

Understanding asthma medical nonadherence in an adult and pediatric population

Joyce Xiang Wu Lee, MD^a, Henry Albert Wojtczak, MD^b, Allan Mark Wachter, MD^c, Martin Laurence Lee, PhD^d, Lisa Burns, RN^b, Diana Chen, MA^b, and Joseph Stephen Yusin, MD^{a,e}

Clinical Implications

- Our study shows that both adult and pediatric populations, though mainly adherent or mildly nonadherent, are more likely to have unintentional than intentional medication nonadherence. This supports the importance of addressing unintentional reasons to improve asthma medication adherence.

TO THE EDITOR:

Health care cost of asthma treatment is enormous and medication adherence is the cornerstone to improving the patient's quality of life, reducing overall health care cost, and decreasing morbidity and mortality.¹

Studies in adult and pediatric asthmatic patients show that adherence to controller therapies range from 30% to 70%.² Closing adherence and prescription gaps can prevent 9 million physician visits, 4 million emergency department visits, and 1 million asthma-related hospitalizations annually.³

Adherence is defined as "the extent to which a person's behavior, taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed upon recommendations from a health care provider."⁴ Nonadherence to medical regimens is divided into two categories: intentional and unintentional. Intentional is defined as patients missing or altering dose to suit their needs. Unintentional is defined as patients not taking their medication or are prevented from implementing their intention due to factors beyond their control. Unintentional nonadherence may be related to poor recall of the consultation. When targeting asthma medication adherence, it is important to identify and target each entity separately.⁵

The purpose of this study was to use the Mediation Adherence Report Scale for Asthma (MARS-A) questionnaire as a tool to test our hypothesis that medical nonadherence of inhaled corticosteroids among both adult and pediatric asthmatic populations is more likely due to unintentional rather than intentional nonadherence. The MARS-A questionnaire data were obtained from a prospective, observational, study at the Phoenix VA Health Care System (PVAHCS) and the Naval Medical Center San Diego (NMCS), which evaluated pharmacoadherence metrics and compared its predictive value with spirometry and validated questionnaires.⁶ Study participants were identified using International Classification of Disease, Ninth Revision (ICD-9) codes with diagnosis of asthma. Enrollment and recruitment occurred in the adult allergy clinic at the PVAHCS

and the pediatric pulmonary clinic at the NMCS. Inclusion criteria are defined as follows: (1) persistent asthma diagnoses based on National Committee for Quality Assurance Healthcare Effectiveness Data and Information Set Administrative database criteria;⁸ (2) age 4 and above; (3) prescribed and required inhaled corticosteroids (ICS) for asthma maintenance therapy at least 1 year before enrollment. Exclusion criteria are defined as follows: (1) chronic obstructive pulmonary disease diagnosis based on ICD-9 codes; (2) inability to complete the questionnaire, perform spirometry, or follow advice of clinicians; (3) confounding comorbidities (cancer, congestive heart failure); (4) failure to follow up during the study.

Enrollment of adult patients occurred from June 2010 to February 2011. Enrollment of pediatric patients occurred from June 2010 to May 2011. In total, 115 adult patients between the age of 46 and 77 years and 159 pediatric patients between the ages of 4 and 17 years were recruited. Of these, 108 adult patients and 156 pediatric patients agreed to the study. One patient dropped out for not wanting to share health data.

MARS-A is a 10-item questionnaire used to assess ICS adherence. It includes both generic and asthma-specific questions about medication usage. It also assesses intentional and unintentional nonadherence. A 5-point Likert scale, where 1-4 was considered nonadherent and 5 was adherent, is used (Figure 1). MARS-A demonstrated good psychometric performance as a self-reported measure of adherence with ICS among an inner-city adult asthmatic population.⁷

At a minimum, each adult subject was administered the MARS-A questionnaire at enrollment and closeout. Each pediatric subject was administered the MARS-A questionnaire at least once. Most recent response was used if a subject had multiple MARS-A questionnaires completed. Unintentional medication nonadherence was defined by question 1: "I forget to take my (name of medication)." Intentional medical nonadherence was defined by questions 2-9. Question 10—"I use it when I need it"—was excluded as its interpretation can fall into both groups. We moved question 5 to position 1 because our previous experience showed that it was easier for subjects to understand the flow of the questionnaire.

Data were analyzed using NCSS (version 7.0, Kaysville, Utah). Only nonadherent subjects, defined by at least one of the question's response that is less than 5, were included in the data analysis. Cronbach's α was 0.84 in the adult group and 0.85 in the pediatric group. Analysis of MARS-A questionnaires revealed that most subjects were mildly nonadherent. The mean for question 1, which addresses unintentional nonadherence, was 3.9 (SD 1.01) in the adult group and 3.9 (SD 0.81) in the pediatric group. The means for questions 2-9, which address intentional nonadherence, ranged from 4.1 to 4.8 (SD 0.65-1.04) in the adult group and from 4.3 to 4.8 (SD 0.63-1.22) in the pediatric group. Dunn's nonparametric multiple comparison test that compared all 9 questions showed significant differences between question 1 and all the other questions ($P < .05$) except for question 9 for both the adult ($P = .21$) and pediatric groups ($P = .11$) (Table I).

Our study shows that both adult and pediatric populations, though mainly adherent or mildly nonadherent, are more likely to

MEDICATION ADHERENCE REPORT SCALE – ASTHMA (MARS-A)

The purpose of this questionnaire is for your provider to understand how you use your _____ . How often do you do the following?

Answers: (1) Always (2) Often (3) Sometimes (4) Rarely (5) Never

1	I forget to take my _____.	_____
2	I stop taking it for awhile.	_____
3	I decide to miss a dose.	_____
4	I try to avoid using it.	_____
5	I only use it when I feel breathless.	_____
6	I alter the dose.	_____
7	I use it for a reserve, if my other treatment doesn't work.	_____
8	I use it before doing something which might make me breathless.	_____
9	I take it less than instructed.	_____
10	I use it when I need it.	_____
TOTAL SCORE		_____

FIGURE 1. MARS-A questionnaire.

TABLE I. Mean and standard deviation of the Medication Adherence Report Scale for Asthma questionnaire

	Questions	PVAHCS (adult) (n = 283)		NMCSD (pediatric) (n = 196)	
		Mean	Standard deviation	Mean	Standard deviation
Unintentional nonadherence	Q1	3.9	1.01	3.9	0.81
Intentional nonadherence	Q2	4.3	0.95	4.6	0.84
	Q3	4.5	0.75	4.5	0.86
	Q4	4.7	0.79	4.7	0.77
	Q5	4.3	0.97	4.6	0.98
	Q6	4.8	0.65	4.7	0.9
	Q7	4.6	0.87	4.8	0.63
	Q8	4.4	1.04	4.5	1.02
	Q9	4.1	1.04	4.3	1.22

NMCSD, Naval Medical Center San Diego; PVAHCS, Phoenix VA Health Care System.

Dunn's test that compared all 9 questions showed a significant difference between Q1 and all of the other questions ($P < .05$) except for Q9 for both the adult ($P = .21$) and pediatric group ($P = .11$). Question 10 was excluded and results not shown.

have unintentional than intentional nonadherence. This supports the importance of addressing unintentional reasons to improve asthma medication adherence in mildly nonadherent patients. A unique feature of this study is that both cohort populations are in a Department of Defense/Veterans Affairs health care environment where access to medication is not affected by cost. Medication refills in both patient cohorts were evaluated by 2 pharmacoadherence metrics: AMR (Asthma Medication Ratio), which focuses on controller usage, and RI (Rescue Index), which focuses on β_2 agonist usage.⁶ Abnormal AMR or RI values should alert the health care provider to look at all possible causes of nonadherence when AMR or RI is abnormal, such as poor

comprehension or carelessness. Nonadherence in the pediatric population is troubling. Providers have to be aware of belief systems of children, teens, and parents. Forgetfulness in young patients can be a major driver in nonadherence.

Whereas intentional nonadherence is a conscious decision influenced by a patient's belief, background, or religion, unintentional nonadherence is less impacted by these factors.

There are many barriers to both unintentional and intentional nonadherence; once identified, appropriate interventions can be made. Unintentional nonadherence may be addressed with reminder systems and patient education. Our finding is consistent with new emerging interventions that address unintentional adherence, ie, text alerting, GPS-enabled smart inhalers, and web-based programs that are becoming more acceptable to patients.

^aDivision of Allergy/Immunology, VA Greater Los Angeles Medical Center, Los Angeles, Calif

^bDivision of Pulmonary Medicine, Department of Pediatrics, Naval Medical Center San Diego, San Diego, Calif

^cFoundation for Asthma Research and Intervention, 501(c)(3), Phoenix, Ariz

^dDepartment of Biostatistics, UCLA School of Public Health, Los Angeles, Calif

^eSection of Allergy/Immunology, Phoenix VA Health Care System, Phoenix, Ariz

This research is funded by Foundation for Asthma Research and Intervention 501(c)(3) Not-for-Profit. Conflicts of interest: H. A. Wojtczak has received lecture fees from Gilead, Vertex, GlaxoSmithKline, and MedImmune. A. M. Wachter has received research support and fees for participation in review activities from the Foundation for Asthma Research Intervention [501(e)(3)]; and is employed by the Foundation for Asthma Research Intervention. J. S. Yusin is employed by the VA Greater Los Angeles Healthcare Center. The rest of the authors declare that they have no relevant conflicts.

Received for publication June 6, 2014; revised November 6, 2014; accepted for publication November 17, 2014.

Available online January 21, 2015.

Corresponding author: Joyce Xiang Wu Lee, MD, VA Greater Los Angeles Medical Center, 11301 Wilshire Blvd 111R, Los Angeles, CA 90073. E-mail: joycexianglee@gmail.com.

2213-2198

© 2015 American Academy of Allergy, Asthma & Immunology

<http://dx.doi.org/10.1016/j.jaip.2014.11.022>

REFERENCES

- Murphy KR, Meltzer EO, Blaiss MS, Nathan RA, Stoloff SW, Doherty DE. Asthma management and control in the United States: results of the 2009 Asthma Insight and Management survey. *Allergy Asthma Proc* 2012;33:54-64.
- Eakin MN, Rand CS. Improving patient adherence with asthma self-management practices: what works? *Ann Allergy Asthma Immunol* 2012;109:90-2.
- Schlender A, Alperin PE, Grossman HL, Sutherland ER. Modeling the impact of increased adherence to asthma therapy. *PLoS One* 2012;7:e51139.
- World Health Organization. Adherence to Long-Term Therapies—Evidence for Action, 2003. Available from: <http://apps.who.int/medicinedocs/en/d/Js4883e/>. Accessed August 25, 2013.
- Wroe AL. Intentional and unintentional nonadherence: a study of decision making. *J Behav Med* 2002;25:355-72.
- Wojtczak HA, Wachter AM, Lee M, Burns L, Yusin JS. Understanding the relationship among pharmacoadherence measures, asthma control test scores, and office-based spirometry. *Ann Allergy Asthma Immunol* 2012;109:103-7.
- Cohen JL, Mann DM, Wisnivesky JP, Home R, Leventhal H, Musumeci-Szabó TJ, et al. Assessing the validity of self-reported medication adherence among inner-city asthmatic adults: the Medication Adherence Report Scale for Asthma. *Ann Allergy Asthma Immunol* 2009;103:325-31.
- HEDIS 2006, Technical Specifications. 2. (National Committee for Quality Assurance, 2005).

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.