

ORIGINAL RESEARCH

Patient Beliefs Have a Greater Impact Than Barriers on Medication Adherence in a Community Health Center

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Purpose: Nonadherence to medicines contributes to poor health outcomes, especially for patients with complicated medicine regimens. We examined adherence among patients at a family health center and the impact that barriers to getting medicines and negative beliefs about medicines have on adherence.

Methods: A survey was administered incorporating the 8-item Morisky Medication Adherence Scale, questions from the Beliefs about Medicine Questionnaire, and questions about patients' external barriers to getting medicines. Low adherence was examined by any external barrier and by higher negative beliefs, adjusting for patient characteristics.

Results: The convenience sample of 343 participants is demographically representative of the larger population. Among these patients, 54% report low adherence, 51% have at least 1 barrier to adherence, and 52% report more negative than positive beliefs about medicines. When beliefs and barriers are examined together, patients with negative beliefs are 49% less likely to adhere than those with more positive beliefs, whereas barriers show no significant impact on adherence.

Conclusions: Negative beliefs about medicines are as prevalent in this population as external barriers to accessing medicines, but negative beliefs were more significantly associated with adherence than external barriers. Physicians should identify and address patients' negative beliefs about medicines to improve adherence rates. (J Am Board Fam Med 2017;30:331–336.)

Keywords: Family Health, Medication Adherence, Surveys and Questionnaires

Nonadherence to medicines, defined as the extent to which a patient does not take medicines as prescribed,¹ is a major contributor to poor health outcomes that often goes undetected. The World Health Organization has estimated the average medication adherence rate to be 50% in developed countries.² Nonadherence accounts for nearly

125,000 deaths and over \$290 billion in health care costs per year.^{3–7} Patients with chronic diseases have particular difficulty adhering because of complicated medication regimens.⁸ Chronic diseases are the leading causes of death and disability in the United States, affecting about half of all American adults.⁹

Researchers suggest using a patient-centered approach when treating nonadherence.¹⁰ This may be accomplished by focusing on patients' beliefs about medicines, an important factor affecting adherence.^{11–13} Beliefs have been found to be positive predictors of nonadherence for chronic diseases,^{14,15} but logistic or external barriers to accessing medicines, while acknowledged as affecting adherence, have not been as systematically studied. Better understanding patients' beliefs about their medicines in the context of external barriers preventing them from accessing medicines is necessary to adequately address nonadherence.

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With the goal of improving family medicine providers' understanding of patients' barriers to using and beliefs about medicines, we conducted a study among patients at a health center providing family medicine services to primarily low-income patients in New York City. Our research questions examine adherence rates among the patient population and the impact of barriers and beliefs on adherence.

Methods

We developed a 31-question survey to capture participants' concerns about medicines and their perceptions of the necessity of the medicines. The survey incorporated 2 previously used instruments: the complete 8-item Morisky Medication Adherence Scale (MMAS-8),¹⁶ and questions from the Beliefs about Medicine Questionnaire (BMQ). The MMAS-8 is used to measure patient self-reported adherence, or the extent to which the patient does not take medicines as prescribed. The BMQ is used to assess patients' beliefs about taking their medicines.^{13,17,18} We limited BMQ items to 7 statements specifically pertaining to beliefs about medicines, and we changed the wording of some questions to make them more applicable to our study population. In addition to these 2 instruments, we asked questions about patient characteristics and questions about barriers to getting their medicine prescriptions filled. Barriers to getting medicines consisted of 7 factors including cost, access to refills, and perceived side effects.

The survey was administered to a convenience sample of patients coming to the health center for regularly scheduled appointments between September 2013 and May 2014. Patients over age 18 years were eligible. Study personnel obtained consent in private examination rooms before beginning the survey. Questions were read aloud by survey administrators, and answers were recorded, without patient identifiers, on iPads using iSURVEY software (Harvest Your Data, Wellington, New Zealand). The survey was available in both English and Spanish. The research protocol was approved by the institutional review board at the Institute for Family Health.

Analyses

Sociodemographic factors including age, sex, race/ethnicity, education, and income, as well as chronic

disease prevalence and number of medicines taken, were examined. Descriptive analyses included general univariate values (numbers and percentages). Corresponding with past research,^{19–22} low adherence was defined as an MMAS-8 score <6. Specific positive BMQ measures and reported “barriers” were explored independently based on adherence level (low vs high), using the Mantel-Hanszel χ^2 test of proportions.

For the predictive models, affirmative responses to questions regarding “beliefs” about medicine (adapted BMQ) were summed for a low value of 1 and an upper value of 7; these were further dichotomized to produce low beliefs (1–5) and high beliefs (6–7). “Barriers” were dichotomized as no reported barrier (49%) or ≥ 1 barrier (51%). Low adherence rates were examined by sociodemographics, chronic disease prevalence, and medicine utilization. Log-binomial predictive models were used to test the outcome of low adherence by any external barrier and by higher negative beliefs, adjusting for race, education, income, number of medicines, and disease burden to patients. Log-binomial regression was used as the preferred model when the prevalence of the outcome was not rare.²³ All analyses were conducted using SPSS version 22 (IBM, Chicago, IL).

Results

The majority of the 343 survey participants were between the ages of 41 and 65 years, were black/African American, and had an income <\$10,000. Slightly more women were included, and 30% had less formal education than a high school diploma. Where we have comparable health center data, these demographics are reflective of the health center population. The most noted chronic disease was high blood pressure, and nearly a quarter of participants had ≥ 3 chronic diseases. Nearly half of participants reported taking ≥ 4 medicines regularly. Among participants, 54% reported low adherence to their medication regimens. Adherence to medicines was significantly lower among younger patients. Just over half of participants reported at least 1 barrier to medicine adherence, and just over half also reported more negative than positive beliefs about medicines (Table 1).

The most reported barrier to medicine adherence was cost, followed by challenges filling prescriptions. Cost, refill access, side effects, forgetting

Table 1. Patient Descriptive Characteristics Overall and by Low Adherence to Medicines

	Patients (n = 343)		Low Adherence (%)*	P Value
	n	%		
Age, years				
18–25	31	9.0	62.5	.01
26–40	66	19.2	55.3	
41–65	203	59.2	58.6	
≥65	36	10.5	27.3	
Missing	7	2.0		
Sex				
Female	199	58.0	49.4	.37
Male	138	40.2	43.7	
Missing	6	1.7		
Race				
Black/African American	184	53.6	43.2	.35
Hispanic/Latino	95	27.7	48.1	
Mixed race	25	7.3	63.2	
White	16	4.7	46.2	
Other	11	3.2	75.0	
Refused to answer	11	3.2	37.5	
Missing	1	0.3		
Level of education				
Some high school	103	30.0	41.4	.08
High school diploma	102	29.7	42.3	
Some college	78	22.7	54.4	
College diploma	40	11.7	64.7	
Graduate school diploma	13	3.8	28.6	
Missing	7	2.0		
Annual household income (\$)				
<10,000	165	48.1	53.7	.13
10,000–30,000	78	22.7	40.4	
30,000–60,000	39	11.4	42.9	
≥60,000	15	4.4	55.6	
Refused to answer	46	13.4	31.3	
Chronic illness				
High blood pressure	167	48.7	47.0	.99 [†]
Asthma	105	30.6	43.5	.41 [†]
Type 2 diabetes	73	21.3	43.1	.47 [†]
Heart disease	46	13.4	52.4	.44 [†]
Other	151	44.0	45.2	.56 [†]
≥3 chronic diseases	77	22.5	44.4	.62 [†]
Prescribed medicines taken regularly, n				
0	42	12.2		.39
1–3	135	39.4	51.4	
4–10	140	40.8	42.6	
≥10	25	7.3	50.0	
Missing	1	0.3		
Composite barrier				
0	168	49.0	32.3	<.01
≥1	175	51.0	60.1	
Composite belief				
More positive	117	48.1	32.7	<.01
More negative	126	51.9	68.4	
Missing	29.2	34.1	36.7	

*A total of 46.9% of patients reported low adherence.

[†]Compared with patients who did not report that chronic disease.

Table 2. Unadjusted Relationships between Identified Barriers and Negative Beliefs and Low Adherence to Medicines (n = 343)

	n	%	Low Adherence (%)
Barrier			
Cost	78	22.7	63.0*
No refills	72	21.0	58.6*
Pharmacy did not have medicine	64	18.7	57.7
Forgot to get prescription filled	50	14.6	82.5*
Side effects	32	9.3	87.0*
Transportation	30	8.7	73.1*
Hospitalization	10	2.9	85.7*
Other	5	1.5	50.0
Negative beliefs			
I sometimes worry about becoming too dependent on my medicines.	129	37.6	61.2*
Without medicines I would be very sick. [†]	117	34.1	51.6
Having to take my medicine worries me.	88	25.7	70.6*
My current health depends on my medicines. [†]	80	23.3	62.7*
My medicines disrupt my life.	66	19.2	69.8*
Doctors do not understand my background so how can they order my medicines?	60	17.5	81.1*
I often stop taking medicine prescribed by my doctor when I take traditional medicine.	24	7.0	78.6*

* $P < .05$.[†]Reversed for negative belief.

to get refills, transportation, and hospitalization were each significantly associated with low adherence. The most reported negative belief about medicines was fear of dependence, followed by disbelief that medicine is keeping the patient from being very sick. All negative beliefs, except for the disbelief that the patient would be very sick without medicines, were significantly associated with lower medication adherence (Table 2).

When examining barriers to adherence independent of beliefs about medicines (adjusting for race, education, income, number of medicines, and disease burden), patients with ≥ 1 barrier were approximately 47% less likely to adhere compared with patients reporting no barriers to medication adherence ($P < .05$). When examining beliefs independent of barriers (adjusting for the same covariates), patients reporting more negative beliefs toward medicine were 53% less likely to adhere to medication regimens than patients reporting more positive beliefs ($P < .05$). When beliefs and barriers are examined together (adjusting for the same covariates), barriers no longer showed any significant effect on adherence, whereas beliefs

remain significant: patients with more negative beliefs about medicine were 49% less likely to adhere than patients with more positive beliefs (Table 3).

Discussion

Patients with chronic diseases, particularly those with multiple chronic conditions, have especially complicated medication regimens. In a population with such a high burden of chronic disease, proper medication adherence is vital to disease management. However, more than half of participants, notably younger ones, reported low adherence to their medication regimens, revealing that nonadherence is prevalent among the study population.

Both beliefs and barriers contributed to participants not taking their medicines as prescribed. More than half of participants reported at least 1 barrier. Most patients said that cost was a barrier; however, this does not pose the greatest limitation on adherence. Although reported less frequently, concerns about side effects play a major role in adherence.

Table 3. Adjusted Risk Models Predicting Low Adherence to Medicines

	Model 1 (Includes Barriers Only)	Model 2 (Includes Beliefs Only)	Model 3 (Includes Both Barriers and Beliefs)
Any barrier	0.53 (0.33–0.87)	NA	0.68 (0.39–1.19)
Higher negative beliefs	NA	0.47 (0.27–0.80)	0.51 (0.29–0.88)

Data are relative risk (95% confidence interval). Models 1 and 2 look at the 2 independent variables alone (ignoring the other). Model 3 adjusts the risk of barriers given beliefs and vice versa. All 3 models are adjusted for race (white), education, income, number of medicines, and disease burden.

NA, not applicable.

In addition to external barriers to getting their medicines, over half of participants reported having more negative than positive beliefs about medicines. Like barriers, most negative beliefs were significantly associated with lower adherence. The most commonly reported negative belief about medicines was fear of dependence, but this did not have the greatest association with adherence. Though reported less frequently, if patients did not feel that their doctor understood them or if they were taking alternative medications, they were less likely to take medicines as prescribed.

Our separate analyses of barriers and beliefs found that both independently affect adherence. When we examined barriers to getting medicines and strong negative beliefs about medicines in the same predictive model, we found that beliefs—not barriers—have a significant effect on adherence. Even in a population experiencing considerable barriers to medication adherence, negative beliefs are a larger obstacle.

Limitations

The study was conducted at a single health center, which limits the generalizability of our findings. We developed a Spanish-language survey, but a Spanish-speaking administrator was not available for the full duration of the study, so Spanish-speaking patients (and speakers of other languages) are potentially underrepresented. Barriers to adherence might exist that are not represented here because the survey was not open-ended and we did not ask about all possible barriers. The survey also did not define *medicines*, so the term may not have been interpreted consistently. Finally, because any self-report measure may have limitations such as recall bias or overestimation,²⁴ low adherence may actually have been more prevalent among our population than the 54% reported here.

Conclusions

Each examined barrier and belief was found to have an independent effect on adherence. If a patient reported any external barriers to getting medicines or held a single belief that medicines are not important, he or she was less likely to adhere to prescribed medication regimens. When examined in the same model, however, negative beliefs about medicines were a more significant deterrent to adherence than external barriers to accessing medicines. Patients' beliefs that they may become dependent on medicines, that their medicines disrupt their lives or otherwise worry them, that their medicines are ineffective, and that their doctor does not understand them all contribute more to nonadherence than external barriers to getting medication prescriptions filled. These findings suggest that in order to reduce chronic disease mortality by improving adherence rates, prescribing physicians should identify and address the range of negative beliefs that patients hold regarding adherence to medicine regimens.

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References

- Osterberg L, Blaschke T. Adherence to medication. *N Engl J Med* 2005;353:487–97.
- World Health Organization. Adherence to long-term therapies: evidence for action. Geneva: World Health Organization; 2003. Available from: http://www.who.int/chp/knowledge/publications/adherence_report/en/index.html. Accessed March 23, 2017.
- Briesacher BA, Gurwitz JH, Soumerai SB. Patients at-risk for cost-related medication nonadherence: a review of the literature. *J Gen Intern Med* 2007;22:864–71.

4. Heisler M, Langa KM, Eby EL, et al. The health effects of restricting prescription medication use because of cost. *Med Care* 2004;42:626–34.
5. Hsu J, Price M, Huang J, et al. Unintended consequences of caps on Medicare drug benefits. *N Engl J Med* 2006;354:2349–59.
6. Vermeire E, Hearnshaw H, Van Royen P, et al. Patient adherence to treatment: three decades of research. A comprehensive review. *J Clin Pharm Ther* 2001;26:331–42.
7. Thinking outside the pillbox: a system-wide approach to improving patient medication adherence for chronic disease. Cambridge, MA: New England Healthcare Institute; 2009.
8. Brown MT, Bussell JK. Medication adherence: WHO cares? *Mayo Clinic Proc* 2011;86:304–14.
9. Ward BW, Schiller JS, Goodman RA. Multiple chronic conditions among US adults: a 2012 update. *Prev Chronic Dis* 2014;11:E62.
10. Marcum ZA, Sevic MA, Handler SM. Medication nonadherence: a diagnosable and treatable medical condition. *JAMA* 2013;309:2105–6.
11. Mardby A, Akerlind I, Jorgensen T. Beliefs about medicines and self-reported adherence among pharmacy clients. *Patient Educ Couns* 2007;69:158–64.
12. Horne R, Weinman J. Patients' beliefs about prescribed medicines and their role in adherence to treatment in chronic physical illness. *J Psychosom Res* 1998;47:555–67.
13. Gatti ME, Jacobson KL, Gazmararian JA, et al. Relationships between beliefs about medications and adherence. *Am J Health Syst Pharm* 2009;66:657–64.
14. Phatak HM, Thomas J. Relationships between beliefs about medications and nonadherence to prescribed chronic medications. *Ann Pharmacother* 2006;40:1737–42.
15. Gadkari AS, McHorney CA. Unintentional non-adherence to chronic prescription medications: how unintentional is it really? *BMC Health Serv Res* 2012;12:98.
16. Morisky DE, Alfonso A, Krousel-Wood M, et al. Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens* 2008;10:348–54.
17. Horne R, Buick D, Fisher M, et al. Doubts about necessity and concerns about adverse effects: identifying the types of beliefs that are associated with non-adherence to HAART. *Int J STD AIDS* 2004;15:38–44.
18. Mahler C, Hermann K, Horne R, et al. Patients' beliefs about medicines in a primary care setting in Germany. *J Eval Clin Pract* 2012;18:409–13.
19. de Oliveira-Filho AD, Morisky DE, Neves SJ, et al. The 8-item Morisky Medication Adherence Scale: validation of a Brazilian-Portuguese version in hypertensive adults. *Res Social Adm Pharm* 2014;10:554–61.
20. Plakas S, Mastrogiannis D, Mantzourou M, et al. Validation of the 8-Item Morisky Medication Adherence Scale in chronically ill ambulatory patients in rural Greece. *Open J Nurs* 2016;6:158–69.
21. Moharamzad Y, Saadat H, Nakhjavan Shahraki B, et al. Validation of the Persian version of the 8-Item Morisky Medication Adherence Scale (MMAS-8) in Iranian hypertensive patients. *Glob J Health Sci* 2015;7:173–83.
22. Krousel-Wood M, Islam T, Webber LS, et al. New medication adherence scale versus pharmacy fill rates in hypertensive seniors. *Am J Manag Care* 2009;15:59–66.
23. McNutt LA, Wu C, Xue X, Hafner JP. Estimating the relative risk in cohort studies and clinical trials of common outcomes. *Am J Epidemiol* 2003;157:940–3.
24. Gonzalez JS, Schneider HE. Methodological issues in the assessment of diabetes treatment adherence. *Curr Diab Rep* 2011;11:472–9.