See discussions, stats, and author profiles for this publication at: https://www.researchgate.net/publication/232322756

Defining the minimal detectable change in scores on the eight-item Morisky Medication Adherence Scale.

Annals of Pharmacotherapy · October 2012		
	READS	
	1,001	
rs, including:		
Cara Joyce		Elizabeth Holt
Loyola University Chicago		Furman University
338 PUBLICATIONS 4,672 CITATIONS		47 PUBLICATIONS 1,843 CITATIONS
SEE PROFILE		SEE PROFILE
Jiang He		
Inner Mongolia University		
1,015 PUBLICATIONS 90,735 CITATIONS		
SEE PROFILE		
	Annals of Pharmacotherapy · October 2012 s, including: Cara Joyce Loyola University Chicago 338 PUBLICATIONS 4,672 CITATIONS SEE PROFILE Jiang He Inner Mongolia University 1,015 PUBLICATIONS 90,735 CITATIONS SEE PROFILE	Annals of Pharmacotherapy · October 2012 READS 1,001 rs, including: Cara Joyce Loyola University Chicago 338 PUBLICATIONS 4,672 CITATIONS SEE PROFILE Jiang He Inner Mongolia University 1,015 PUBLICATIONS 90,735 CITATIONS SEE PROFILE

All content following this page was uploaded by Donald E. Morisky on 16 May 2014.

# RESEARCH REPORTS

# Adherence

# Defining the Minimal Detectable Change in Scores on the Eight-Item Morisky Medication Adherence Scale

Paul Muntner, Cara Joyce, Elizabeth Holt, Jiang He, Donald Morisky, Larry S Webber, and Marie Krousel-Wood

n a recent nationwide study of more than 26,000 US adults, 27% of participants were not taking their medications as prescribed.<sup>1</sup> Several studies have found an association between low adherence to antihypertensive medications and uncontrolled hypertension.<sup>1-4</sup> In a metaanalysis of published studies, the odds ratio for hypertension control was 3.44 (95% CI 1.60 to 7.37) for adherent versus nonadherent individuals.<sup>5</sup>

Over recent years, research efforts have focused on practical methods for measuring adherence in the outpatient or research setting.6-10 These methods include self-report, electronic adherence monitoring devices, pharmacy fill rates, and pill counts. More detailed information on the strengths and weaknesses of methods to assess adherence are provided elsewhere.<sup>11,12</sup> Unlike other methods of measuring adherence, self-report is simple, economically feasible, and has the added advantage of soliciting information regarding situational factors, which interfere with medication adherence (eg, forgetfulness, adverse ef**BACKGROUND:** Self-report scales are used to assess medication adherence. Data on how to discriminate change in self-reported adherence over time from random variability are limited.

**OBJECTIVE:** To determine the minimal detectable change for scores on the 8-item Morisky Medication Adherence Scale (MMAS-8).

**METHODS:** The MMAS-8 was administered twice, using a standard telephone script, with administration separated by 14-22 days, to 210 participants taking antihypertensive medication in the CoSMO (Cohort Study of Medication Adherence among Older Adults). MMAS-8 scores were calculated and participants were grouped into previously defined categories (<6, 6 to <8, and 8 for low, medium, and high adherence).

**RESULTS:** The mean (SD) age of participants was 78.1 (5.8) years, 43.8% were black, and 68.1% were women. Overall, 8.1% (17/210), 16.2% (34/210), and 51.0% (107/210) of participants had low, medium, and high MMAS-8 scores, respectively, at both survey administrations (overall agreement 75.2%; 158/210). The weighted  $\kappa$  statistic was 0.63 (95% CI 0.53 to 0.72). The intraclass correlation coefficient was 0.78. The within-person standard error of the mean for change in MMAS-8 scores was 0.81, which equated to a minimal detectable change of 1.98 points. Only 4.3% (9/210) of the participants had a change in MMAS-8 of 2 or more points between survey administrations.

**CONCLUSIONS:** Within-person changes in MMAS-8 scores of 2 or more points over time may represent a real change in antihypertensive medication adherence.

**KEY WORDS:** hypertension, medication adherence, Morisky Medication Adherence Scale-8 (MMAS-8), retest, self-report, test-retest.

Ann Pharmacother 2011;45:xxxx.

Published Online, 26 Apr 2011, theannals.com, DOI 10.1345/aph.1P677

fects).<sup>11,13-15</sup> As such, self-report is becoming a more widely adopted method for assessing adherence in research.

The 8-item Morisky Medication Adherence Scale (MMAS-8) was developed as a self-report measure of adherence to antihypertensive medication (Appendix I).<sup>16</sup> Published in 2008, the MMAS-8 has been used in crosssectional studies to provide a measure of adherence to anti-

hypertensive medication.<sup>2,17,18</sup> While data on the internal reliability and convergent and construct validity of the MMAS-8 have been published, few data are available on the short-term test-retest reliability of this measure.<sup>2,19</sup> To use the MMAS-8 to assess changes in adherence in longitudinal studies, data on short-term reliability are needed. Such data will provide an estimate of the within-person minimal detectable change for this scale and permit the discrimination of random variability from true changes in MMAS-8 scores over time. Additionally, identifying the

Author information provided at end of text.

## P Muntner et al.

minimal detectable change will facilitate the identification of patient-, provider-, and system-level factors associated with changes in adherence to antihypertensive medication. Therefore, we conducted a study with 2 administrations of the MMAS-8 over a short interval to determine the minimal detectable change in this scale.

# Methods

# STUDY POPULATION

The current study was conducted among a subset of participants enrolled in the CoSMO (Cohort Study of Medication Adherence among Older Adults). The study design and baseline characteristics of CoSMO participants have been described.<sup>2</sup> The primary objectives of CoSMO include assessing the impact of patient and health-care-related factors on change in adherence to antihypertensive medication over 2 years of follow-up and determining the relationship of antihypertensive medication adherence at baseline on future medical and psychosocial outcomes such as blood pressure control, quality of life, cardiovascular outcomes, and utilization. CoSMO enrolled adults aged 65 years and older with essential hypertension who were randomly selected from the roster of a large managed care organization in southeastern Louisiana. Recruitment was conducted from August 2006 through September 2007 and 2194 participants were enrolled. Recruitment for the substudy reported here was conducted between July 15 and July 29, 2010. Over this period, we attempted to contact a randomly selected sample of 241 CoSMO participants with the a priori goal of recruiting 200 individuals for this substudy. Based on a 1000 iteration simulation, the sample size of 200 participants provided 80% statistical power to detect a  $\kappa > 0.73$  if the true  $\kappa$  statistic was >0.8. Additionally, this sample size provided 80% statistical power to detect an intraclass correlation coefficient of 0.86 or higher if the true value was >0.9. The CoSMO study, including this substudy, was approved by the institutional review board. Verbal informed consent was provided by all participants prior to enrollment in CoSMO.

## DATA COLLECTION

In CoSMO and this substudy, data were collected by trained research staff, through telephone interviews, using standard scripts. Training of staff included review of the study protocol, the standard script, and the survey tool. Practice interviews with nonparticipants were conducted prior to the substudy and staff members were retrained if inconsistencies were identified. All surveys were recorded and 100% were double entered into a Microsoft Access (Microsoft Corp., Redmond, WA) database for quality control purposes. Any discrepancies (<1% in this study) were corrected using source survey recordings. Of relevance to this report, data collection in CoSMO included assessment of sociodemo-

graphic factors (age, sex, race, education) and duration of hypertension. In addition to the survey administration, information regarding comorbid conditions and number of antihypertensive medications filled was obtained from the administrative databases of the managed care organization. For the substudy reported here, 2 telephone interviews, each of which included administration of the MMAS-8, were conducted. The first interview was conducted between July 15 and July 29, 2010, and the second between August 1 and August 15, 2010. In conducting test-retest studies, investigators often choose an interval from 2 days to 2 weeks.<sup>20</sup> We chose a 2-week period to minimize the possibility for recall of the original survey administration or the occurrence of a true clinical change in adherence.

# 8-ITEM MORISKY MEDICATION ADHERENCE SCALE

The MMAS-8 was designed to facilitate the identification of barriers to and behaviors associated with adherence to antihypertensive medication.<sup>16</sup> The MMAS-8 has also been shown to maintain a high degree of concordance with antihypertensive medication pharmacy fill rates.<sup>2,19</sup> Scores on the MMAS-8 can range from 0 to 8, with MMAS-8 scores of <6, 6 to <8, and 8 reflecting low, medium, and high adherence.<sup>16</sup> In prior studies, low and medium adherence shown on the MMAS-8 (ie, scores of <6 and 6 to <8) have been associated with higher rates of uncontrolled blood pressure among individuals with hypertension.<sup>2,16</sup> The MMAS-8 is worded at an 8th grade reading level and is provided in Appendix I.

## STATISTICAL ANALYSIS

Characteristics of participants in this substudy were calculated as mean (SD) or percentage, as appropriate. The concordance of responses to each of the MMAS-8 items over the 2 survey administrations was calculated. Next, the cross-tabulation of low, medium, and high adherence based on MMAS-8 scores, as described above, for the first versus second survey administrations was assembled and the overall agreement and weighted  $\kappa$  statistic were calculated. The  $\kappa$ statistic provides a measure of agreement between 2 assessments above that expected by chance alone. Although there is no accepted interpretation of k statistics, Landis and Koch characterized values of 0-0.20 as slight, 0.21-0.40 as fair, 0.41-0.60 as moderate, 0.61-0.80 as substantial, and 0.81-1.0 as almost perfect agreement.<sup>21</sup> A Bland-Altman plot of MMAS-8 scores on the first and second administrations was constructed, as was the distribution of changes in MMAS-8 scores.<sup>22</sup> The Bland-Altman plot is used to visually demonstrate the agreement between 2 different measures. The intraclass correlation coefficient was calculated, as was the within-person standard error of the mean for changes in MMAS-8 scores between survey administrations. The intraclass correlation coefficient provides a measure of the reliability of measurements; higher values indicate better reliability.<sup>23</sup> The minimal detectable change in MMAS-8 scores was calculated as 1.96 times the square root of 2, times the standard error of the mean of changes in MMAS-8 scores.23 The minimum detectable difference represents the smallest difference or change that would be statistically significant when comparing different samples. Finally, the percent of participants who experienced a change in MMAS-8 scores equal to or greater than the minimal detectable change between survey administrations was calculated overall and by age group (<75 and  $\geq$ 75 years, the median age of the study population), sex, and race. The statistical significance of the proportion of participants with a change in MMAS-8 scores equal to or greater than the minimal detectable change across age, sex, and race groupings, separately, was calculated using the Fisher exact test. Analyses were conducted using SAS version 9.1 (SAS Institute, Cary, NC).

## **Results**

### PARTICIPANT CHARACTERISTICS

Of the 214 participants who completed the initial survey, 210 (98%) completed the follow-up survey. Of potential participants who did not complete the survey (n = 27 of 241 approached), 9 refused participation, 6 had died, 6 were unable to be reached, 3 reported no longer taking antihypertensive medication, and 3 were contacted but unable to complete the questionnaire. Characteristics of the 210 study participants are provided in Table 1.

#### CONCORDANCE OF INDIVIDUAL ITEMS ON THE MMAS-8

Participants completed the second administration of the MMAS-8 a median of 14 days following its initial administration (range 14-22 days). The concordance of responses between administrations exceeded 90% on 6 of the 8 items on the MMAS-8 (Figure 1). For item 1 (sometimes forgetting to take medication) and item 8 (sometimes having difficulty remembering to take all medications), the concordance was 86.2% (181/210) and 79.5% (167/210), respectively.

Table 1. Characteristics of Study Participants <sup>a</sup>					
Characteristic	Pts. (N = 210)				
Age (y), mean (SD)	78.1 (5.8)				
Women, %	68.1				
Blacks, %	43.8				
<high %<="" education,="" school="" td=""><td>28.6</td></high>	28.6				
Hypertension duration ≥10 y, %	59.5				
≥2 Comorbid conditions, %	47.6				
History of CVD, % <sup>b</sup>	41.9				
Antihypertensive drug classes (n), mean (SD)	3 (1)				
CVD = cardiovascular disease. <sup>a</sup> These patients were in the Cohort Study of Medication Adherence among Older Adults (CoSMO) substudy administered the 8-item Morisky Medication Adherence Scale 2 times over 14-22 days. <sup>b</sup> Chest pain or angina due to a heart problem or coronary heart dis-					

<sup>2</sup>Chest pain or angina due to a heart problem or coronary heart disease, heart failure, myocardial infarction, stroke, or other diagnosed heart conditions.



Figure 1. Concordance of responses for each of the Morisky Medication Adherence Scale items assessed 2 times over a 14- to 22-day period. Possible responses to questions 1 through 7 are "Yes" or "No" and for question 8 are "Rarely/Never," "Once in a While," "Sometimes," "Usually," and "Always." Exact phrasing of the Morisky Medication Adherence Scale items is provided in Appendix I and reference 16.

## CONCORDANCE OF HIGH. MEDIUM AND LOW MMAS-8 ADHERENCE CATEGORIES

Using the previously published MMAS-8 adherence categories, 51.0% (107/210), 16.2% (34/210), and 8.1% (17/210) of participants had high, medium, and low adherence, respectively, on both survey administrations (Table 2). Additionally, 17.6 % of participants (37/210) had high adherence at 1 survey administration and medium adherence at the other survey administration (11.0% [23/210] with medium and high adherence on the first and second administrations + 6.7% [14/210] with high and medium adherence on the first and second administrations), and 6.2% (4.3% + 1.9% [9/210 + 4/210]) had medium adherence at 1 survey administration and low adherence at the other survey administration. Only 1.0% of participants (0.5% + 0.5% [1/210 + 1/210]) had high adherence on 1 administration and low adherence for the other survey administration. The weighted  $\kappa$  statistic was 0.63 (95% CI 0.53 to 0.72).

## **CHANGE IN MMAS-8 SCALE SCORES**

Overall, 61.9% of participants (130/210) had the same MMAS-8 score on both survey administrations (Figure 2). Additionally, 14.7% of participants (31/210) had a decline in MMAS-8 scores of less than 2 points and 19.0% of participants (40/210) had an increase in MMAS-8 scores of less than 2 points between survey administrations. Between the 2 survey administrations, 1.0% (2/210) had a decline in MMAS-8 scores of 2 or more points and 3.3% (7/210) had an increase in scores of 2 or more points.

## **MINIMAL DETECTABLE CHANGE IN MMAS-8 SCALE SCORES**

A Bland-Altman plot of MMAS-8 scores on the first and second survey administrations is provided in Figure 3. The intraclass correlation coefficient was 0.78. The within-person standard error of the mean of change in MMAS-8 scores was 0.71. This equates to a minimal detectable change for the MMAS-8 of 1.98 points. Overall, 4.3% of participants (9/210) had a change in MMAS-8 score  $\geq 2$  points between survey administrations. In subgroup analyses, a change of 2 or more points occurred for 5.1% (4/78) and 3.8% (5/132) of participants <75 and  $\geq$ 75 years of age (p = 0.73), respectively, 1.5% (1/67) and 5.6% (8/143) of men and women (p = 0.28), respectively, and 3.4% (4/118) and 5.4% (5/92) of white and black participants (p = 0.51), respectively.

## Discussion

In our study, high within-participant concordance was present for most MMAS-8 items when assessed 2 times over 14 to 22 days. Concordance on 6 of the 8 MMAS-8 items exceeded 90% and exceeded 75% for the other 2 items. Additionally, whether grouped into previously published categories or analyzed as a continuous variable, concordance was moderate to high for the overall MMAS-8 scale scores. Data from this study suggest that a within-person change in MMAS-8 score of 2 or more points over time may represent a real change in adherence. This definition provides a metric for identifying change over time in self-reported antihypertensive medication adherence using the MMAS-8.

The MMAS-8 was developed using data collected on 1367 participants enrolled in a randomized study evaluating the effects of structural and educational interventions on blood pressure control.<sup>16</sup> In this prior work, the MMAS-8 maintained a strong association with blood pressure control. Specifically, uncontrolled blood pressure was present in 43%, 55%, and 67% of individuals with high, medium, and low

Table 2. Concordance of Adherence Categories <sup>a</sup>							
		Second Administration					
	Level of Adherence <sup>b,c</sup>	Low, n (%)	Medium, n (%)	High, n (%)	Total, n (%)		
ion	Low	17 (8.1)	9 (4.3)	1 (0.5)	27 (12.9)		
st	Medium	4 (1.9)	34 (16.2)	23 (11.0)	61 (29.1)		
inis	High	1 (0.5)	14 (6.7)	107 (51.0)	122 (58.1)		
Adm	Total	22 (10.5)	57 (27.1)	131 (62.4)	210 (100)		

<sup>a</sup>For the 8-item Morisky Medication Adherence Scale administered 2 times over 14-22 days.

<sup>b</sup>Eight-item Morisky Medication Adherence Scale scores of 8 represent high adherence, 6 to <8 medium adherence, and <6 low adherence.17

 $^{\circ}\kappa$  = 0.546; 95% CI 0.442 to 0.650.Weighted  $\kappa$  = 0.63; 95% CI 0.53 to 0.72.



80%

Figure 2. Distribution of change in scores on the 8-item Morisky Medication Adherence Scale over 14-22 days.

adherence, respectively (ie, MMAS-8 scores of 8, 6 to <8, and <6).<sup>16</sup> Additionally, scores on the Morisky scale have been associated with pharmacy fill rates in 2 previous studies.<sup>2,19</sup> For example, in a prior analysis from the CoSMO study, the prevalence of nonpersistent pharmacy fill rates (ie, medication possession ratio <0.8) among individuals with scores of 8, 6 to <8, and <6 on the MMAS-8 was 19%, 28%, and 55%, respectively (p value trend across MMAS-8 categories <0.001).<sup>2</sup> Our study extends prior reports by presenting data on the test-retest reliability of the MMAS-8 over a 14- to 22-day period. Prior to this analysis, few such data were available, and a definition of change in medication adherence over time, using this scale, had not been evaluated.

The intraclass correlation coefficient was 0.78. This is consistent with the intraclass correlation coefficient of 0.81 derived from a Thai version of the MMAS-8 scale used among 303 patients with diabetes.<sup>18</sup> Additionally, the Spearman correlation coefficient for 2 administrations of the MMAS-8 was 0.83 among 39 patients with diabetes in Malaysia.<sup>24</sup> Although many factors affect the intraclass correlation coefficient and make values difficult to interpret, levels above 0.80 are often considered good.<sup>25</sup> Given that a majority of participants had the same MMAS-8 score (ie, a score of 8 indicating high adherence) on both survey administrations in our study, an intraclass correlation coefficient of 0.78 may be considered high.<sup>23</sup>

Although the overall agreement between MMAS-8 categories was 75%, the weighted  $\kappa$  statistic was only 0.63. While different interpretations exist, a  $\kappa$  between 0.6 and 0.8 is generally considered moderate to substantial agreement.<sup>21</sup> Differences between high and medium adherence using published MMAS-8 categories can reflect a change in the response category on a single item (eg, reporting almost never



Figure 3. Bland-Altman plot of the 8-item Morisky Medication Adherence Scale scores administered 2 times over 14-22 days. Circle size is proportional to the percentage of participants. Difference on the y-axis is the score at the first minus second survey administration. MMAS-8 = 8-item Morisky Medication Adherence Scale.<sup>16</sup>

versus never for "How often do you have difficulty remembering to take all your blood pressure medication?"). More importantly, changes in MMAS-8 categories from high to low adherence (or from low to high adherence) over the 2 survey administrations in our study were uncommon. Specifically, only 1% of participants (n = 2) scored in the high adherence category for 1 administration and the low adherence category for the other administration of the MMAS-8. Moving from high to low adherence between MMAS-8 administrations requires a change in scores greater than 2 points (ie, from a score of 8 to  $\leq$ 5.75) and may have clinical implications. This change in scores is slightly larger than the minimal detectable change definition identified in this study. A decline in medication adherence may result in an increase in blood pressure and, subsequently, the occurrence of adverse clinical outcomes (eg, coronary heart disease and stroke). Future studies of changes in medication adherence on outcomes, including increases in blood pressure and coronary heart disease and stroke incidence, are warranted.

The MMAS-8 and other self-report measures have been used to assess medication adherence at a single time point in prior studies.<sup>17,18,26,27</sup> While factors associated with adherence have been identified, risk factors for change in adherence are less well defined. Studies have begun to collect repeated measures of adherence to antihypertensive medication using the MMAS-8.<sup>2,28</sup> The evaluation of adherence over time will provide researchers and clinicians data with which to benchmark patient patterns and identify meaningful changes in adherence behaviors. Additionally, identifying risk factors for clinically meaningful declines in adherence will allow for efficiently targeted interventions to maintain high adherence and avoid adverse consequences

> of low adherence. Understanding what constitutes a meaningful change in adherence over time is needed.

> Several potential limitations need to be considered when interpreting the results from this study. The study was limited to a subset of participants in an ongoing cohort study of older patients with hypertension. As such, participants were 65 years of age or older, black or white, and members of a large managed care organization. Further studies are needed to confirm the current findings among younger adults with hypertension, other ethnic groups, and individuals in other health-care settings. Also, while the MMAS-8 is widely used, other antihypertensive medication adherence scales have been published and should be subjected to similar analyses.<sup>10,29</sup> Another limitation is the possibility that participants provided socially desirable responses, as they are enrolled in a research study. Despite these limitations, our

## P Muntner et al.

study maintains several strengths, including the use of a well-characterized cohort, a high participation rate, and the collection of data by following a structured protocol and using trained research staff.

The majority of participants in our study had identical MMAS-8 scores when assessed via 2 survey administrations conducted over 14-22 days. Using these data, we determined that within-person differences in MMAS-8 scores of 2 or more points over time may represent a real change in adherence. Subsequent studies are needed to confirm this definition for change in adherence in different populations. In the interim, studies using the MMAS-8 should consider score changes of less than 2 points to be consistent with random variation. Further studies are warranted to assess the clinical implications of changes in adherence.

Paul Muntner PhD, Professor, Department of Epidemiology, University of Alabama at Birmingham, Birmingham, AL

**Cara Joyce** MPH, PhD Candidate, Department of Biostatistics, Tulane University, New Orleans, LA

**Elizabeth Holt** PhD, Senior Epidemiologist, Center for Health Research, Ochsner Clinic Foundation, New Orleans

Jiang He MD PhD, Professor and Chair, Department of Epidemiology, Tulane University

**Donald Morisky** PhD, Professor, Department of Community Health Sciences, University of California at Los Angeles, Los Angeles, CA **Larry S Webber** PhD, Professor, Department of Biostatistics, Tulane University

Marie Krousel-Wood MD, Director, Center for Health Research, Ochsner Clinic Foundation; Clinical Professor of Epidemiology and of Family and Community Medicine, Tulane University

**Correspondence:** Dr. Muntner, pmuntner@uab.edu

Reprints/Online Access: www.theannals.com/cgi/reprint/aph.1P677

Conflict of interest: Authors reported none

**Financial Support:** This project was supported by Grant Number R01 AG022536 from the National Institute on Aging (Dr. Krousel-Wood, principal investigator). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Aging or the National Institutes of Health.

# References

- Muntner P, Judd SE, Krousel-Wood M, McClellan WM, Safford MM. Low medication adherence and hypertension control among adults with CKD: data from the REGARDS (Reasons for Geographic and Racial Differences in Stroke) study. Am J Kidney Dis 2010;56:447-57. DOI 10.1053/j.ajkd.2010.02.348
- Krousel-Wood MA, Muntner P, Islam T, Morisky DE, Webber LS. Barriers to and determinants of medication adherence in hypertension management: perspective of the cohort study of medication adherence among older adults. Med Clin North Am 2009;93:753-69. DOI 10.1016/j.mcna.2009.02.007
- Morisky DE, Green LW, Levine DM. Concurrent and predictive validity of a self-reported measure of medication adherence. Med Care 1986;24:67-74.
- Shea S, Misra D, Ehrlich MH, Field L, Francis CK. Predisposing factors for severe, uncontrolled hypertension in an inner-city minority population. N Engl J Med 1992;327:776-81.
- DiMatteo MR, Giordani PJ, Lepper HS, Croghan TW. Patient adherence and medical treatment outcomes: a meta-analysis. Med Care 2002;40: 794-811.
- Krousel-Wood M, Hyre A, Muntner P, Morisky D. Methods to improve medication adherence in patients with hypertension: current status and future directions. Curr Opin Cardiol 2005;20:296-300.
- Burnier M, Santsc V, Favrat B, Brunner HR. Monitoring compliance in resistant hypertension: an important step in patient management. J Hypertens Suppl 2003;21:S37-S42.
- Choo PW, Rand CS, Inui TS, et al. Validation of patient reports, automated pharmacy records, and pill counts with electronic monitoring of adherence to antihypertensive therapy. Med Care 1999;37:846-57.
- Hamilton GA. Measuring adherence in a hypertension clinical trial. Eur J Cardiovasc Nurs 2003;2:219-28.
- Kim MT, Hill MN, Bone LR, Levine DM. Development and testing of the Hill-Bone Compliance to High Blood Pressure Therapy Scale. Prog Cardiovasc Nurs 2000;15:90-6.
- Krousel-Wood M, Thomas S, Muntner P, Morisky D. Medication adherence: a key factor in achieving blood pressure control and good clinical outcomes in hypertensive patients. Curr Opin Cardiol 2004;19:357-62.
- Hawkshead J, Krousel-Wood M. Techniques for measuring medication adherence in hypertensive patients in outpatient settings: advantages and limitations. Disease Management and Health Outcomes 2007;15:109-18.
- Caro JJ, Salas M, Speckman JL, Raggio G, Jackson JD. Persistence with treatment for hypertension in actual practice. CMAJ 1999;160:31-7.

Appendix I. 8-Item Morisky Medication Adherence Scale <sup>a</sup>					
Item	Response Option				
1. Do you sometimes forget to take your high blood pressure pills?	Yes/No				
2. Over the past 2 weeks, were there any days when you did not take your high blood pressure medicine?	Yes/No				
3. Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?	Yes/No				
4. When you travel or leave home, do you sometimes forget to bring along your medications?	Yes/No				
5. Did you take your high blood pressure medicine yesterday?	Yes/No				
6. When you feel like your blood pressure is under control, do you sometimes stop taking your medicine?	Yes/No				
7. Do you ever feel hassled about sticking to your blood pressure treatment plan?	Yes/No				
8. How often do you have difficulty remembering to take all your blood pressure medication?	Never, Almost Never Sometimes Quite Often Always				

<sup>a</sup>Use of the MMAS is protected by US copyright laws. Permission for use is required. A license agreement is available from: Donald E Morisky ScD ScM MSPH, Professor, Department of Community Health Sciences, UCLA School of Public Health, 650 Charles E Young Drive South, Los Angeles, CA 90095-1772.

- Ogedegbe G, Mancuso CA, Allegrante JP, Charlson ME. Development and evaluation of a medication adherence self-efficacy scale in hypertensive African-American patients. J Clin Epidemiol 2003;56:520-9.
- Ogedegbe G, Harrison M, Robbins L, Mancuso CA, Allegrante JP. Barriers and facilitators of medication adherence in hypertensive African Americans: a qualitative study. Ethn Dis 2004;14:3-12.
- Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. J Clin Hypertens (Greenwich) 2008;10:348-54.
- Islam T, Muntner P, Webber LS, Morisky DE, Krousel-Wood MA. Cohort study of medication adherence in older adults (CoSMO): extended effects of Hurricane Katrina on medication adherence among older adults. Am J Med Sci 2008;336:105-10.
- Sakthong P, Chabunthom R, Charoenvisuthiwongs R. Psychometric properties of the Thai version of the 8-item Morisky Medication Adherence Scale in patients with type 2 diabetes. Ann Pharmacother 2009;43:950-57. DOI 10.1345/aph.1L453
- Krousel-Wood M, Islam T, Webber LS, Re RN, Morisky DE, Muntner P. New medication adherence scale versus pharmacy fill rates in seniors with hypertension. Am J Manag Care 2009;15:59-66.
- Marx RG, Menezes A, Horovitz L, Jones EC, Warren RF. A comparison of two time intervals for test-retest reliability of health status instruments. J Clin Epidemiol 2003;56:730-5.
- Landis JR, Koch GG. An application of hierarchical kappa-type statistics in the assessment of majority agreement among multiple observers. Biometrics 1977;33:363-74.
- 22. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. Lancet 1986;1:307-10.
- Weir JP. Quantifying test-retest reliability using the intraclass correlation coefficient and the SEM. J Strength Cond Res 2005;19:231-40. DOI 10.1519/15184.1
- 24. Al-Qazaz HKh, Hassali MA, Shafie AA, Sulaiman SA, Sundram S, Morisky DE. The eight-item Morisky Medication Adherence Scale MMAS: translation and validation of the Malaysian version. Diabetes Res Clin Pract 2010;90:216-21. DOI 10.1016/j.diabres.2010.08.012
- Nunnally JC, Bernstein IH. Psychometric theory. 3rd ed. New York, NY: McGraw-Hill, 1994.
- Hyre AD, Krousel-Wood MA, Muntner P, Kawasaki L, DeSalvo KB. Prevalence and predictors of poor antihypertensive medication adherence in an urban health clinic setting. J Clin Hypertens (Greenwich ) 2007;9: 179-86.
- Hill MN, Bone LR, Kim MT, Miller DJ, Dennison CR, Levine DM. Barriers to hypertension care and control in young urban black men. Am J Hypertens 1999;12:951-8.
- Payne KA, Caro JJ, Daley WL, et al. The design of an observational study of hypertension management, adherence and pressure control in Blood Pressure Success Zone Program participants. Int J Clin Pract 2008;62:1313-21. DOI 10.1111/j.1742-1241.2008.01840.x
- McHorney CA. The adherence estimator: a brief, proximal screener for patient propensity to adhere to prescription medications for chronic disease. Curr Med Res Opin 2009;25:215-38. DOI 10.1185/03007990802619425

Definiendo el cambio mínimo detectable en la puntuación de la Escala Morisky de Adherencia a Medicamentos de 8 puntos

P Muntner, C Joyce, E Holt, Jg He, D Morisky, LS Webber, y M Krousel-Wood

Ann Pharmacother 2011;45:xxxx.

#### EXTRACTO

TRASFONDO: Las escalas de auto-reporte se han estado usando para evaluar la adherencia a medicamentos. La información sobre cómo discriminar el cambio del auto-reporte de adherencia a través del tiempo de la variabilidad al azar está limitada. **OBJETIVOS:** Determinar el cambio mínimo detectable para las puntuaciones de la escala Morisky de Adherencia a Medicamentos de 8 puntos (MMAS-8).

METODOS: Se administró la MMAS-8 dos veces utilizando un libreto estándar por vía telefónica, separada por 14 a 22 días, a 210 participantes que utilizaban medicamentos antihipertensivos en el Estudio Cohorte de Adherencia a Medicamentos entre Adultos Mayores (CoSMO). Se calculó la puntuación de MMAS-8 y se agruparon los participantes dentro de una categorías previamente definidas (<6, 6, a <8 y 8 para adherencia baja, mediana y alta, respectivamente).

**RESULTADOS:** La edad promedio de los participantes fue de 78.1 (5.8) años, 43.8% eran de raza negra y 68.1% eran mujeres. En general, 8.1% (n = 17/210), 16.2% (n = 34/210) y 51.0% (n = 107/210) de los participantes tuvieron puntuación de MMAS-8 baja, mediana y alta, respectivamente, en ambas entrevistas realizadas (acuerdo general = 75.2%, n = 158/210). La estadística κ ajustada fue de 0.63 (intervalo de confianza 95% 0.53 y 0.72). El coeficiente de correlación intra-clase fue de 0.78. El error estándar del promedio por persona para cambio en puntuación de MMAS-8 fue de 0.81 lo que equipara a un cambio detectable de 1.98 puntos. Solamente el 4.3% (n = 9/210) de los participantes tuvieron un cambio en la puntuación de MMAS-8 de 2 o más puntos entre las dos entrevistas realizadas.

CONCLUSIONES: Los cambios por persona en la puntuación de MMAS-8 de 2 o más puntos a través del tiempo podrían representar un cambio real en la adherencia a medicamentos antihipertensivos.

Traducido por Giselle Rivera-Miranda

Définition du Changement Minimal Détectable sur l'Échelle d'Évaluation de l'Observance Médicamenteuse de Morisky en 8 Points

P Muntner, C Joyce, E Holt, Jg He, D Morisky, LS Webber, et M Krousel-Wood

Ann Pharmacother 2011;45:xxxx.

#### RÉSUMÉ

INTRODUCTION: Des échelles d'auto-évaluation sont utilisées pour évaluer l'observance au traitement médicamenteux. Cependant, les données pour bien distinguer les variations de l'observance ainsi rapportées des variations dues au hasard sont très limitées.

**OBJECTIFS:** Déterminer le changement minimal détectable sur le résultat de l'échelle d'observance médicamenteuse de Morisky en 8 points. (EOMM-8).

MÉTHODE: On a demandé à 210 participants prenant des médicaments antihypertenseurs de répondre à l'EOMM-8, lors de 2 entrevues standardisées, réalisées par téléphone, espacées de 14 à 22 jours, dans le cadre de l'étude Cohort Study of Medication Adherence among Older Adults (CoSMO). Le résultat à l'EOMM-8 a été calculé et les participants ont ensuite été regroupés dans des catégories préétablies soit <6, 6, à <8, et 8 pour une observance faible, modérée et élevée, respectivement.

**RÉSULTATS:** L'âge moyen des participants était de 78.1 (5.8) ans, 43.8% étaient de race noire, et 68.1% étaient de sexe féminin. Globalement, 8.1% (n = 17/210), 16.2% (n = 34/210), et 51.0% (n = 107/210) des participants présentaient des résultats à l'EOMM-8 catégorisés comme faible, modéré et élevés, respectivement, lors des 2 entrevues pour compléter le questionnaire (degré d'accord global = 75.2%; n = 158/210). La statistique  $\kappa$  pondérée était de 0.63 (Intervalle de confiance 95%: 0.53 à 0.72). Le coefficient de corrélation intra-classe était de 0.81 ce qui correspond à un changement minimal détectable de 1.98 points. Seulement 4.3% (n = 9/210) des participants ont présenté un changement du EOMM-8 de 2 points ou plus entre les 2 questionnaires.

CONCLUSIONS: Un changement intra-sujet de l'EOMM-8 de 2 points ou plus pourrait représenter un changement réel de l'observance au traitement antihypertenseur.

Traduit par Marc Parent

#### theannals.com