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Relationship of Blood Pressure Self-Monitoring, Medication Adherence, Self-Efficacy, Stage of Change, and Blood Pressure Control Among Municipal Workers With Hypertension

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Abstract

Uncontrolled blood pressure remains a major public health issue. Medication adherence is a key factor in blood pressure management; however, adherence behavior is not clearly understood and the most significant factors contributing to poor medication adherence and blood pressure control are unknown. The purpose of this study was to determine the relationship of self-monitoring of blood pressure, medication adherence, self-efficacy, stage of change, and blood pressure control among municipal workers with access to health insurance. Stage of change was a significant independent predictor of self-monitoring of blood pressure, but not blood pressure control. A strong relationship was found between medication adherence and medication adherence self-efficacy ($r = .549, p < .05$).

Recently, it has been estimated that as many as 70% of clients with hypertension are uncontrolled (American Heart Association, 2009). Although many factors contribute to poor blood pressure control, non-adherence to antihypertensive medication has been found to contribute significantly to lack of control (Bosworth et al., 2008). Many intervention studies have assessed medication adherence and blood pressure control; the majority of findings indicate that improved adherence was demonstrated only with a combination of interventions. A systematic review conducted, by Haynes, Ackloo, Sahota, McDonald, and Yao (2008) suggested that only about 50% of intervention studies demonstrated improved medication adherence. Due to conflicting results in the literature, more studies are needed to examine the relationship between medication adherence and blood pressure control (Bosworth et al., 2008; Haynes et al, 2008; Shah, Steiner, Vermeulen, Flemings, & Cory, 2007).

Sufficient blood pressure control often requires behavior change (Lenz & Shortridge-Baggett, 2002), which usually occurs gradually in stages (Prochaska & DiClemente, 1983). Stage of change and perceived self-efficacy were selected for this study of blood pressure

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control because timing the intervention with readiness and confidence to adhere to antihypertensive medication is believed to be important to long-term treatment success (Krousel-Wood, Hyre, Muntner, & Morisky, 2005; Sidani & Braden, 1998). The level of motivation or readiness to change an undesired behavior has been identified as a key factor in behavior change.

In 1983, Prochaska and DiClemente developed the Transtheoretical Model of Change, a model of intentional change that focuses on decision-making (Johnson et al., 2006; Prochaska & DiClemente, 1983). The model includes four major constructs: the stage of change, processes of behavior change, decisional balance, and self-efficacy. This model can guide health care providers' understanding of the motivation of individuals who are being treated with medications to control blood pressure.

An individual's current stage of change is a reflection of personal motivation to change an undesired behavior or to acquire a healthy and desired behavior (Prochaska, DiClemente, & Norcross, 1992). Thus, the Transtheoretical Model of Change is useful because identification of clients' stage allows for tailoring interventions to match the stage of change, potentially leading to optimal results (Grimley, Prochaska, & Veier, 1994; Prochaska, Velicer, et al., 1994).

The Transtheoretical Model of Change approaches behavior change as a dynamic process, and research findings have suggested that individuals attempting to change their behavior move through a continuum of five stages: (1) precontemplation (not thinking about change), (2) contemplation (thinking about changing but have not started), (3) preparation (seriously thinking about changing soon and has taken some steps toward action; trying out the behavior but not in a consistent way), (4) action (performing the behavior consistently for less than 6 months), and (5) maintenance or sustaining the behavior over time (i.e., more than 6 months) (Prochaska & DiClemente, 1983). The Transtheoretical Model of Change is based on the premise that individuals progress through these specific stages of change toward action and adoption of healthy behaviors (e.g., adherence to treatment for blood pressure control and self-monitoring of blood pressure).

Stage of change has been found to be useful in several studies about adherence to HIV medications. However, only a few studies have used the Transtheoretical Model of Change to explore adherence to antihypertensive medications. Self-efficacy contributes to motivating individuals to perform health behaviors by creating a desire for and a willingness to adopt the behavior and setting goals that are expected. Lower levels of self-efficacy have been associated with elevated blood pressure (Williams, Connor, & Ricciardelli, 1998).

Office blood pressure readings have been standard for diagnosing and treating hypertension, despite the evidence that this method has significant limitations (Pickering, 2008). Previous studies have suggested that the results of self-monitoring of blood pressure at home are more reproducible and are devoid of the white coat syndrome effect (Pickering, 2008). Therefore, measurements from self-monitoring of blood pressure at home are more likely to reflect individuals' true blood pressure levels than office blood pressure readings. In addition, findings from a meta-analysis have suggested that self-monitoring of blood pressure may modestly improve blood pressure control and decrease the cost of hypertension treatment (Cappuccio, Kerry, Forbes, & Donald, 2004).

To date, however, no research has been reported on the relationship among self-monitoring of blood pressure, stage of change, medication adherence, self-efficacy, and blood pressure control for workers with health insurance. Further, factors that predict blood pressure control among clients diagnosed with hypertension have not been well identified (Cushman et al., 2002), and few studies have examined the predictors of blood pressure control among

workers with health insurance (Sinsuesatkul, 2008). The purposes of this study were to (1) identify the best subset of predictors of blood pressure control among workers with hypertension from a set of personal factors (age, gender, race, and marital status), stage of change, medication adherence, and medication adherence self-efficacy; (2) test whether adding home blood pressure monitoring to the model increases its predictive ability; and (3) identify the best predictive model for home blood pressure monitoring among workers with hypertension from a set of personal factors (age, gender, race, and marital status), stage of change, medication adherence, and medication adherence self-efficacy.

METHODOLOGY

A cross-sectional, correlational design was used to explore relationships among the variables. The convenience sample consisted of municipal employees who had access to health insurance and who participated in an employee wellness program. To be included in this study, participants must have self-reported that they were told by a health care provider at least once that they have high blood pressure and that they were taking antihypertensive medications. Exclusion criteria included unable to read, speak, and write English; never diagnosed with hypertension; or not taking antihypertensive medication.

After Institutional Review Board approval was received, individuals who met criteria for inclusion were invited to participate at the regularly scheduled health screening and told that participation in the study was completely voluntary. An explanation was also provided that declining to participate in the study would not influence their screening in the wellness program or their employment and that if they agreed to participate, they could withdraw from the study at any time without penalty. A cover letter was attached to the questionnaire that included the purposes of the study, eligibility, study location, participants' responsibilities, and time required to participate in the study. Return of the completed questionnaire packet indicated the volunteers' informed consent.

Instruments

A modified version of the Behavioral Risk Factor Surveillance Survey was used to measure self-monitoring of blood pressure, the individual's report of using a blood pressure device to measure personal blood pressure outside the provider's office (Centers for Disease Control and Prevention, 2008). Stage of change, an individual's readiness to maintain adherence to blood pressure medication at least 80% of the time, was measured by a modified version (Sidebar) of the four-item Stage of Change Questionnaire (Prochaska, Norcross, & DiClemente, 1994). Prochaska and DiClemente (1994) developed statements to be used initially in smoking cessation and addiction research. These statements have been used with a broad array of problem behaviors, including gambling, alcoholism, troubled drinking, high-risk sex, depression, panic attacks, physical abuse, obesity, high-fat diet, sedentary lifestyle, dental hygiene, procrastinating, and sun exposure (Prochaska, Velicer, et al., 1994). Individuals in the precontemplation stage for medication adherence are those who are non-adherent to their blood pressure medications every day or on some days and have no intention to adhere at least 80% of the time within the next 6 months. Contemplation for medication adherence is the identified stage for individuals who are non-adherent to blood pressure medications every day or on some days and are thinking about adhering within the next 6 months. Individuals in the action stage for medication adherence are those who are adherent to their blood pressure medications every day and have been adherent for less than 6 months. Finally, individuals in the maintenance stage of medication adherence are those who are adherent to their blood pressure medications every day and have been adherent for more than 6 months (Prochaska, Norcross, et al., 1994).

The eight-item Morisky Medication Adherence Scale was used to measure medication adherence, the individual's self-report of compliance taking blood pressure medication at least 80% of the time (Morisky, Green, & Levine, 1986). The internal consistency of the Morisky Medication Adherence Scale was assessed using Cronbach's alpha coefficients. This technique is the most commonly used approach to determine the homogeneity of an instrument (Polit & Beck, 2004). The reliability estimate for the Morisky Medication Adherence Scale was acceptable at .74 (George & Mallery, 2003). Medication adherence self-efficacy, an individual's confidence in adhering to a medication regimen, was measured by the revised Medication Adherence Self-Efficacy Scale (MASES-R) (Fernandez, Chaplin, Schoenthaler, & Ogedegbe, 2008; Ogedegbe, Mancuso, Allegrane, & Charlson, 2003).

The personal factors of age, gender, race, education, and marital status were measured by the Good Health Program Questionnaire. Blood pressure control was defined as blood pressure less than 140/90 mmHg, as recommended by the current Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) guidelines (Chobanian et al., 2003). An average of two blood pressure measurements taken 3 minutes apart with an electronic device after 5 minutes of rest was the recorded blood pressure. All items in the questionnaires were checked for completion; if questionnaires were incomplete, they were included in the study only if less than 20% of the items were missing. Coding and double-checking were completed by the investigator. Data were analyzed using SPSS software, version 16. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to examine the distributions of variables in this study. In addition, analysis of variance, correlation, chi-square analyses, and logistic regression were used to investigate the remaining research questions. All hypotheses were tested at a significance level of .05.

RESULTS

More than 700 municipal employees were screened, with 149 meeting the inclusion criteria. The majority of the participants were married (71%), Black (69%), and male (85%), with an average age of 47 years ($SD = 8.4$) and some college education (49%). However, more than one third of the sample (35%) had college or postgraduate education. More than one third had been diagnosed with hypertension less than 1 year (36%), and half were prescribed a combination antihypertensive medication (50%).

Mean scores for medication adherence and medication adherence self-efficacy were in the moderate range (5.97 to 6.07 and 3.44 to 3.57, respectively). Surprisingly, of those taking medications, participants who had uncontrolled blood pressure had a higher mean medication adherence score (6.07) than participants with controlled hypertension (5.97). The same was true for medication adherence self-efficacy, with mean scores of 3.57 and 3.44 among the uncontrolled and controlled blood pressure groups, respectively (Table 1).

Significant differences were found by stage of change in both medication adherence and medication adherence self-efficacy scores (Table 2). Participants in the maintenance stage had the highest average scores on both measures.

The findings indicated a significant positive linear relationship between medication adherence and medication adherence self-efficacy ($r = .549, p < .001$). In addition, the age of the participants was also positively associated ($r = .183, p < .05$) with medication adherence (Table 3). Similarly, the age of the participants was positively associated with medication adherence self-efficacy ($r = .255, p < .01$). Stage of change and race were significantly associated with self-monitoring of blood pressure in this sample. Only stage of change was

found to be a significant predictor of self-monitoring of blood pressure when both variables were included in the model (Table 4).

This study had several unexpected findings. Years diagnosed with hypertension was not associated with medication adherence ($r = .134, p > .05$) or with medication adherence self-efficacy ($r = .165, p > .05$). No association was found between stage of change and blood pressure control ($p = .35$), or between medication adherence self-efficacy and blood pressure control ($\chi^2 = 4.509, df = 2, p = .092$). Likewise, no association was found between medication adherence self-efficacy and self-monitoring of blood pressure ($\chi^2 = 1.016, df = 2, p = .600$). When determining the best predictive model for blood pressure control, no variables were found to be significant univariate predictors of blood pressure control for this sample. Therefore, no further model development for blood pressure control was performed.

Preliminary analyses to examine the bivariate relationships between blood pressure self-monitoring and the set of proposed predictors revealed two significant relationships, stage of change and race (Table 5). Age, gender, education, and marital status were not found to be significant univariate predictors of self-monitoring of blood pressure for this study. The regression results demonstrated no significant relationship between self-monitoring of blood pressure and medication adherence self-efficacy, controlling for age and gender ($\chi^2 = 8.654, df = 4, p = .07$).

DISCUSSION

Blood Pressure Control

In the current study, the set of factors including stage of change for medication adherence, medication adherence self-efficacy, and self-monitoring of blood pressure did not predict the probability of blood pressure control among hypertensive municipal workers who take antihypertensive medications. However, limitations of the current study, including the lack of variability in these variables as well as the sample size, may have influenced the results.

Self-Monitoring of Blood Pressure

Self-monitoring of blood pressure provides more accurate blood pressure readings than clinic monitoring because it minimizes white coat hypertension effects and blood pressure variability (Baguet & Mallion, 2002). In addition, findings from a previous meta-analysis have suggested that self-monitoring of blood pressure may modestly improve blood pressure control and decrease the cost of hypertension treatment (Cappuccio et al., 2004). Self-monitoring of blood pressure was not a predictor of blood pressure control in the current study. These findings are contrary to previous studies, which have primarily focused on the association between home blood pressure monitoring or telemonitoring and blood pressure control. The current study is one of the few conducted to date that has focused on self-monitoring of blood pressure, including home monitoring and blood pressure monitoring done in the community.

Contrary to the current study results, Artinian et al. (2007) found a statistically significant reduction in systolic blood pressure among participants who used self-monitoring of blood pressure through telemonitoring during a 12-month period. Telemonitoring was also found to significantly decrease blood pressure in other studies (Friedman et al., 1996; Rogers et al., 2001). The current study did not examine the differences in self-monitoring equipment or approaches. A possible explanation for the discrepant findings is that a majority of participants in the current study used community-based self-monitoring rather than home self-monitoring. The effect of location of self-monitoring on blood pressure control should be explored further.

Medication Adherence

Medication adherence is a major factor in blood pressure control (Borzecki, Oliveria, & Berlowitz, 2005). Medication adherence was significantly associated with stage of change, medication adherence self-efficacy, and age in the current study. Medication adherence was not significantly associated with self-monitoring of blood pressure or home blood pressure monitoring, contrary to previous studies (Chobanian et al, 2003).

Few studies have examined medication adherence among hypertensive workers with access to health insurance. Further, only two studies have examined medication adherence and blood pressure control among African Americans (Fernandez et al., 2008; Ogedegbe et al., 2003). The finding that medication adherence did not predict blood pressure control is contrary to a previous research study that found a significant association between medication adherence and blood pressure control among African American men (Krousel-Wood et al., 2005). The average medication adherence score in the current study was 5.99, indicating low medication adherence. This finding was inconsistent with a previous study reporting that the average medication adherence score was 6.6, indicating medium medication adherence (Morisky, Ang, Krousel-Wood, & Ward, 2008). A possible reason medication adherence was not associated with blood pressure control may be that the current study participants were a homogeneous group lacking variability in medication adherence. Another plausible reason for these results might be that the participants gave socially desirable answers on the medication adherence questionnaire. Other possible reasons for low medication adherence in the current study might be that the participants could not afford the medication co-payments or, because blood pressure is asymptomatic, some participants may not refill their medications. Also, although the participants were municipal workers with access to insurance, some might select not to purchase insurance, which may be a barrier to medication adherence and health care access.

Medication Adherence Self-Efficacy

Medication adherence self-efficacy was positively related to the duration of having hypertension, education, and medication adherence in the current study, a major finding. Furthermore, no previous studies were found that explored medication self-efficacy with length of hypertension diagnosis and education. Medication adherence self-efficacy was not a significant predictor of self-monitoring of blood pressure in the current study. The average medication adherence self-efficacy score in the current study was 3.47, indicating medium medication adherence self-efficacy. This finding was consistent with a previous study that included 86% African American women (Fernandez et al., 2008) with an average score of 3.62 at baseline and 3.72 at 3 months.

The current study findings suggested that medication adherence self-efficacy also was not a significant predictor of blood pressure control. These findings are inconsistent with the results of a previous study that found an association between medication adherence self-efficacy and blood pressure control among African Americans (Fernandez et al, 2008). Additionally, Ogedegbe et al. (2003) found an association between low income and medication, adherence self-efficacy among African Americans. Finally, Lennon, Hughes, Johnston, and McElnay (2001) conducted a study in an outpatient clinic in which a significant relationship was observed between self-efficacy scores and self-reported medication adherence ($p < .005$).

A possible reason for medication adherence self-efficacy not predicting blood pressure control in the current study might be a lack of variability in the medication self-efficacy scores. Almost half (48%) of the participants in the current study had high medication adherence self-efficacy and about 23% had medium medication adherence self-efficacy.

Another potential reason for not finding a significant association between medication self-efficacy and blood pressure control is that the instrument lacked questions on potential barriers such as medication costs and ability to obtain medication refills, perception of side effects, and the chronic nature of hypertension. These potential barriers were removed from the MASES-R instrument during its development and validation.

Finally, the findings of the current study suggest a significant positive linear relationship between medication adherence and medication adherence self-efficacy ($r = .549, p < .001$). The age of the participants was also positively associated ($r = .183, p < .05$) with medication adherence. However, years diagnosed with hypertension was not associated with medication adherence ($r = .134, p > .05$). Similarly, age of the participants was positively associated with medication adherence self-efficacy ($r = .255, p < .01$), but years diagnosed with hypertension was not associated with medication adherence self-efficacy ($r = .165, p > .05$).

Stage of Change

Treatment is challenging for individuals diagnosed with hypertension because hypertension usually has no associated symptoms. Because they do not feel ill, individuals may experience denial when told they have hypertension. This denial results in failure to be ready for instructions and treatment. In the current study, adequate evidence existed to conclude that a difference existed among medication scores by stage of change ($F^2 = 17.995, df = 2, p < .001$) (Table 2). Participants in the maintenance stage had the highest reported medication adherence.

Assessment of an individual's stage of change is beneficial to establish an optimal care plan. Douglas et al. (2003) recommended an individualized care plan as an essential element in successfully reducing blood pressure. The specific care plan should be based on each individual's level of readiness to appropriately address barriers to effectively move the individual to the action or maintenance stages. An individual's current stage of change is a reflection of personal level of motivation to change an undesired behavior or to acquire a healthy and desired behavior (Prochaska et al., 1992). Thus, stage of change is useful because identification of the stage allows for the tailoring of interventions that match where the individual may be in the process of change, potentially leading to better results (Grimley et al., 1994; Prochaska, Velicer, et al. 1994). The change does not occur until the positive attributes of a desired behavior (e.g., medication adherence) outweigh the negative attributes of that behavior (Prochaska et al., 1992).

Stage of change was a significant predictor of self-monitoring of blood pressure in the current study, but not blood pressure control. Similar results were found in a study conducted by Powell (2003) in which the progression in the stage of change for medication adherence was not related to blood pressure control. One potential reason for this may be that the stage of change variable is a behavior construct that may influence actions but not outcomes such as blood pressure control. Another potential reason for the lack of association found in the current study may be the complex wording of the four-item self-reported stage of change instrument developed by Prochaska et al. (1992). If the participant answered "yes" to the first item of the questionnaire, the participant was placed in the maintenance stage of change. However, the second item asks participants about their intent to adhere to their medications, which should be answered "yes" only if they are not in the maintenance stage. Many participants in the maintenance stage of change were confused by this and answered "yes" to the second item. Difficulty classifying participants into a stage category was also reported in a previous study conducted in Taiwan (Chang, McAlister, Taylor, & Chan, 2003).

A two-item instrument created by Willey et al. (2000) may be more sensitive in detecting the stage of change than the four-item instrument of Prochaska et al. used in the current study. Transitions between stages and the association between relapse and stage status are not captured by the stage of change instrument. Also, the negative results may be related to the majority of participants in the current study being classified in the maintenance stage of change. Assessing the stage of change may assist health care providers with selecting the appropriate interventions based on the readiness of clients to improve medication adherence to reach adequate blood pressure control.

CONCLUSION

Medication adherence self-efficacy was positively related to the duration of diagnosed hypertension, education, and medication adherence. Stage of change was found to be a significant independent predictor of self-monitoring of blood pressure. A significant correlation was found between stage of change and medication adherence and medication adherence self-efficacy. A significant positive correlation was found between medication adherence and medication adherence self-efficacy. Age was positively associated with medication adherence self-efficacy and medication adherence. Stage of change, medication adherence, and medication adherence self-efficacy did not predict blood pressure control.

Because this study had a small sample size ($n = 149$) and participants were relatively homogeneous, some predictors might not have been detected. Therefore, medication adherence, self-efficacy, and stage of change may be predictors of blood pressure control and self-monitoring of blood pressure in a larger, more heterogeneous sample of participants. Nevertheless, a strong relationship was found between medication adherence self-efficacy and medication adherence, indicating that the MASES-R was useful in this sample of municipal employees.

Several limitations to the study must be noted. First, the sample was one of convenience; thus, volunteers may be different from those who do not volunteer to participate in a study on blood pressure control. Second, the self-report instruments are subject to possible socially desirable answers and recall bias. However, valid and reliable self-report instruments are valuable because they are relatively easy to administer and inexpensive to use in clinical settings. Finally, the investigation was a correlational study that cannot demonstrate causation. The results of the study can only yield information about whether relationships exist among the variables and the extent of the relationships (Brink & Wood, 1998). Future studies are recommended to examine blood pressure control and self-monitoring. Additional studies using larger sample sizes, other employee groups, and key variables will give occupational health nurses further data to design interventions that target blood pressure management. Physiological variables, such as sleep apnea, body mass index, primary aldosteronism, chronic kidney disease, and thyroid or parathyroid disease, should be explored as potential predictors of blood pressure control. Researchers conducting future studies should also examine the effect of location of self-monitoring on blood pressure control. One future study could explore if having human interaction when self-monitoring blood pressure (e.g., at the employee health office or at a fire station) results in better medication adherence than self-monitoring blood pressure without human contact (e.g., at a retail pharmacy).

IMPLICATIONS FOR PRACTICE

Occupational health nurses should be familiar with the current JNC 7 guidelines and the Transtheoretical Model of Change, particularly self-efficacy, stage of change, and processes of change. The JNC 7 guidelines are available on a reference card from the National Heart,

Lung, and Blood Institute website. The card also contains an algorithm for the treatment of hypertension. Occupational health nurses can use the reference card in health coaching to promote hypertension self-care among the work force.

Occupational health nursing care plans that include medication adherence and self-monitoring of blood pressure should be standardized for hypertensive employees. Creative interventions to influence employees' self-efficacy should be explored because medication adherence self-efficacy was found to be related to medication adherence. An employee's stage of change has significance for self-monitoring of blood pressure, as demonstrated by this study. Therefore, occupational health nurses should focus on assessing workers' stage of change as well as encouraging and assisting workers with self-monitoring blood pressure and medication adherence. If these areas are found to be deficient, barriers such as medication co-payments and refill practices and insurance coverage should be assessed.

Occupational health nurses have the opportunity to offer employees health care specific to their stage of change and needs. In the precontemplation and contemplation stages of change, empathy, reflective listening, and encouragement are most effective (Miller & Rollnick, 2002). Future studies should examine blood pressure control and self-monitoring using a larger sample and include additional variables that influence blood pressure control in this population, such as cost of medications and barriers to treatment. Additional studies on self-efficacy and hypertension management would also be useful.

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Applying Research to Practice

Occupational health nurses may consider routinely assessing stage of change, medication adherence, and medication adherence self-efficacy among hypertensive workers to improve blood pressure control. Health coaching or motivational interviewing must occur once employees are identified in a particular stage of change. In the precontemplation stage, occupational health nurses should reflect employees' statements indicating they are moving toward change in behavior. During the contemplation stage, occupational health nurses can offer employees empathy, encouragement, and hope. In the preparation stage, occupational health nurses routinely provide blood pressure target goals and actions. In the action stage, occupational health nurses provide self-help resources (e.g., logs so employees can record their blood pressure measurements). Occupational health nurses can provide continued coaching, reinforcement, and a relapse prevention plan to maintain medication adherence and blood pressure control.

Stage of Change Questionnaire

Statements of Prochaska and DiClemente (1994) were used to collect data on motivation in this study because they are (a) widely used in research regarding behavioral change and (b) simple to use, as suggested in a self-help book written by the authors for individuals interested in changing unhealthy behaviors without professional care. The stage of change statements were modified for use with hypertensive clients by including the words “blood pressure medication” and “at least 80% of the time or more” suggested by DiClemente when obtaining permission to use the statements. Each statement has a dichotomous answer choice of “yes” or “no” assessing motivational readiness to change. The four statements, requiring 5 to 10 minutes to complete, are (1) I have been taking my blood pressure medication as my doctor prescribed for more than 6 months; (2) I have been taking my blood pressure medication everyday at least 80% of the time in the last 6 weeks; (3) I intend to take my blood pressure medication everyday at least 80% of the time or more in the next 30 days; and (4) I intend to take my blood pressure medication everyday as my doctor prescribed at least 80% of the time or more in the next 6 months.

As recommended by Prochaska and DiClemente (1994), the statements were used to categorize each participant into one of five stages of change. The algorithm was scored as follows: precontemplation = “no” to all statements; contemplation = “yes” to statement 4 only; preparation = “yes” to statements 3 and 4 and “no” to the others; action = “yes” to statement 2 and “no” to statement 1; and maintenance = “yes” to statement 1.

Table 1

Medication Adherence and Medication Adherence Self-Efficacy by Blood Pressure Status Among Municipal Workers ($N = 149$)

Study Variable	Range of Possible Scores	Range of Scores in Sample	M	SD
Medication adherence				
Controlled blood pressure	0–8	0–8	5.97	2.02
Uncontrolled blood pressure	0–8	2–8	6.07	1.80
Medication adherence self-efficacy				
Controlled blood pressure	0–4	1.23–4.00	3.44	0.772
Uncontrolled blood pressure	0–4	2.00–4.00	3.57	0.532

Table 2

Associations for Morisky Medication Adherence Scale (MMAS) and Medication Adherence Self-Efficacy Scale (MASES-R) With Stage of Change ($N = 149$)

Variable/Stage of Change	M	Kruskal–Wallis Chi-Square	p
MMAS		17.995	<.001
Precontemplation	4.53		
Contemplation	3.71		
Maintenance	6.40		
MASES-R		19.822	<.001
Precontemplation	2.39		
Contemplation	3.16		
Maintenance	3.59		

Table 3

Bivariate Correlations for Medication Adherence Self-Efficacy, Years Diagnosed With Hypertension, and Medication Adherence ($N=149$)

Variable	MMAS	Y-DX	Age
Medication adherence Self-efficacy (MASES-R)	.549 [*]	.165	.255 [*]
Morisky Medication Adherence Scale (MMAS)		.134	.183
Years diagnosed with hypertension (Y-DX)			.310 [*]

Note

^{*}
p < .05

Table 4Logistic Multiple Regression Analysis of Predicting Self-Monitoring of Blood Pressure ($N=149$)

Variable	Coefficient Estimate	OR Estimate	Wald Chi-square	P
Intercept	-0.532	-	0.451	.502
Stage of change	-	-	7.823	.020
Preparation		1.481		
Maintenance		5.699		
Race	-	-	0.672	.714
Black		0.812		
Other		0.448		

Note. *OR* = odds ratio. *Pseudo* $R^2 = 0.089$.

Table 5

Bivariate Correlations for Blood Pressure Control and Self-Monitoring of Blood Pressure With Predictor Variables ($N = 149$)

Variable	n	r	p
Blood pressure control			
Stage of change	139	-.015	.863
Medication adherence	148	-.023	.785
Self-monitoring of blood pressure	145	-.094	.263
Age	148	.054	.517
Gender	147	-.029	.729
Race	145	-.156	.060
Education	148	.180	.193
Marital status	148	.068	.414
Self-monitoring of blood pressure	1		
Stage of change	136	-.204 [*]	.016
Medication adherence self-efficacy	143	.043	.605
Medication adherence	146	.054	.511
Age	145	.095	.252
Gender	142	.069	.407
Race	142	-.232 [*]	.005
Education	145	-.023	.778
Marital status	146	.130	.118

Note.

^{*}
p < .05.