were first diagnosed?...(PAUSE)...How many times have you visited a nurse, physician's assistant, or nurse practitioner without seeing a doctor for PROBLEMS with your blood pressure?

(RECORD "DON'T KNOWS" AS 999)

# OF ROUTINE N/PA/NP VISITS	
# OF N/PA/NP VISITS FOR PROBLEMS	

12-18. Next, I'm going to hand you the questionnaire. On it, you will see a series of questions that asks for your views about your health. Please answer every question by marking one box. If you are unsure about how to answer, please give the best answer you can. Please continue on with each page until you see an instruction to return the questionnaire to me contained in the box at the bottom of the page.

(INTERVIEWER: OBSERVE RESPONDENT AS HE/SHE ANSWERS QUESTIONS 12-18, ENSURING THAT ONE BOX IS CHECKED FOR EVERY ANSWER.)

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Research & Consulting

12. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor

13. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, Limited A Lot	Yes, Limited A Little	No, Not Limited At All
Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf			
Climbing several flights of stairs			

14. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

	YES	NO
Accomplished less than you would like		
Were limited in the kind of work or other activities		

15. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

	YES	NO
Accomplished less than you would like		
Didn't do work or other activities as carefully as usual		

Please continue with the next page.

Paragon
Research & Consulting

16. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely

17. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks -

	All of the Time	Most of the Time	A Good Bit of the Time	Some of the Time	A Little of the Time	None of the Time
Have you felt calm and peaceful?	6	5	4	3	2	1
Did you have a lot of energy?						
Have you felt downhearted and blue?						

18 During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the Time	Most of the Time	Some of the Time	A Little of the Time	None of the Time
5	4	3	2	1

Please stop here and hand the questionnaire back to the interviewer.

Paragon
Research & Consulting

19. Since you were first prescribed medication for your high blood pressure, how many times has your doctor changed the dosage or strength of your high blood pressure medication?

(RECORD "DON'T KNOWS" AS 999)

# OF DOSAGE CHANGES	

20. How many times has your doctor added a new medication to the ones you were already taking for your high blood pressure?

(RECORD "DON'T KNOWS" AS 999)

# OF MEDICATION ADDITIONS	

21. How many times has your doctor had you stop taking a blood pressure medication without replacing it with a new medication?

(RECORD "DON'T KNOWS" AS 999)

# OF MEDICATION DELETIONS	

22. How many times has your doctor had you stop taking a high blood pressure medication, but then replaced it with one or more new ones?

(RECORD "DON'T KNOWS" AS 999)

# OF MEDICATION SWITCHES	

(HAND CARD Q.23 TO RESPONDENT.)

23. Please tell me the name of the medication or medications that your doctor first prescribed for your high blood pressure.

(ALLOW RESPONDENT TO EXAMINE LIST. PROBE FOR SPECIFIC NAMES AND SPELLINGS OF MEDICATIONS AND VERIFY AGAINST MEDICATION LIST.)

	NAME OF MEDICATION FROM LIST
OTHER (Specify)	

(IF ANSWERS TO 20, 21 AND 22 ARE ALL "0", SKIP TO QUESTION 25.)

24. Please tell me the name of the medication or medications that you are now taking for your high blood pressure.

(PROBE FOR SPECIFIC NAMES AND SPELLINGS OF MEDICATIONS AND VERIFY AGAINST MEDICATION LIST. IF RESPONDENT CANNOT RECALL NAME OF MEDICATION, ALLOW HIM/HER TO EXAMINE LIST. RECORD NUMBER CORRESPONDING TO MEDICATION.)

(RECORD "DK" IF PATIENT HAS TAKEN OTHER MEDICATION BUT DOES NOT KNOW THE NAME.)

	# OF MEDICATION FROM LIST
OTHER (Specify)	

25-27. Next, I'm going to hand you the questionnaire. On it, you will see a list of problems you may or may not have had in the past month. For each, please indicate whether you have had the problem, and if it is due to your blood pressure or your blood pressure medication in the column to the immediate right. If you don't think that it is due to either, just leave those two columns blank. If you have had the problem, please also indicate how bothered you were by it, using the scale to the far right.

(HAND QUESTIONNAIRE TO RESPONDENT, AND ILLUSTRATE THE PROCESS OF FILLING OUT COLUMN Q.25, Q.26, AND Q.27 ACCORDING TO DIRECTIONS IN INTERVIEWER MANUAL. ENSURE THE RESPONDENT IS FILLING IT OUT CORRECTLY, AND PROBE FOR A COMPLETE LIST, INCLUDING OTHER SYMPTOMS.)

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25-27. Please indicate whether you have had the problem in the PAST MONTH, and whether it was due to your blood pressure, your blood pressure medication, or neither. Then, if you have had the problem in the PAST MONTH, please indicate how bothered you were by it.

PROBLEMS	COL. Q.25		COL. Q.26		COL. Q.27				
	HAVEN'T HAD PROBLEM	HAVE HAD PROBLEM	DUE TO BLOOD PRESSURE	DUE TO MEDI-CATION	NOT AT ALL BOTHERED	SLIGHTLY BOTHERED	MODER-ATELY BOTHERED	VERY BOTHERED	EXTREMELY BOTHERED
Dryness of mouth	1	2	1	2	1	2	3	4	5
General weakness	1	2	1	2	1	2	3	4	5
Confusion	1	2	1	2	1	2	3	4	5
Heartburn	1	2	1	2	1	2	3	4	5
Itching	1	2	1	2	1	2	3	4	5
Shortness of breath	1	2	1	2	1	2	3	4	5
Unable to sleep, insomnia	1	2	1	2	1	2	3	4	5
Mood swings	1	2	1	2	1	2	3	4	5
Difficulty remembering things	1	2	1	2	1	2	3	4	5
Blurry vision	1	2	1	2	1	2	3	4	5
Wheezing, difficulty breathing	1	2	1	2	1	2	3	4	5
Hives or swelling of body or facial areas	1	2	1	2	1	2	3	4	5
Extreme thirst	1	2	1	2	1	2	3	4	5
Lethargy, no energy to do things	1	2	1	2	1	2	3	4	5
Difficulty thinking	1	2	1	2	1	2	3	4	5
Diarrhea	1	2	1	2	1	2	3	4	5
Loss of taste	1	2	1	2	1	2	3	4	5
Slow heartbeat	1	2	1	2	1	2	3	4	5
Nightmares	1	2	1	2	1	2	3	4	5
Cloudy thinking	1	2	1	2	1	2	3	4	5
Hair loss	1	2	1	2	1	2	3	4	5
Double vision	1	2	1	2	1	2	3	4	5
Lightheadedness	1	2	1	2	1	2	3	4	5
Nausea	1	2	1	2	1	2	3	4	5
Constipation	1	2	1	2	1	2	3	4	5
Rapid heartbeat or palpitations	1	2	1	2	1	2	3	4	5
Numbness or tingling of hands	1	2	1	2	1	2	3	4	5

Please continue with the next page.

(HAND RESPONDENT CARD Q.28)

28. Now, for the next five questions, I'd like you to think for a moment about everything that has happened to you since you were first diagnosed with high blood pressure. On this card is a scale from 0 to 10, where 0 means very dissatisfied and 10 means very satisfied. Please use the scale to tell me how satisfied you are with the following items. How satisfied are you with...(READ EACH ITEM)

	Very dissatisfied					Neither satisfied nor dissatisfied					Very satisfied
The assistance you receive from your health care provider in managing your high blood pressure?	0	1	2	3	4	5	6	7	8	9	10
Your ability to help yourself in managing your high blood pressure?	0	1	2	3	4	5	6	7	8	9	10
The degree to which your high blood pressure is controlled?	0	1	2	3	4	5	6	7	8	9	10
The medications that are available for you to use in managing your high blood pressure?	0	1	2	3	4	5	6	7	8	9	10
The other services that are available for you to use in managing your high blood pressure?	0	1	2	3	4	5	6	7	8	9	10

(HAND RESPONDENT CARD Q.29)

29. Now I'd like to ask you a few questions about cigarette smoking. Which of the statements listed on this card best describes you and cigarette smoking?

I NEVER SMOKED	1
I STOPPED SMOKING MORE THAN THREE YEARS AGO	2
I STOPPED SMOKING WITHIN THE LAST THREE YEARS	3
I SMOKE REGULARLY	4

(IF ANSWER TO QUESTION 29 IS "1", "2", OR "3", ASK QUESTION 30.)

30. Do you live and/or work with smokers?

YES	1
NO	2

Do you drink alcohol? About how many drinks, beers, and/or glasses of wine do you have in a week?

(RECORD NUMBER OF DRINKS PER WEEK. IF RESPONDENT DOES NOT DRINK, ENTER "0".)

# DRINKS PER WEEK	

(HAND RESPONDENT CARD Q.32.)

32. Sometimes people find it difficult to take their medication(s) as directed by their physician. "As directed" means consistently taking the amount of your medication(s) prescribed by your physician at the time(s) prescribed by your physician. Please find the statement listed on this card that best describes the way you feel right now about taking your high blood pressure medications AS DIRECTED.

NO, I DO NOT, AND RIGHT NOW I AM NOT CONSIDERING TAKING MY HIGH BLOOD PRESSURE MEDICATION AS DIRECTED.	1
NO, I DO NOT, BUT RIGHT NOW I AM CONSIDERING TAKING MY HIGH BLOOD PRESSURE MEDICATION AS DIRECTED.	2
NO, I DO NOT, BUT I AM PLANNING TO START TAKING MY HIGH BLOOD PRESSURE MEDICATION AS DIRECTED WITHIN THE NEXT MONTH.	3
YES, RIGHT NOW I CONSISTENTLY TAKE MY HIGH BLOOD PRESSURE MEDICATION AS DIRECTED.	4

(IF ANSWER TO Q.32 IS "4", ASK QUESTION 33.)

33. How long have you been taking your high blood pressure medication as directed?

(READ LIST)

3 months or less	1
Just over 3 months to 6 months	2
Just over 6 months to 12 months	3
More than 12 months	4

34. In a moment, I'm going to hand the questionnaire to you to complete the next set of questions. The statements in the left hand column of the grid represent some thoughts and experiences that some people have when they are taking medication(s) as directed. Think about your thoughts and experiences during the past month. For each situation, please circle the number under the statement that best describes HOW OFTEN that thought has occurred to you in the past month.

34. How often has each thought occurred to you in the past month?

	Never	Rarely	Occasionally	Often	Very often
I seek out new information on the benefits of taking my medication(s).	1	2	3	4	5
I think about the benefits of taking my medication(s).	1	2	3	4	5
I call my health care provider if I have questions about taking my medication(s).	1	2	3	4	5
I feel that my health care provider listens when I have questions about my medication(s).	1	2	3	4	5
Reminders from my family or friends help me remember to take my medication(s) as directed.	1	2	3	4	5
Emotional support from others helps me take my medication(s) as directed.	1	2	3	4	5
When I plan my day, I make sure to include taking my medication(s).	1	2	3	4	5
I use reminders to help me remember to take my medication(s) as directed.	1	2	3	4	5
I use a pill organizer or timer to help me take my medication(s) as directed.	1	2	3	4	5
When I am tempted to skip a dose of my medication(s), I remind myself about the importance of staying on schedule.	1	2	3	4	5
When it is difficult to take my medication(s) as directed, I remind myself that others are counting on me.	1	2	3	4	5
I encourage myself to stick to my schedule for taking my medication(s).	1	2	3	4	5
I use determination to help me stick to my regular schedule for taking medication(s).	1	2	3	4	5
I feel good about myself when I remember to take my medication(s) as directed.	1	2	3	4	5
I feel more responsible when I am taking my medication(s) as directed.	1	2	3	4	5
I get upset with myself when I forget to take my medication(s).	1	2	3	4	5

Please continue with the next page

35. On the left hand side of the grid in this question, you'll see some situations that might affect whether you take your medication(s) as directed to help lower your blood pressure. For each situation, please circle the number under the statement that best describes HOW TEMPTED you would be to skip your medication(s) or take a dose which is different from the one prescribed.

How tempted would you be to skip your medication(s) or take a dose which is different from the one prescribed?

	Not at All Tempted	Slightly Tempted	Moderately Tempted	Very Tempted	Extremely Tempted
When you feel good and think you don't need it.	1	2	3	4	5
When you are worried about the side effects.	1	2	3	4	5
When you want to save on the cost of your medication(s).	1	2	3	4	5
When you wonder why you need your medication(s).	1	2	3	4	5
When you feel unhappy.	1	2	3	4	5
When you experience minor side effects.	1	2	3	4	5
When you start to feel better.	1	2	3	4	5
When your health care provider doesn't seem interested in whether you take your medication(s).	1	2	3	4	5
When you have no energy.	1	2	3	4	5
When your blood pressure is under control.	1	2	3	4	5
When you doctor has not found the right drug for you.	1	2	3	4	5
When your blood pressure is not under control.	1	2	3	4	5
When another medication is added to your regimen.	1	2	3	4	5
When you are asked to come in for additional tests.	1	2	3	4	5
When the dose of your medication is changed.	1	2	3	4	5
When asked to come in for additional monitoring by your health care provider.	1	2	3	4	5
When you have been drinking alcohol.	1	2	3	4	5
When you change your diet.	1	2	3	4	5
When the general quality of your life is good.	1	2	3	4	5
When you have reached your target weight.	1	2	3	4	5
When you are functioning well.	1	2	3	4	5
When you think that controlling your blood pressure without medication(s) is better.	1	2	3	4	5
When a friend tells you that you don't need medication(s) to lower your blood pressure.	1	2	3	4	5

Please stop here and hand the questionnaire back to the interviewer

Paragon

36. (continued)

	Not Important	Slightly Important	Moderately Important	Very Important	Extremely Important
I worry that it's unhealthy to control my high blood pressure with medication(s), instead of changes in diet, smoking and exercise.	1	2	3	4	5
When I take my medication(s) as directed, I feel more responsible.	1	2	3	4	5
Taking too many medication(s) may not be good for my health.	1	2	3	4	5
Taking my medication(s) as directed may offset my unhealthy habits.	1	2	3	4	5
Taking medication(s) correctly may prevent high blood pressure symptoms from recurring.	1	2	3	4	5
I worry about the long term side effects of taking medication(s).	1	2	3	4	5
If I take my medication(s) as directed, I will live longer.	1	2	3	4	5
If I take my medication(s) as directed, they will eventually lose their effectiveness.	1	2	3	4	5
If I take my medication(s) as directed, they will build up to harmful levels in my body over time.	1	2	3	4	5
If I take my medication(s) as directed, I can avoid a possible stroke or heart attack.	1	2	3	4	5
I worry about taking my medication because I'm not sure that I really have high blood pressure.	1	2	3	4	5
I feel that I am less likely to be a burden to others if I take my medication(s) as directed.	1	2	3	4	5

Please stop here and hand the questionnaire back to the interviewer

Paragon

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