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Improving Clinician Self-Efficacy Does Not Increase Asthma Guideline Use by Primary Care Clinicians

Michelle M. Cloutier, MD[1,2], **Howard Tennen, PhD**[3], **Dorothy B. Wakefield, MS**[1], **Kevin Brazil, PhD**[4], and **Charles B. Hall, PhD**[5]

[1]Department of Pediatrics, University of Connecticut Health Center, Farmington, CT

[2]Asthma Center, Connecticut Children's Medical Center, Hartford, CT

[3]School of Medicine, University of Connecticut Health Center, Farmington, CT

[4]St. Joseph's Health System Research Network & Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, ON

[5]Department of Epidemiology and Population Health, Albert Einstein College of Medicine, New York, NY

Abstract

Objectives—The association between changes in clinician self-efficacy and readiness to change and implementation of an asthma management program (Easy Breathing©) was examined.

Methods—A 36 month randomized, controlled trial was conducted involving 24 pediatric practices (88 clinicians). Randomized clinicians received interventions designed to enhance clinician self-efficacy and readiness to change which were measured at baseline and 3 years. Interventions consisted of an educational toolbox, seminars, teleconferences, mini-fellowships, opinion leader visits, clinician-specific feedback, and pay for performance. The primary outcome was program utilization (number of children enrolled in Easy Breathing/year); secondary outcomes included development of a written treatment plan and severity-appropriate therapy.

Results—At baseline, clinicians enrolled 149 ± 147 (mean ± SD) children/clinician/year; 84% of children had a written treatment plan and 77% of plans used severity-appropriate therapy. At baseline, higher self-efficacy scores were associated with greater program utilization (Relative Rate (RR) 1.34 (95% Confidence Interval 1.04, 1.72), p=0.04) but not treatment plan development (RR 0.63 (0.29, 1.35), p=.23) or anti-inflammatory use (RR 1.76 (0.92, 3.35), p=.09). Intervention clinicians participated in 17 interventions over 36 months. At study end, self-efficacy scores increased in intervention clinicians compared to control clinicians (p=0.01) and more clinicians were in an action stage of change (p=0.001) but these changes were not associated with changes in primary or secondary outcomes.

Corresponding Author: Michelle M. Cloutier, M.D., Connecticut Children's Medical Center, 282 Washington Street, Hartford, CT 06106, Tel. 860-545-9442, Fax: 860-545-8979, mclouti@ccmckids.org.

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Conclusions—Self-efficacy scores correlated with program use at baseline and increased in the intervention arm but these increases were not associated with greater program-related activities. Self-efficacy may be necessary but not sufficient for behavior change.

Keywords

Stage of change; social learning theory; contingency management; pay for performance; academic detailing

Introduction

Guidelines for chronic disease management can improve both the process and outcomes of care[1–4]. Studies of guideline-specific therapies have not demonstrated broad use of evidence-based care in several important areas[5–10]. Reasons proposed for not adopting guidelines[8] include physician-related issues (e.g. lack of awareness, knowledge or agreement)[11], guideline-related issues (based on consensus rather than evidence, complexity, adoption complexity)[12], organizational issues (e.g. time constraints, job satisfaction, turnover)[13–14] and health policy issues (e.g. access to care, reimbursement)[15–16].

Two important personal attributes - self-efficacy and readiness to change - have been associated with health behavior change in patients and to a lesser extent to use of guidelines by clinicians[17–20]. Self-efficacy, (the degree of confidence in one's capacity for success in implementing a goal-directed behavior[21]), is a personal attribute that is central to social learning theory (SLT)[22]. SLT has been applied successfully to many health behaviors and to health-related behavior change and maintenance[21, 23]. Clinicians with high self-efficacy are thought to be more likely to adopt and adhere to guidelines[19]. Readiness to change[24] recognizes that each individual is at a different stage of behavior change and that interventions must be tailored to each individual's stage of readiness within the continuum beginning with pre-contemplation, contemplation of a behavior change, the action of a behavior change and the maintenance of that change[25]. Stages of change recognizes that changing behavior is complex, that one intervention will not work for everyone, that change does not occur quickly or immediately and that increasing self-efficacy may be one of several processes that promote change.

Easy Breathing© is an asthma management program for pediatricians that is based upon the National Asthma Education and Prevention Program Expert Panel Reports (NAEPP-EPR)[26–27]. The program is currently being used by more than 450 clinicians in Connecticut. In Connecticut, enrollment of Medicaid-insured children in Easy Breathing has resulted in a 34% decrease in hospitalization, a 31% decrease in ED visits and a 29% decrease in outpatient visits[28]. Privately insured children with persistent asthma in Connecticut have experienced a 56% decrease in outpatient visits and a 91% decrease in ED visits[29]. The program was designed to overcome guideline- and organizational-related barriers by using an evidence-based approach, by reducing guideline complexity and by reducing the time needed for asthma management. Despite the program's simplicity and improved efficiency[29–31], however, not all pediatricians use the program fully or to the same extent.

A three-arm randomized, controlled trial (The Provider and Organization in Asthma Guidelines, #NCT00345514) was conducted to examine whether interventions directed at changing provider self-efficacy and stages of change or interventions designed to change organizational culture (e.g. teamwork building, role clarity) resulted in greater program utilization. Results from the provider intervention arm compared to the control arm are reported here. We hypothesized that clinicians in the provider-directed intervention arm, as a

result of participating in various study-supported interventions, would increase their self-efficacy and move into an action stage of readiness to change and that these changes would be associated with more children being enrolled in the Easy Breathing program as compared to control clinicians.

Methods

Twenty four pediatric practices (8 urban and 16 private) in central Connecticut completed baseline measures that examined clinician self-efficacy and stages of change related to asthma, in addition to other measures and were randomized into a control or provider intervention arm[32, 33] (Figure 1).

A practice was eligible to participate if the clinicians had been previously trained in the Easy Breathing© program, which has been described[34–35]. The Easy Breathing program at this time consisted of 4 elements: an Easy Breathing Survey composed of 11 demographic, exposure and family history questions and 4 questions validated for use in making a diagnosis of asthma[36]; a Provider Assessment with 4 symptom-related questions that guide clinicians in determining asthma severity for children with asthma[37]; a Treatment Selection Guide of asthma medications and appropriate dosages and insurance coverage by asthma severity for daily, sick and emergency use; and a simple, written Asthma Treatment Plan (in multiple languages) that is given to every parent/child with asthma[38]. All children greater than 6 months of age, regardless of their asthma status and regardless of the reason for their visit, were eligible to have their parents complete a Survey. A copy of each form was provided to the investigators.

The primary outcome measure was the number of children enrolled in Easy Breathing (i.e. completed an Easy Breathing Survey) per full time equivalent (FTE) clinician per year. This was chosen as the primary outcome measure because children diagnosed with asthma who completed a Survey, experienced significant decreases in medical services utilization[28–29]. Quality of care measures including severity-appropriate anti-inflammatory therapy prescribing for children with persistent asthma and creation of a written asthma treatment plan were secondary outcomes.

This study was approved by the Institutional Review Boards at Connecticut Children's Medical Center and the University of Connecticut Health Center and informed consent was obtained from clinicians, staff and parents/guardians.

Study Design

After completion of baseline questionnaires, 12 practices were randomly assigned to the provider arm and 12 were randomized to a control arm. *A priori*, practice size, the practice patient profile (including the percent of patients receiving state supported assistance) and the duration of participation in Easy Breathing were considered potential modifiers of the interventions. For this reason, the randomization strategy matched practices according to practice type (urban vs. non-urban), practice size and duration of participation in Easy Breathing. Urban clinics were defined as clinics serving primarily a Medicaid (>50%) population who resided in a high density area (>500–1000 people per square mile (www.census.gov/geo/ua)). Urban clinics were in general large (>5 FTE clinicians) and federally funded or subsidized. Both arms received on-going programmatic support from Easy Breathing staff consisting of bi-weekly visits by program coordinators to re-stock forms and program materials, quarterly newsletters, and quarterly clinic/practice summaries. Practices in the intervention arm in addition were offered multiple interventions of a type reported by others to enhance self-efficacy (Table 1). Each intervention practice was given an educational toolbox which consisted of a cart with a VCR and educational tapes,

demonstration spacers and inhalers and instruction sheets for each inhaler, medication identification posters, peak flow meters and graphs, educational brochures (risks of corticosteroids, environmental trigger avoidance) and airway models. Luncheon seminars were offered on 7 topics including office management of asthma, spirometry, spacers and peak flow meters. Eight monthly 30 minute teleconferences were offered at 3 different times and discussed cough, indoor airway quality, allergic rhinitis and adolescent adherence to therapy. Mini fellowships consisting of a half day of shadowing an asthma specialist were also offered. Three national experts participated in Grand Rounds and dinner symposia that were open to all clinicians but intervention clinicians received personal invitations. Individual provider feedback on performance including number of children enrolled in Easy Breathing, number of treatment plans submitted and percent of treatment plans that adhered to the national asthma guidelines were distributed quarterly. Since the control arm was not a "do-nothing" arm, the contrast between the two arms represents the impact of interventions over and above that gained from the effect of a successful disease management program. Because the best interventions to change clinician behavior are not known[39–43], our goal was not to test one specific intervention but rather to offer clinicians multiple interventions and the opportunity to choose the interventions appropriate to their self-identified needs.

Questionnaires—Questionnaires that assessed SLT-derived personal attributes were completed before randomization (baseline, T_1) and at the end of the study (T_2) and returned in numbered envelopes. Incentives for questionnaire completion included a drawing for a gift card.

The Asthma Practice Survey consisted of 52 items and assessed clinician goals for asthma care, time spent in asthma-related activities, self-efficacy, outcome value and expectancy and barriers to asthma care. The instrument was made specific for asthma from a general pediatric instrument[44] and from the recommendations of the NAEPP-EPR[26–27]. Self-efficacy was assessed by having participants rate their level of confidence on a 7-point Likert scale in being able to carry out activities in 14 areas related to asthma care including making an asthma diagnosis, developing an asthma treatment plan, and teaching patients about asthma. Cronbach's alpha for self-efficacy for the two time periods was 0.93 and 0.94.

Readiness to change was assessed using a 12-item questionnaire modeled after Rollnick et al[45]. Clinicians responded to statements regarding the NAEPP Guidelines and their use of the Guidelines using a 5-point Likert scale (strongly disagree to strongly agree). The initial survey was reviewed by 5 experts in the stages of change literature. They determined face and construct validity by examining and assigning each item to pre-contemplative, contemplative, and action stages. A modified Delphi approach was used to come to consensus. Since the goal of the study was to increase enrollment of children in the program, maintenance items were excluded since their inclusion would prevent the emergence of factors corresponding to stages of change[46]. An exploratory factor analysis demonstrated 3 reliable, well-defined components corresponding to the following stages of change: Pre-contemplative, Contemplative and Action. Re-test reliability was determined over a 3-month period.

Statistical analysis

The primary outcome was the number of Easy Breathing Surveys completed by a clinician and the study was powered to detect an 8% increase in study enrollment (ie Easy Breathing Surveys) at an alpha level of 0.05 and a power of 86%. The Easy Breathing enrollment rate/full time equivalent (FTE) clinician was defined as the total number of children with a completed Easy Breathing Survey per FTE per year. Two secondary outcomes were also tested: submission of a written asthma treatment plan and adherence of that plan to national

guidelines for appropriate use of anti-inflammatory therapy for children with persistent asthma. These secondary outcome measures were chosen because clinicians under-prescribe anti-inflammatory therapy and under-use written treatment plans[47–48]. Asthma treatment plan use for each clinician was defined as the number of children with persistent asthma who had a written treatment plan divided by the number of children with persistent asthma enrolled by that clinician. Adherence to national guidelines for use of anti-inflammatory therapy for each clinician was defined as the number of submitted written treatment plans for children with persistent asthma with a severity-appropriate anti-inflammatory drug (usually an inhaled corticosteroid) divided by the number of written treatment plans for children with persistent asthma since this was the only prescribing information that was available. The investigators received copies of the Survey and the written treatment plan. Analyses were adjusted for FTE and were performed at baseline (T_1) and 36 months later at study end (T_2). All models were fit using SAS version 9.2 (SAS Institute Inc, Cary, NC).

Changes in self-efficacy and stages of change were tested using the Wilcoxon signed rank test. The Kruskal-Wallis test was used to compare characteristics at baseline across the study arms. Linear mixed models (controlling for the proportion of patients in the practice on public insurance as an indicator of an urban-based clinic) were used to examine differences between mid-level practitioners' (MLP, e.g., advanced practice nurses, pediatric nurse practitioners and physician assistants) and physicians' self-efficacy; a random intercept was included in the model to account for the fact that clinicians were clustered within practices.

The nesting of clinicians in a practice was accounted for using linear mixed models with a random intercept to also model the number of Easy Breathing Surveys/FTE clinician as a function of self-efficacy using the square root of the survey number. Covariates included the practice's insurance profile, the staff-to-clinician ratio, the clinician's highest degree (MD vs. MLP) and clinician FTE%. The number of submitted written asthma treatment plans and the number of adherent-to-guideline written treatment plans were modeled using the binomial distribution. All random effects were modeled using normal distributions.

Results

Study Participants

Eighty-eight clinicians in 24 practices randomized either into the provider arm (n=44 clinicians, 12 practices) or the control arm (Figure 1, Table 2). Eighteen clinicians ($^2/_3$ were MLPs) left their practice before end of study. Their data were used at baseline only. Two thirds of the clinicians were full time physicians and $^1/_3$ were mid-level practitioners. Seventy-five percent of physicians and 40% of mid-level practitioners had received their highest degree more than 10 years previously with a mean tenure of 10 years.

Baseline Program Use and Quality, Self-efficacy and Relationship to Easy Breathing Surveys

At baseline, clinicians completed 149 ± 147 surveys/FTE/yr (mean ± SD); 84% of children had a written treatment plan and 77% of those plans adhered to national asthma guidelines. Baseline self-efficacy scores for all clinicians in both study arms were high (Table 3). There was no difference in baseline survey number, use of a treatment plan, anti-inflammatory therapy use or self-efficacy scores between clinicians in either study arm or between physicians as compared to mid-level practitioners.

Higher baseline clinician self-efficacy scores were associated with a greater number of surveys (Relative Rate (RR) 1.34 (95% Confidence Interval 1.04, 1.72), p=0.04) but were not associated with anti-inflammatory therapy use or creation of a written asthma treatment plan (RR = 1.76 (0.92, 3.35), p=0.09, RR =0.63 (0.29, 1.35), p=0.23 respectively).

Effect of Interventions on Self-efficacy in Clinicians in the Provider Arm

All clinicians in practices in the provider arm participated in at least one of the 8 categories of provider interventions which were offered a total of 115 times over the 3 years (Table 1). On average, provider arm clinicians participated in 17 interventions (range 1 to 30) over the 3 years.

In the intervention arm, clinician self-efficacy scores increased between baseline and end of study (p=.0008) (Table 3). Clinicians with the lowest self-efficacy scores (below 50th percentile, i.e. less than 5.92) at baseline had larger increases in self-efficacy scores from baseline to end of study as compared to clinicians with higher self-efficacy scores at baseline (change = +0.70 ± 0.55 vs. +0.09 ± 0.55, p=0.02) but self-efficacy increased for all clinicians regardless of their baseline self-efficacy scores In contrast, for clinicians in the control arm, there was no change in self-efficacy scores between baseline and end of study (change = +0.17 ± 0.55, p=0.23 respectively).

Increases in self-efficacy over the intervention period among clinicians in the intervention arm did not predict increases in survey number when controlling for % FTE, non-clinician to clinician ratio, public insurance, and clinician type (p=0.45). For these clinicians in the intervention arm, there was no relationship between the increase in self-efficacy scores from baseline to study end and the number of interventions in which they participated (R^2 = 0.007, p=0.70). Furthermore, increases in self-efficacy after the interventions in clinicians with the lowest self-efficacy scores at baseline were not associated with increases in survey number. Increases in self-efficacy scores at study end were associated with neither greater use of anti-inflammatory therapy for children with persistent disease (RR=0.94 (0.51, 1.75), p=0.85 respectively) nor an increase in the number of children with a written asthma treatment plan (RR=1.82 (0.65, 5.05), p=0.24).

At study end, there was no difference in program utilization, in anti-inflammatory use or in creation of a written treatment plan between the intervention and control arms of the study.

Stages of Change at Baseline and After Interventions in the Provider Arm

Most clinicians at baseline were in the action stage of change (66% action, 34% contemplative). Self-efficacy scores at baseline were higher among clinicians in the action stage than among those in the contemplative stage (6.09 ± 0.49 vs. 5.68 ± 0.67, p=0.05). At study end, all clinicians in the intervention arm except one were in the action stage of change (p=0.001). In contrast, there was no change in stage of change for clinicians in the control arm (88% action at study start; 86% action at end of study, p=0.72). The increase in the number of clinicians in the action stage of change in the intervention arm at study end was not associated with an increase in the number of children enrolled in Easy Breathing (p=.13), with adherence to use of anti-inflammatory therapy for children with persistent disease (p=0.11) or with use of a written asthma treatment plan (p=0.36).

Discussion

For all participants in this study, higher asthma-related self-efficacy scores at baseline were associated with greater asthma program-related activity (i.e., enrollment in Easy Breathing). Self-efficacy scores and readiness to change increased in clinicians in the intervention arm but these increases were not associated with an increase in program enrollment, in increased development of a written asthma treatment plan or with greater use of anti-inflammatory therapy for persistent asthma.

The gap between asthma guidelines and their implementation in primary care practice settings is considerable. The reasons for this gap are multi-factorial and include patient,

payer[25] and provider-related issues[11]. We implemented a set of interventions designed to increase clinician self-efficacy and examined the effectiveness of these interventions at changing behavior as measured by enrollment of children in a disease management program, creation of a written asthma treatment plan and use of anti-inflammatory therapy. The interventions were consistent with social learning theory and were designed to motivate clinicians to increase enrollment through use of live, interactive CME programs to enhance their knowledge, and change their attitudes and beliefs; other strategies known to change behavior including performance feedback, opinion leaders, flow sheets and an educational toolbox were also used. The variable of time was then added using the transtheoretical (readiness to change) model and tailored interventions to assure a full range of stage-appropriate interventions and the interventions were offered multiple times over a 3 year period. The interventions increased clinician self-efficacy and moved clinicians to an action stage of change but did not change any of the targeted behaviors.

Most of the clinicians were in the action stage of change at the beginning of this study. This is not surprising since all of them had modified their practice behavior by participating in Easy Breathing and in this study. Knowledge provided through the various Continuing Medical Education (CME) activities could have created the precondition for change but other interventions including quarterly newsletters, pay for performance and clinician-specific feedback might also have moved clinicians in the intervention arm from the contemplative to the action stage of change. This did not, however, result in an increase in enrollment in children in Easy Breathing. Often behavior change is equated with action but action is only one of the many stages of change in the transtheoretical model and not all modifications of behavior count as action in this model[49] which could explain why the transtheoretical model has recently been criticized[50].

Self-efficacy is a perception of one's own capacity for success in organizing and implementing a goal-directed behavior[21]. Resilient self-efficacy enables individuals to do extraordinary things by productive use of the skills they possess in the face of overwhelming obstacles[22–23]. Clinicians on average participated in 17 interventions over the 3 year study period and the rates of participation remained constant even after 3 years. Although self-efficacy scores were high at the start of the study, they increased further among intervention participants suggesting a lack of a ceiling effect even though those with lower self-efficacy showed greater improvement over time. These increases in self-efficacy, however, did not result in an increase in enrollment even though an association between baseline self-efficacy and enrollment in Easy Breathing was observed. The minimum effective change in measures such as self-efficacy that result in behavior change is not known and so it is possible that the increase in self-efficacy that we observed was statistically significant but not clinically significant. Alternatively, it is possible that self-efficacy demonstrates a threshold for its association with behavior and clinicians in the study were above this threshold. Thus, changes in self-efficacy might translate into changes in a goal-directed behavior in individuals starting with lower self-efficacy levels even though this was not observed in the subset of clinicians with the lowest self-efficacy scores in this study.

This study has several additional limitations. The large clinician drop out (primarily mid-level practitioners) secondary to leaving the practice was unexpected and could have resulted in a decrease in power but the number of participants was sufficient to demonstrate a change in both self-efficacy and in stages of change. The number of children enrolled did not increase over time in either study arm and this potentially could be due to a fatigue factor[51], or to a decrease in the number of eligible children for enrollment over time; these could also have limited the benefits of our interventions. Other measures such as ease of use or efficiency of asthma management may have increased over time but were not measured.

Thus, the interventions in the provider arm increased self-efficacy and moved individuals to an action stage of change. Nevertheless, these changes were not sufficient to increase patient enrollment or to increase the number of submitted written asthma treatment plans or use of anti-inflammatory therapy. Both high self-efficacy and an action stage of change may be required to change behavior but neither may be sufficient to change behavior. Environmental factors or organizational attributes could also influence behavior and either support a clinician's personal attributes or inhibit their capacity for productivity.

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What's New

This study demonstrates that interventions can increase clinician self-efficacy and move clinicians to an action stage of change but neither may be sufficient to effect behavior change related to guideline implementation.

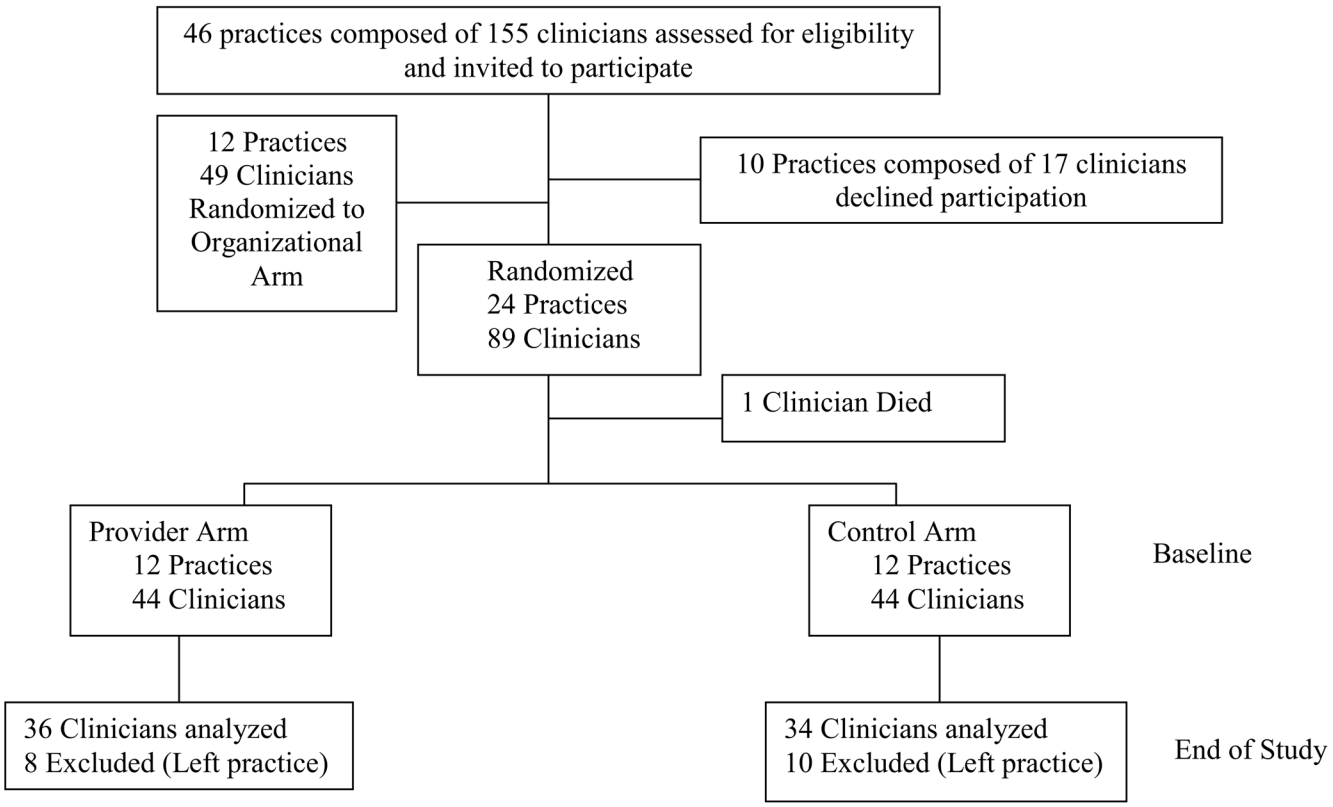

Figure 1.

Table 1

Interventions in Provider Arm

Intervention	# times offered	# participating**
Educational toolbox	1	44
Educational Seminars*	27	42
Teleconferences	35	36
Mini-fellowships	32	21
Opinion Leaders	3	N/A
Clinician Feedback	11	44
Pay for Performance	7	44

* Seminars provided CME credits and focused on enhancing education around the diagnosis and management of asthma and asthma-related co-morbidities.

** Number of unique individuals who participated in at least one of the specific interventions N/A Information on number participating not available.

Table 2

Baseline Demographics of Participants

Personal Characteristics*	Control Arm (n=44)	Provider Arm (n=44)	P Value
Age (yrs)	45 ± 9 (range: 27–62)	43 ± 12 (range: 26–80)	0.48
Gender	M: 9 (20%)	M: 18 (41%)	0.04
Ethnicity			0.61
Caucasian	37 (84%)	40 (91%)	
African-American	3 (7%)	2 (5%)	
Other/Unknown	4 (9%)	2 (5%)	
Employment Status			0.12
Full Time	25 (57%)	32 (73%)	
Part Time	19 (43%)	12 (27%)	
Tenure (yrs)	9 ± 8 (range: 1–30)	9 ± 9 (range: 1–30)	0.84
Clinician Demographics			
Provider Type			0.82
Physician	28 (64%)	29 (66%)	
Mid-Level Practitioner	16 (36%)	15 (34%)	
Yrs Since Highest Degree			0.32
<5 Yrs	4 (9%)	7 (16%)	
5 – 10 Yrs	17 (40%)	11 (26%)	
>10 Yrs	22 (51%)	25 (58%)	
No. Hours Seeing Patients/week:			
Physicians	33 ± 12 (5–60)	36 ± 11 (8–60)	0.39
Mid-level practitioner	31 ± 10 (10–40)	31 ± 10 (8–40)	0.86

*Mean ± SD (Range) or Frequency (Percent)

Table 3

Self Efficacy Scores*

	Baseline (T1); n**	End of Study (T2); n	P value
Overall			
All Clinicians	5.91 ± 0.62; n=88	6.10 ± 0.69; n=68	0.0001
Physicians Only	5.86 ± 0.70; n=57	6.08 ± 0.65; n=49	0.0002
Mid-levels Only	6.01 ± 0.65; n=31	6.16 ± 0.79; n=19	0.20
By Intervention Arm			
Provider Arm			
All Clinicians	5.95 ± 0.58; n=44	6.18 ± 0.54; n=34	0.0008
Control Arm			
All Clinicians	5.88 ± 0.66; n=44	6.02 ± 0.81; n=34	0.23

*Mean ±SD

**n= number completing self-efficacy measurement; two clinicians in the provider arm did not complete self efficacy measures at study end