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Knowledge, Attitude and Self-Efficacy in Asthma Self-Management and Quality of Life

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Abstract

Background—Cognitive variables such as knowledge, attitude and self-efficacy affect asthma patients' abilities to be effective self-managers.

Objective—The objective of this cross-sectional analysis was to determine what patient and clinical factors were associated with these cognitive variables and to assess the contributions of these cognitive variables to clinical status.

Methods—Primary care asthma patients were interviewed using the three domains of the Knowledge, Attitude and Self-Efficacy Asthma Questionnaire (KASE), as well as established scales to measure social support, depressive symptoms, and ratings of asthma care. Clinical asthma status was measured with the Asthma Quality of Life Questionnaire (AQLQ).

Results—In total, 180 patients were enrolled with a mean age of 43 years and 84% were women. Knowledge was low with only 50% of patients answering half or more questions correctly (mean score = 52, possible range 0–100, higher is more knowledge). Attitude toward asthma was generally positive (mean score = 82, possible range 20–100, higher is more positive attitude) and self-efficacy was moderate (mean score = 76, possible range 20–100, higher is more self-efficacy). In separate multivariate analyses: younger age and higher education level were associated with more knowledge ($p \leq .005$); more social support, fewer depressive symptoms, and more favorable prior results of asthma care were associated with more positive attitude ($p \leq .05$); and favorable prior results, more satisfaction with asthma status, not having stress-related triggers, and not having had a recent emergency department visit for asthma were associated with more self-efficacy ($p \leq .07$ for all variables). In additional multivariate analyses, more knowledge ($p = .0005$), more positive attitude ($p = .02$) and more self-efficacy ($p = .01$) were associated with better AQLQ scores.

Conclusions—Different patient and clinical characteristics were associated with cognitive variables pertinent to self-management. These variables, in turn, were independently associated with asthma status. Thus, while fostering improvement in all three variables would be desirable, interventions that improve any of these variables potentially could be beneficial.

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Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

Keywords

knowledge; attitude; self-efficacy; quality of life; asthma; self-management; cognitive variables

Asthma self-management refers to what patients do to monitor and control symptoms and to prevent exacerbations.[1–3] According to the National Asthma Education and Prevention Program Expert Panel, training patients in self-management should be part of routine clinical care and should address pertinent cognitive variables, such as asthma knowledge, attitudes, and self-efficacy.[1] Asthma knowledge includes the ability to recognize triggers, to understand the roles of maintenance and rescue medications, and to develop plans to manage exacerbations.[4] A positive attitude toward asthma promotes the willingness to partner with physicians and to adopt new self-management behaviors. Asthma self-efficacy is the confidence to accurately interpret symptoms and follow through with appropriate self-care.[4–6]

Although complementary, these cognitive variables address unique aspects of how patients view and relate to asthma.[4] As such, they may be affected by different patient and clinical variables. For example, patients' ability to acquire and utilize knowledge about asthma may depend on their existing knowledge base and facility with formal instruction, which, in turn, may vary with education level. Being confident in managing asthma, on the other hand, may depend less on formal education or instruction and more on information acquired from experience, such as prior personal successes in identifying and managing triggers and exacerbations. Attitude about being a self-manager also may be affected by experience as well as by the perceived success of prior asthma care. These cognitive variables probably are affected by available resources, social support, and depressive symptoms, all of which can influence motivation and the ability to be proactive.[5,7,8] These cognitive variables, in turn, may independently affect important asthma outcomes, such as symptoms and limitations in daily activities.

The objective of this study was to determine what patient and clinical characteristics are associated with these cognitive variables as measured by the three domains of the Knowledge, Attitude, and Self-Efficacy Asthma Questionnaire. An additional objective was to assess the contributions of these cognitive variables to different domains of clinical status measured by the Asthma Quality of Life Questionnaire.

Methods

The analyses carried out in this study were based on enrollment data obtained for a randomized trial to test a self-management intervention designed to increase knowledge and self-efficacy in asthma patients followed at the Cornell Internal Medicine Associates primary care practice in New York City.[9] The trial was approved by the Institutional Review Board at the Weill Cornell Medical College/New York Presbyterian Hospital and all patients provided written informed consent. Patients were eligible if they were 18 years of age or older, English speaking, had moderate persistent asthma, and had no pulmonary or severe comorbidity. In total, 349 patients were eligible, 180 were enrolled at the time of a routine office visit, and 169 were not enrolled, primarily because they did not come for their office visit.

At enrollment, patients were interviewed in person. The three self-management cognitive variables were measured with the corresponding domains of the Knowledge, Attitude, and Self-Efficacy Asthma Questionnaire (KASE).[10] The KASE is a valid, reliable scale that has been used in studies assessing self-management, medication compliance, and resource utilization.[2,4,11] The knowledge domain contains 20 questions measuring basic knowledge

of asthma, including types of medications, triggers, and how to manage exacerbations. The attitude domain contains 20 questions addressing optimism about dealing with asthma and the willingness to be a self manager. The self-efficacy domain contains 20 questions measuring confidence in the ability to manage and control asthma. For the knowledge domain, scores can range from 0 to 100, with higher scores indicating more knowledge. For the attitude and self-efficacy domains, scores can range from 20 to 100, with higher scores indicating more optimistic attitude and more self-efficacy.

Patient and clinical characteristics that might be associated with these three cognitive variables were measured with specific questions and validated questionnaires. Social support was measured with the Duke Social Support Scale a 12-item scale which measures the extent of the social network available to provide support and the amount of support provided.[12] Scores can range from 0 to 100, with higher scores indicating more support. Depressive symptoms were measured with the 30-item Geriatric Depression Scale, which has been shown to be valid in younger patients and applicable to asthma patients.[13,14] Scores can range from 0 to 30 with higher scores indicating more depressive symptoms. Patients also were asked about satisfaction with the overall status of their asthma with response options ranging from very satisfied to very dissatisfied, and about their perception of the results of their asthma care, with response options ranging from excellent to poor. In addition, patients were asked about types of triggers, asthma medications, and emergency department visits for asthma in the prior 3 months. Long-term asthma status was measured with the Severity of Asthma Scale, which considers medication use and lifetime urgent resource utilization.[15] Scores can range from 0 to 28, with higher scores indicating more severe asthma. Forced expiratory volume in 1 second (FEV₁) was measured at enrollment with a portable spirometer.

Contributions of asthma knowledge, attitude, and self-efficacy to overall asthma status also were assessed in relation to the Asthma Quality of Life Questionnaire (AQLQ).[16] The AQLQ is a 32-item scale with 4 domains: symptoms, limitations in activities, emotional aspects of asthma, and environmental impact on asthma. An overall summary also can be determined from the 4 domains. Scores for each domain and the overall summary can range from 1 to 7, with higher scores indicating better status.

Means and frequencies were calculated for continuous and categorical variables, respectively. Associations among the three domains of the KASE were calculated with Pearson correlation coefficients. Bivariate analyses followed by multivariate regression analyses were carried out with scores for each domain of the KASE as dependent variables. Independent variables were patient and clinical characteristics, social support, depressive symptoms, and responses to questions about asthma triggers, satisfaction, and results of care. Variables that were associated in bivariate analyses with any of the three cognitive variables were retained in all multivariate models. In another series of analyses, each domain of the AQLQ was the dependent variable and the three cognitive variables were independent variables. All analyses were carried out in SAS.[17]

Results

The mean age was 43 years and 84% were women (Table 1). The sample was racially/ethnically diverse; 7% were self-described as “other”, primarily Asian, Native American, and Caribbean. Approximately half were college graduates, employed, and never married. Twenty-one percent of patients had other major medical conditions, primarily diabetes mellitus, and 29% had a positive screen for depression defined as having a Geriatric Depression Scale score ≥ 11 . Patients reported several major categories of triggers, including emotional and environmental precipitants. Although all patients met criteria for moderate persistent asthma, only 72% reported taking maintenance medications. Most patients (87%) described the results of the

medical care they received for asthma as excellent or good, however, one third was dissatisfied with the status of their asthma. Many patients had been hospitalized (48%) or were treated at least once in the emergency department for asthma (79%); 18% had been treated for asthma in the emergency department in the prior 3 months.

As measured by the KASE, asthma knowledge was low, with only 50% of patients answering half or more questions correctly. Attitude toward asthma was generally positive and self-efficacy was moderate. Correlations between knowledge and attitude scores ($r = .21$) and knowledge and self-efficacy scores ($r = .34$) were lower than between attitude and self-efficacy scores ($r = .56$). Health-related quality of life was moderately affected by asthma, which was anticipated for these patients with moderate persistent disease.

Scores for each domain of the KASE were normally distributed and were assessed in bivariate and then linear regression multivariate analyses. In bivariate analyses, multiple patient and clinical characteristics were associated with more knowledge (Table 2). In particular, younger age, more education, and race/ethnicity categories were associated, as were fewer depressive symptoms, not having weather- or stress-related triggers, and not having been in the emergency department for asthma within the prior 3 months. Having a more positive attitude and more self-efficacy also were associated with more knowledge. In multivariate analysis, younger age, more education, white race, and not having had a recent emergency department visit remained associated with more knowledge. These variables accounted for 45% of the variance in the model.

Different variables were associated with having a more positive attitude toward asthma (Table 3). Specifically, more social support, fewer depressive symptoms, rating the results of care more favorably, and being more satisfied with the status of asthma were associated with a more positive attitude. These variables remained associated in the multivariate model, along with more self-efficacy, and accounted for 46% of the variance in the model.

With respect to self-efficacy, most of the demographic and clinical characteristics considered in this study were associated in bivariate analyses (Table 4). In the multivariate model, patients who were classified as “other” for race/ethnicity had less self-efficacy ($p = .0005$), however, the clinical significance of this is not apparent. Also, patients with stress-related triggers and those who had an emergency department visit in the prior 3 months had less self-efficacy. Being more satisfied with the status of asthma and having a positive attitude toward asthma were associated with more self-efficacy. These variables accounted for 51% of the variance in the model.

The contribution of each cognitive variable to clinical asthma status was assessed with respect to the Asthma Quality of Life Questionnaire. Knowledge and self-efficacy were independently associated with each domain of the AQLQ and attitude was associated with the symptoms and emotional domains (Table 5). All three cognitive variables were independently associated with the overall AQLQ summary score.

Discussion

In this analysis of primary care asthma patients, multiple patient, clinical, and perceived process characteristics were associated with different cognitive variables that affect asthma self-management. These cognitive variables, in turn, were associated with clinical asthma status measured by the Asthma Quality of Life Questionnaire.

It is widely accepted that knowledge of asthma is necessary to be an effective self-manager. [5,18–20] However, there are multiple complex tasks required to manage asthma, and the scope and amount of knowledge required to fulfill these tasks can be formidable.[1,3,19] For

example, patients need to know basic pathophysiology in order to understand why triggers can be diverse and why maintenance medications are necessary in the absence of symptoms. Patients also need to learn to monitor lung function, recognize exacerbations early, dose rescue medications, and determine when emergency care is necessary. Measuring knowledge in all these areas can be challenging and several knowledge scales have been developed and validated, including those that assess general asthma knowledge as well as scales to measure self-management knowledge.[11,18,20] In addition, different query formats have been used in these knowledge scales, such as multiple-choice questions, true/false questions, and hypothetical scenarios.[18,20–22] In the current analysis using the KASE, which measures general knowledge with a multiple-choice response format, younger age and more education were strongly associated with greater asthma knowledge. Our findings confirm results from other studies which also showed that younger age and more education were associated with more knowledge in both ambulatory and emergency department asthma patients.[6,20,21]

Despite the importance of knowledge, knowing what to do is not the same as being able to do it in real-life settings.[4,5,20] Other psychosocial characteristics, such as motivation and favorable expectations of outcomes, are required and these are closely related to attitude about being an asthma self-manager.[6,23] In this analysis, more social support and fewer depressive symptoms were associated with a more positive attitude toward asthma. Both these variables can enhance motivation to maintain daily self-monitoring and care.[5] We also found that satisfaction and better assessments of prior asthma care were associated with a more positive attitude. This is consistent with other studies that also showed attitude toward asthma was affected by experiences with medical care.[6,23] For example, in one study a more positive attitude toward asthma self-management was associated with perceived better quality of care as measured by ratings of treatment efficacy and the competence of health care providers. [23]

Another critical ingredient for turning knowledge into behavior is having the self-efficacy, or confidence, that the behavior will yield the desired outcome.[4,5] Rating the results of prior asthma care more favorably and greater satisfaction with asthma status were related to more self-efficacy. This was anticipated because both these variables reflect personal experiences with asthma. It was particularly interesting to note that, unlike the relationship with asthma knowledge, education level was not related to self-efficacy. This is consistent with the hypothesis that self-efficacy is experience based with patients acquiring most of their confidence about managing asthma from their own successes and from the observed experiences of others rather than from formal instruction.

We also considered the effects of having been treated in the emergency department for asthma. Having had an emergency department visit within the prior 3 months was associated with less knowledge and less self-efficacy. Regarding directionality, it is likely that less knowledge resulted in more emergency department use. However, the relationship was probably bi-directional for self-efficacy -- with less self-efficacy resulting in more emergency care, and more emergency care resulting in perceived failed self-management and subsequent less self-efficacy.

Finally, we found that better scores for the three cognitive variables were independently associated with more favorable clinical asthma status measured by various domains of the Asthma Quality of Life Questionnaire. Previous studies also have shown more general knowledge was associated with better AQLQ scores in ambulatory and emergency department patients.[24,25] In addition, in one longitudinal observational study, greater baseline self-efficacy predicted more favorable subsequent AQLQ scores, and in another prospective study improvements in all KASE variables were associated with improvements in AQLQ scores after a self-management intervention.[2,26]

This study has several limitations. First, this study was conducted in a tertiary care medical center with patients with moderate persistent asthma and may not be generalizable to patients in other settings with different asthma severity. Second, we did not measure actual self-management practices or query patients on knowledge of self-management. Third, given this was a cross-sectional analysis, we were not able to conclude the directionality of some of the clinical variables. For example, asthma that is triggered by stress could lead to less self-efficacy, but less self-efficacy also could lead to increased susceptibility to stress as a trigger. Fourth, patients self-described their race/ethnicity and a heterogeneous group of individuals were categorized as “other”. As such, our analyses regarding the contributions of this variable were limited.

In this study we found that different patient and clinical characteristics were associated with cognitive variables required for effective self-management. Many of these characteristics are potentially modifiable. In addition, the cognitive variables were independently associated with asthma quality of life. Thus, although fostering improvement in all three variables would be desirable, interventions that improve any of these variables potentially could be beneficial.

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Table 1

Patient and clinical characteristics (n=180)

	Percent
Age, mean (SD), years	43 ± 13
Women	84%
Race/ethnicity	
White	31%
African American	32%
Latino	30%
Other	7%
College graduate	47%
Never married	49%
Employed	53%
Current smoker	9%
Social support, mean (SD), years ^a	46 (19)
Depressive symptoms, mean (SD), years ^b	8.3 (7.1)
Asthma duration, mean (SD), years	23 (15)
Forced expiratory volume in 1 second (FEV1), mean (SD)	82% (20%)
Asthma severity, mean (SD) ^c	9 (5)
Asthma triggers	
Stress	61%
Allergies	75%
Upper respiratory infections	94%
Pollution	73%
Variation in weather	66%
Prescribed maintenance medications ^d	72%
Perceived results of asthma care	
Excellent	43%
Good	44%
Fair	12%
Poor	2%
Satisfaction with asthma status	
Very satisfied	20%
Satisfied	22%
Neutral	23%
Dissatisfied	23%
Very dissatisfied	12%
Treated in emergency department for asthma during prior 3 months	18%
KASE domains ^e	
Asthma knowledge, mean (SD)	52 (17)
Attitude toward asthma, mean (SD)	82 (8)

	Percent
Asthma self-efficacy, mean (SD)	76 (14)
Asthma quality of life, total score, mean (SD) ^f	4.1 (1.4)

^a Duke Social Support Scale, possible score range 0–100, higher is more support

^b Geriatric Depression Scale, possible score range 0–30, higher is more depressive symptoms

^c Severity of Asthma Scale, possible score range 0–28, higher is more severe asthma

^d inhaled corticosteroid, theophylline, cromolyn sodium, ipratropium bromide, oral beta agonist

^e Knowledge, Attitude and Self-Efficacy Asthma Questionnaire (KASE), possible score range 0–100 for knowledge domain, 20–100 for attitude and self-efficacy domains, higher is more of that attribute

^f Asthma Quality of Life Questionnaire, possible score range 1–7, higher score is better status

Table 2

Variables associated with more asthma knowledge ^a

Variables	Bivariate		Multivariate	
	Estimate	P value	Estimate	P value R ^{2b}
Older age	-.22	.02	-.27	.001
Men	+7.76	.02	--	ns
College graduate	+14.17	<.0001	+6.53	.005
Less severe asthma	+.49	.06	--	ns
More social support	+.06	.34	--	ns
Fewer depressive symptoms	+.59	.0007	--	ns
White	+18.97	.0001	+14.2	.001
African American	-7.82	.003	--	ns
Latino	-2.89	.03	--	ns
Better rating of results of care	+1.40	.41	--	ns
More satisfied with asthma status	+1.88	.05	--	ns
Triggered by weather	-9.45	.0003	--	ns
Triggered by stress	-9.87	<.0001	--	ns
Had ED visit in past 3 months	-11.88	.0002	-7.33	.01
Attitude toward asthma	+.42	.005	+.23	.14
Asthma self-efficacy	+.41	<.0001	+.13	.19
				.45 ^d

^abased on the knowledge domain of the Knowledge, Attitude and Self-Efficacy Asthma Questionnaire

^bvariance explained by model

^cmodel excluding attitude and self-efficacy variables

^dmodel with all variables

Table 3

Variables associated with more positive attitude toward managing asthma ^a

Variables	Bivariate		Multivariate	
	Estimate	P value	Estimate	P value R ^{2b}
Older age	+0.06	.22	--	ns
Men	+1.04	.54	--	ns
College graduate	+2.4	.85	--	ns
Less severe asthma	+2.5	.05	--	ns
More social support	+1.4	<.0001	+0.9	.005
Fewer depressive symptoms	+3.8	<.0001	+2.2	.02
White	+1.68	.21	--	ns
African American	+1.88	.15	--	ns
Latino	-2.89	.03	--	ns
Better rating of results of care	+4.28	<.0001	+3.01	.0004
More satisfied with asthma status	+2.04	<.0001	+0.99	.05
Triggered by weather	-3.19	.01	--	ns
Triggered by stress	-1.45	.25	--	ns
Had ED visit in past 3 months	-1.67	.30	--	ns
				.31 ^c
Asthma self-efficacy	+3.4	<.0001	+2.8	<.0001
Asthma knowledge	+1.0	.005	+0.6	.14
				.46 ^d

^a based on the attitude domain of the Knowledge, Attitude and Self-Efficacy Asthma Questionnaire

^b variance explained by model

^c model excluding self-efficacy and knowledge variables

^d model with all variables

Table 4

Variables associated with more asthma self-efficacy ^a

Variables	Bivariate		Multivariate	
	Estimate	P value	Estimate	P value R ^{2b}
Older age	+0.05	.49	--	ns
Men	+5.14	.06	--	ns
College graduate	+4.39	.03	--	ns
Less severe asthma	+7.71	.0007	--	ns
More social support	+1.11	.04	--	ns
Fewer depressive symptoms	+6.1	<.0001	--	ns
White	+8.42	.0001	+15.3	<.0001
African American	+3.36	.87	+13.3	.0005
Latino	-4.82	.03	+3.56	.0005
Better rating of results of care	+6.63	<.0001	+4.70	.0003
More satisfied with asthma status	+4.06	<.0001	+1.98	.01
Triggered by weather	-4.77	.03	--	ns
Triggered by stress	-8.50	<.0001	-3.61	.07
Had ED visit in past 3 months	-8.88	.0008	-5.25	.04
				.38 ^c
Attitude toward asthma	+9.3	<.0001	+7.0	<.0001
Asthma knowledge	+2.8	<.0001	+0.8	.19
				.51 ^d

^abased on the self-efficacy domain of the Knowledge, Attitude and Self-Efficacy Asthma Questionnaire

^bvariance explained by model

^cmodel excluding attitude and knowledge variables

^dmodel with all variables

Table 5

Multivariate models of Asthma Quality of Life Questionnaire domains

Variables ^a	Activities		Symptoms		Emotional		Environmental		Total	
	Estimate	p value	Estimate	p value	Estimate	p value	Estimate	p value	Estimate	p value
Knowledge	+02	.0008	+02	.002	+02	.007	+02	.01	+02	.0005
Attitude	+02	.24	+05	.002	+03	.08	+02	.22	+03	.02
Self-efficacy	+02	.05	+02	.07	+03	.008	+03	.003	+02	.01

^abased on the Knowledge, Attitude and Self-Efficacy Asthma Questionnaire