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Long-term effects of negotiated treatment plans on self-management behaviors and satisfaction with care among women with asthma

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Abstract

Objective—To examine characteristics of women with negotiated treatment plans, factors that contribute to newly forming a treatment plan, and the impact of plans on asthma management, and their satisfaction with care over two years.

Methods—Data came from telephone interviews with 324 women with asthma at baseline, 12 and 24 months. The effect of having a negotiated treatment plan on medication adherence, asking the physician questions about asthma, asthma management self-efficacy, and satisfaction with care was assessed over 24 months. Data were analyzed using mixed models. Analyses controlled for patient characteristics.

Results—38% reported having a negotiated treatment plan at three time points. Seeing an asthma specialist ($X^2(1)=24.07$; $p<0.001$), was associated with having a plan. Women who did not have a negotiated treatment plan at baseline, but acquired one at 12 or 24 months were more likely to report greater urgent office visits for asthma (OR= 1.37, 95% CI: 1.07 to 1.61). No associations were observed between having a plan and urgent health care use or symptom frequency. When

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DECLARATION OF INTEREST

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adjusting for household income, level of asthma control, and specialty of the caregiving provider, women who did not have a negotiated treatment plan (OR=0.28, 95% CI: 0.09 to 0.79), and those with a plan at fewer than three time points (OR=0.30, 95% CI: 0.11 to 0.83) were less likely to report medication adherence and satisfaction with their care (regression coefficient (SE), -0.65 (0.17), $p<0.001$). No differences in asthma management self-efficacy or asking the doctor questions about asthma were observed.

Conclusion—Women with asthma who had a negotiated treatment plan were more likely to see an asthma specialist. In the long-term, not having a treatment plan that is developed in partnership with a clinician may have an adverse impact on medication use, and patient views of clinical services.

Keywords

patient satisfaction; treatment plans; clinical guidelines; shared-decision making; outcomes

INTRODUCTION

The National Asthma Education and Prevention Program (NAEPP) Expert Panel Guidelines on the Diagnosis and Management of Asthma describe patient satisfaction as an important proxy measure of achieving treatment goals [1]. For long-term management of asthma, the NAEPP guidelines recommend that all patients receive a treatment plan detailing prescribed daily management (including medications and environmental control strategies) and how to recognize and handle worsening asthma [1]. Asthma treatment plans often encapsulate educational messages and are thought to support and facilitate self-management [2]. Investigations have shown that asthma treatment plans can positively influence patient health outcomes such as improved asthma control and decreased health care use [3], [4]. An evidence-based review of essential components of asthma treatment plans suggests that patient engagement is also associated with acceptance of and adherence to clinical recommendations [5]. In recent years, the changing culture of medicine and the emphasis on patient-centered care has shifted the one-way communication paradigm from health care provider to patient, toward a collaborative, interactive partnership [6].

In the management of chronic disease, ongoing partnerships with providers and patients are considered processes that enable patients to maintain optimal control over their disease [7]. Negotiated treatment plans where physician and patient share in decision making about the regimen are increasingly discussed in the literature as an important element of clinical care [8], [9]. However, negotiating a treatment plan is, for many physicians, a new procedure requiring a different relationship and interaction with patients. Enhanced outcomes as a result of engaging in negotiation, that might require additional time and new skills, need to be evident to recommend the practice.

Few empirical studies have examined the impact of having a negotiated treatment plan on asthma outcomes. Wilson and colleagues (2010) showed that in a general population of adults with poorly controlled asthma followed over two years, having a negotiated treatment plan was associated with significant improvement in adherence to use of asthma medicines compared to having an asthma treatment plan determined by the clinician alone [10]. No significant differences in other outcomes were reported.

Women have the highest prevalence of disease among adult asthma patients and experience the greatest burden related to symptoms and health care use [11]. They comprise an important group for intervention to enhance asthma outcomes. Ensuring that women obtain the care they require is central to keeping asthma under control and reducing the high asthma-related personal and financial costs patients and the health care system bear.

Satisfaction with care is an increasingly evident dimension when determining the quality of clinical services and has been associated with seeking care [12].

Clark et al. (2011) showed that in the long-term, defined as two years, women with negotiated treatment plans had better compliance with asthma medications, although no differences in health care use were observed [13]. The demographic and clinical characteristics of women who are in possession of a negotiated treatment plan have not been explored, nor has the effect of such plans on asthma self-management behaviors and satisfaction with care across time.

The purpose of this study was to compare the characteristics of women with asthma who report having a negotiated treatment plan versus those who do not, examine factors that contribute to forming a treatment plan, and to determine the impact over a two-year period of such plans on medication compliance, asking the physician questions about asthma, asthma management self-efficacy, and satisfaction with clinical care.

METHODS

Data Source

Data used for this study came from three waves of data comprising the control arm of a randomized controlled trial evaluating a self-management program in women diagnosed with asthma. Those randomized to the control group of the study were not exposed to an asthma self-management intervention, but rather received usual care, that is, standard treatment and asthma education of a type that is found in most health-care institutions. Details of the self-management study are described elsewhere [14], [15]. The protocol for the study presented here was approved by the Institutional Review Board of the University of Michigan Health System (UMHS).

Sample

Participants were women with asthma 18 years of age or older with a diagnosis of asthma by a UMHS physician based on NAEPP guidelines [1]. Study eligibility criteria included being enrolled as a patient in one of the participating UMHS asthma or primary care clinics, presence of active asthma symptoms in the past 12 months, and no extenuating medical or mental conditions (e.g., terminal illness or dementia). Recruitment and sampling procedures for participants are described in detail elsewhere [14]. The findings presented here comprise data from the 384 control group participants at baseline, 297 at 12 months, and 203 at 24 months post-baseline. The attrition rate from baseline to first follow-up (12 months post baseline) was 23%, and 32% from follow-up 1 to follow-up 2 (24 months post baseline).

Data Collection and Measures

All data were collected through telephone calls conducted by trained interviewers. Survey items included information about the treatment plan, adherence to the asthma medicine regimen, frequency of asthma symptoms, asking their doctor questions about asthma, asthma management self-efficacy beliefs, and satisfaction with clinical care for asthma. Items also elicited if the respondents received services from a specialist (allergy or pulmonology) or from a primary care physician, and demographic characteristics including age, education, household income, marital status, and race/ethnicity. Survey items were administered at baseline, 12-months, and 24-months post-baseline. Variables were operationalized as follows:

Negotiated Treatment Plan—Negotiated treatment plan is operationalized in this study as a plan formulated between clinician and patient that includes shared-decision making [8].

To determine if patients had a negotiated treatment plan, they were asked, “Do you have a treatment plan or asthma care plan that you and your doctor worked out together for you to adjust your medication use when symptoms change?” Responses were recoded into three categories based on the distribution of responses across the three time points: negotiated treatment plan (reported having plan at all three time points), inconsistent negotiated treatment plan (reported having plan at some, but not all time points), and no negotiated treatment plan (did not report having a plan at any time point).

Patient Satisfaction—Patient satisfaction with asthma care was assessed by the item: “In general, how satisfied are you with the clinical/medical care you receive for asthma?” (‘not at all satisfied’=1 to ‘extremely satisfied’=5).

Asthma Management Self-Efficacy—To evaluate asthma management self-efficacy, participants were asked: “how confident are you in your ability to manage your asthma?” Responses were rated on a 10-point Likert scale with 1 meaning ‘not at all confident’ and 10 meaning ‘extremely confident.’

Medication Adherence—Medication adherence was evaluated by the following question: “How often do you take your asthma medications as prescribed by your physician?” (usually, sometimes, rarely). Responses were collapsed into a binary response with ‘usually’ indicating ‘yes’ and ‘rarely’ or ‘sometimes’ indicating ‘no.’

Asking the Doctor Questions about Asthma—One item assessed whether participants asked their doctor questions about asthma using a four point response scale: “Would you say that you asked the doctor questions about asthma often, sometimes, rarely, or never?”

Asthma Control and Frequency of Symptoms—Asthma control was assessed based on self-report of frequency of presence of daytime and nighttime symptoms in the previous month, based on the NAEPP Guidelines for the Diagnosis and Management of Asthma [1]. The control level was calculated by taking the worst of the day or night symptoms. Frequency of symptoms were classified into four categories: 2 days/week, >2 days/week but not daily, daily, and throughout the day. Asthma control was organized into three categories: poorly controlled, not well controlled, or well controlled [1].

Asthma-related Urgent Care Use—Asthma-related urgent care use was assessed by asking participants, during the past 12 months, how many times they had: “an unscheduled visit to the doctor or clinic for urgent asthma treatment?”, “gone to the emergency department for asthma treatment?”, “to stay overnight at least one night in the hospital, because of your asthma?”, all assessed through open-ended responses. Since urgent care experiences are usually rare events, objective and self-reports have shown relatively high concordance [16], [17]. Other work has shown that a 12-month recall period for health care utilization did not diminish accuracy of patient reports [18].

Data analysis

The main independent predictor was negotiated treatment plan. Outcomes of interest were patient satisfaction, asthma-related urgent care, asthma management self-efficacy, medication adherence, and initiating discussion about asthma with the doctor. Sensitivity analyses were conducted to confirm the stability of the results with ‘rarely’ indicating ‘no’ for medication compliance and ‘sometimes’ and ‘usually’ indicating ‘yes’.

For demographic and clinical variables, frequencies were computed for each of the categorical variables (education, household income, marital status, race/ethnicity, asthma control, frequency of symptoms, medical specialty of physician providing asthma care, medication adherence, asking the doctor questions about asthma, and negotiated treatment plan), and means and standard deviations were computed for continuous variables (e.g. participant age).

Demographic and clinical characteristics were compared between participants lost to follow-up and participants retained at 24-month follow-up using one-way Analysis of Variance (ANOVA) for continuous variables and cross tabulations with chi-squared and Fisher's exact tests as appropriate for categorical variables.

One-way Analysis of Variance (ANOVA) for continuous variables and cross tabulations with chi-squared and Fisher's exact tests as appropriate for categorical variables were used to examine differences in demographic and clinical characteristics between participants in the three treatment plan groups.

Multivariate logistic regression was used to examine clinical characteristics of participants who did not have a treatment plan at baseline, but came to have one at follow-up. The dependent variable in the model was inconsistent treatment plan, and the independent variables included frequency of symptoms, asthma control, emergency department visits, hospitalizations, and urgent office visits for asthma.

For repeated measures analysis, linear mixed models were utilized for the continuous outcomes (patient satisfaction, asthma management self-efficacy), and generalized mixed models for binary outcomes (medication compliance, asking the doctor questions about asthma). All models were adjusted for asthma control and medical specialty of the provider based on bivariate analyses, and intended to control for potential differences in physician treatment and management recommendations for patients in the sample. Patient educational attainment and household income demonstrated high collinearity ($X^2(12) = 61.60$, $p < 0.0001$), and based on prior studies that suggest differential receipt of information and verbal activity between clinician and patient based on patients' income [19], models were also adjusted for household income. Models for asking the doctor questions about asthma were additionally adjusted for participant race since a consistent body of research demonstrates differential communication patterns in the clinical encounter between physicians and racial/minority patients [20]. All models included the main effect of treatment plan status, time, and the interaction of treatment plan status by time. Examining the impact of negotiated treatment plans based on three groups provides a closer look at whether having a consistent plan brings about the most benefit in terms of outcomes under investigation. Alpha values of 0.05 or less were considered significant for these analyses. All analyses were conducted using SAS 9.2.

RESULTS

Sample

Demographic and clinical differences between participants lost to follow-up ($n=181$) and participants retained at 24-month follow ($n=203$) included educational attainment ($X^2(4)=10.28$; $p<0.05$), with those a greater proportion of women retained at follow-up having higher educational attainment, and frequency of symptoms, with participants lost to follow-up having a great proportion of daily frequent symptoms ($X^2(3)= 13.01$; $p<0.01$). There were also significant differences between groups with level of asthma control ($X^2(2)= 13.97$; $p<0.001$), with a greater proportion of women who were lost to follow-up reporting poorly controlled asthma.

Demographic and clinical characteristics of the study participants who completed 24-month follow-up are presented in Table 1. The mean age of participants was 49.53 years (SD=13.39), 13% of the sample was non-white, and 65% reported being married. Seventy five percent of participants reported educational attainment above the high school level and 70% of participants had an annual household income greater than \$40 000. Based on NAEPP guidelines, 50% of the sample reported well-controlled asthma, while 44% were not well controlled, and 6% had poorly controlled asthma. Sixty percent of participants experienced asthma symptoms more than two days per week. Mean urgent care use for participants was 0.211 (SD=0.66) emergency visits, 0.137 (SD=0.54) hospitalizations, and 0.566 (SD=1.31) urgent office visits. No associations were observed between having a plan and urgent health care use or symptom frequency. Thirty eight percent of participants reported having a negotiated treatment plan at three points in time, while 36% of participants had a plan at only one time period, and 25% reported not having a negotiated treatment plan. Significant differences in having and not having a plan were found for receiving care from a specialist, with participants seen by specialists more likely to have a treatment plan at all three time points ($X^2(1)= 8.37$; $p<0.01$), and asthma-related hospitalizations, with participants who had higher mean hospitalizations more likely to have a treatment plan at all three time points ($F=3.10$; $p<0.05$).

In a multivariate logistic regression model examining clinical factors and health care use events associated with receiving a negotiated treatment plan after baseline, findings indicate that women who did not have a negotiated treatment plan at baseline, but acquired one at follow-up 1 or follow-up 2 were more likely to report greater urgent office visits for asthma (OR= 1.37, 95% CI: 1.07 to 1.61, $p<0.01$) compared to women who had a negotiated treatment plan at baseline or did not have one through the entire study period.

Self-Management Behaviors and Negotiated Treatment Plans

Two self-management behaviors were associated with having a negotiated treatment plan, specifically medication compliance and asking the doctor questions about asthma (see Table 2). Analyses showed that for medication compliance, within-group trends across time points were similar for participants who reported having a negotiated treatment plan at all three time points, fewer than three time points, and no time points in a model adjusted for asthma control, receiving specialty care, and income. These results remained the same in models adjusted only for receiving specialty care and income. However, between-group differences showed that outcomes varied at each of the three time points by having or not having a treatment plan (see Figure 1). Findings indicate that participants who did not have a negotiated treatment plan at any time point (OR= 0.28, 95% CI: 0.09 to 0.79, $p<0.01$), and those with a treatment plan at fewer than three time points (OR= 0.30, 95% CI: 0.11 to 0.83, $p<0.05$) were less likely to report medication compliance when adjusted for asthma control, receiving specialty care, and income. These findings were similar when level of asthma control was removed from the models. No differences in asking the doctor questions about asthma were observed.

Patient Satisfaction, Asthma Management Self-Efficacy and Negotiated Treatment Plans

Table 3 shows results of the associations between patient satisfaction and asthma management self-efficacy and having a negotiated treatment plan. Results illustrate that for patient satisfaction with care, within-group trends across time were similar for participants who reported having a negotiated treatment plan at all three time points, fewer than three time points, and no time point in a model adjusted for asthma control, receiving specialty care, and income. However, between-group differences showed that the treatment plan groups did vary at each of the three time points (as presented in Figure 1). Findings demonstrated that there was less patient satisfaction (estimated regression coefficient

(standard error), -0.65 (0.17), $p < 0.001$) for participants without a treatment plan compared to participants with a treatment plan at all three time points when adjusted for asthma control, receiving specialty care, and income.

For asthma management self-efficacy, within-group trends across time were similar across each of the treatment plan conditions in models adjusted for asthma control, receiving specialty care, and income, and there were no differences between having or not having a treatment plan and self-efficacy.

DISCUSSION

The study presented here is the first we are aware of that has examined asthma self-management behavior, confidence to carry out a treatment plan, and satisfaction with care over a two-year period as they are associated with having a negotiated treatment plan. Women comprise a group vulnerable to problems with asthma. This study illustrated that one-quarter of the women studied did not have a negotiated treatment plan. In our sample, significant associations between negotiated treatment plans, asthma control and urgent care use for asthma were not found. However, women who had a negotiated treatment plan were more likely to be seen by an asthma specialist. Women who did not have a plan at baseline but came to have a plan later during the two-year follow-up period were more likely to have experienced urgent office visits for asthma. An asthma event or episode may have motivated the women or the doctor to negotiate a plan. These findings reinforce other work demonstrating that there are clinical differences in those who receive asthma self-management tools of various types [21], [22].

Previous research has shown that negotiated treatment plans and shared decision making approaches in a general population of adults with asthma are associated with better use of medicines [10]. Women in the present study who did not have a negotiated treatment plan were less likely to comply with use of medicines, supporting the idea that when clinicians and patients engage in partnership to develop a treatment plan, patients are more willing to follow it perhaps because it is tailored to their unique circumstances.

Although the lack of a negotiated treatment plan was associated with less compliance to the medical regimen, possessing one did not appear to affect a woman's confidence to manage asthma. Such treatment plans have been discussed as a means to build the self-efficacy of patients to manage their asthma effectively at home [23]. However, these findings did not confirm this assumption. Further, although expectations in the literature suggest that negotiated plans create more exchange of information between the physician and patient, in this study, having such a plan was not associated with asking more questions of the physician [8], [24].

Study women who received asthma care from primary care physicians and not specialists were less likely to have a negotiated treatment plan. This finding is consistent with other work that has shown that adherence to practices recommended in national guidelines remains lower among general practitioners than asthma specialists [25], [26].

There are several limitations in this study that should be noted. Data were self-reported, therefore, some responses may not reflect actual behavior. For example, self-report measures of medication adherence can be more positive than is the case [27]. As a result these findings may underreport the extent of non-adherence. Nonetheless, the study aim was to examine differences in groups (with and without a plan) and there is no evidence that underreporting was greater in one group versus the other. The study sample comprised women seen in one health system, and represented a predominately white and well-educated group. As a result, findings may not be generalizable to all women or all adults with asthma

or those seen in other types of practice settings. Lastly, women lost to follow-up were more likely to be lower in educational attainment and in poor asthma control compared to women retained in the study, therefore the findings for this study may not be generalizable to women with less education or poorer asthma control.

This study has strengths. It examines negotiated treatment plans in a population subgroup vulnerable to poor asthma outcomes. It looks more broadly at asthma self-management, that is, beyond just medicine taking. It examines self-efficacy, a construct often discussed as associated with negotiated plans but not previously tested. It considers patient satisfaction with care and identifies patients more likely to get such plans and physicians more likely to give them. This research has also shown significant effects at different time points related to self-management behavior and patient satisfaction, and their relationship to having a negotiated treatment plan.

Findings have implications for both future research and clinical practice. The association of negotiated treatment plans to health care utilization is an important area of study. Reduction in health services use is relevant for both patients and the health care system. Future studies could explore relationships between elements of negotiated treatment plans and outcomes including urgent care use and asthma control. Further inquiry into the utility of negotiated treatment plans may help to inform asthma interventions and strengthen the evidence for clinical recommendations. Clinical implications of this work include the relationship of such plans for greater patient satisfaction with care, an outcome of value for most clinicians and clinical care systems. These findings also suggest that negotiating treatment plans may comprise an important topic for education of general practice physicians as they appear less likely to provide them to patients. Behavioral interventions targeted at primary care physicians to strengthen communication with patients and guideline recommended asthma care have been shown to be accomplished in a standard office visit without extra time even in the face of competing demands [28], [29]. In addition, the fact that communication with the doctor and self-efficacy fluctuated over time for both patients with and without a plan suggests the need for review and discussion of the therapeutic regimen with patients and building their confidence to manage asthma as routine practices.

CONCLUSION

Not having a negotiated treatment plan was related to less medication adherence and satisfaction with clinical care over two years in women, a particularly vulnerable group for poor asthma outcomes. Over the long-term, not having a treatment plan made in partnership with a clinician may have an adverse impact on asthma management and patient perceptions of quality of care.

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Figure 1.
Outcomes of interest at each time point by negotiated treatment plan status.

Table 1

Demographic and clinical aspects of participants who completed 24-month follow up by status of a negotiated treatment plan for asthma.

Variable	Total Sample (N=203) %	Negotiated treatment Plan (N=78) %	Inconsistent treatment plan (N=73) %	No treatment plan (N=51) %	χ^2 or F value	P-value
Age in years (Mean, SD)	49.53 (13.39)	48.47 (11.32)	50.12 (13.94)	49.81 (15.27)	F=0.32; NS	
Education (%)					$\chi^2=7.10$; NS	
Below high school	2%	1%	0%	6%		
High School	24%	22%	23%	27%		
2 year college	23%	23%	25%	20%		
4 year college	26%	30%	26%	22%		
Post-graduate	26%	24%	26%	25%		
Household income					$\chi^2=8.92$; NS	
Less than \$20 000	14%	6%	20%	18%		
\$20 001–\$40 000	16%	15%	14%	20%		
\$40 001–\$60 000	17%	17%	15%	21%		
\$60 001 and greater	53%	62%	51%	41%		
Marital status (% married)	65%	73%	57%	63%	$\chi^2=4.37$; NS	
Race (% non-white)	13%	11%	9%	21%	$\chi^2=4.17$; NS	
Medical specialty of asthma care					$\chi^2=8.37^{**}$	
Asthma specialist	60%	72%	57%	47%		
Primary care	40%	28%	43%	53%		
Asthma control					$\chi^2=1.73$; NS	
Well controlled	50%	52%	49%	51%		
Not well controlled	44%	40%	46%	45%		
Poorly controlled	6%	8%	5%	4%		
Frequency of symptoms					$\chi^2=4.72$; NS	
2 days/week	58%	61%	53%	59%		
>2 days/week, not daily	19%	14%	24%	21%		
Daily	21%	22%	23%	18%		
Throughout the day	2%	3%	0%	2%		
Emergency department visits (Mean, SD)	0.211 (0.66)	0.26 (0.63)	0.24 (0.84)	0.078 (0.33)	F=1.41; NS	

Variable	Total Sample (N=203) %	Negotiated treatment Plan (N=78) %	Inconsistent treatment plan (N=73) %	No treatment plan (N=51) %	χ^2 or F value	P-value
Hospitalizations (Mean, SD)	0.137 (0.54)	0.25 (0.79)	0.08 (0.32)	0.03 (0.19)	F=3.10 *	
Urgent office visits (Mean, SD)	0.566 (1.31)	0.73 (1.63)	0.65 (1.24)	0.19 (0.69)	F=2.83; NS	

ANOVA and chi-square tests were performed on demographic and clinical variables of interest to identify differences between the groups. NS= not significant. Level of significance reported as (p-value):

* p<.05,

**

p<.01,

p<.001.

Table 2

Binary outcomes (medication adherence and asking the doctor questions about asthma) associated with treatment plan status across three time points: Baseline, follow-up 1, and follow-up 2.

Predictor	Medication adherence OR [CI]		Asking the doctor questions about asthma OR [CI]	
	<i>a</i> Model 1	<i>b</i> Model 2	<i>c</i> Model 1	<i>d</i> Model 2
Intercept OR, [CI]	13.30 [4.53 to 38.97]	9.69 [4.48 to 20.95]	2.67 [1.01 to 7.06]	1.30 [0.67 to 2.50]
Baseline	0.54 [0.22 to 1.30]	0.61 [0.28 to 1.35]	1.25 [0.72 to 2.17]	1.47 [0.88 to 2.46]
Follow-up 1	0.58 [0.23 to 1.44]	0.63 [0.29 to 1.38]	0.71 [0.36 to 1.38]	0.85 [0.51 to 1.43]
No treatment plan	0.28 [0.09 to 0.79] **	0.32 [0.11 to 0.87] *	0.52 [0.22 to 1.19]	0.63 [0.29 to 1.38]
Inconsistent treatment plan	0.30 [0.11 to 0.83] *	0.33 [0.13 to 0.86] *	0.62 [0.30 to 1.28]	0.64 [0.32 to 1.29]
Baseline × no treatment plan	1.40 [0.46 to 4.27]	1.09 [0.38 to 3.12]	0.50 [0.19 to 1.30]	0.47 [0.19 to 1.14]
Baseline × Inconsistent treatment plan	1.01 [0.31 to 3.25]	1.18 [0.42 to 3.29]	1.08 [0.35 to 3.28]	0.58 [0.23 to 1.44]
Follow-up 1 × no treatment plan	1.73 [0.56 to 5.31]	1.59 [0.58 to 4.33]	0.55 [0.22 to 1.32]	0.51 [0.22 to 1.18]
Follow-up 1 × Inconsistent treatment plan	1.38 [0.40 to 4.75]	1.89 [0.71 to 5.05]	1.31 [1.75 to 0.44]	1.55 [0.70 to 3.45]

NOTE: estimates for control variables not displayed;

*
p<0.05;

**
p<0.01;

p<0.001; Reference groups are treatment plan, Follow-up 2, and income >\$60,001

a Model adjusted for asthma control, medical specialty of provider, and income.

b Model adjusted for medical specialty of provider and income.

c Model adjusted for asthma control, medical specialty of provider, income, and race.

d Model adjusted for medical specialty of provider, income, and race.

Table 3

Continuous outcomes (patient satisfaction and asthma management self-efficacy) associated with treatment plan status across three time points: Baseline, follow-up 1, and follow-up 2.

Predictor	Patient Satisfaction Estimate (SE)		Asthma Management Self-Efficacy Estimate (SE)	
	<i>a</i> Model 1	<i>b</i> Model 2	<i>a</i> Model 1	<i>b</i> Model 2
Intercept (estimate, SE)	4.38 (0.17)	4.78 (0.11)	8.39 (0.28)	8.85 (0.18)
Baseline	−0.10 (0.11)	−0.13 (0.11)	−0.15 (0.18)	−0.24 (0.18)
Follow-up 1	0.05 (0.14)	0.04 (0.11)	0.09 (0.23)	−0.05 (0.18)
No treatment plan	−0.65 (0.17)***	−0.64 (0.17)***	−0.21 (0.27)	−0.36 (0.27)
Inconsistent treatment plan	−0.11 (0.16)	−0.11 (0.15)	−0.09 (0.25)	−0.26 (0.25)
Baseline × no treatment plan	0.18 (0.18)	0.19 (0.17)	−0.15 (0.28)	−0.10 (0.28)
Baseline × Inconsistent treatment plan	−0.07 (0.17)	−0.06 (0.16)	−0.05 (0.27)	0.08 (0.26)
Follow-up 1 × no treatment plan	0.28 (0.24)	0.16 (0.18)	−0.23 (0.37)	−0.26 (0.29)
Follow-up 1 × Inconsistent treatment plan	−0.002 (0.22)	−0.11 (0.17)	0.15 (0.35)	0.39 (0.27)

NOTE: estimates for control variables not displayed;

*
p<0.05;

**
p<0.01;

p<0.001; Reference groups are treatment plan, Follow-up 2, and income >\$60,001

^a Model adjusted for asthma control, medical specialty of provider, and income.

^b Model adjusted for medical specialty of provider and income.