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Factors associated with attaining coaching goals during an intervention to improve child asthma care

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Abstract

Purpose—To examine parent and child characteristics associated with engagement in a coaching intervention to improve pediatric asthma care and factors associated with readiness to adopt and maintain targeted asthma management behaviors.

Methods—Using methods based on the Transtheoretical Model, trained lay coaches worked with 120 parents of children with asthma promoting adoption and maintenance of asthma management strategies (behaviors). Coaches assigned stage-of-change (on continuum: pre-contemplation, contemplation, preparation, action, maintenance) for each behavior every time it was discussed. Improvement in stage-of-change was analyzed for association with characteristics of the participants (parents and children) and coaching processes.

Results—Having more coach contacts was associated with earlier first contact ($p < 0.001$), fewer attempts per successful contact ($p < 0.001$), prior asthma hospitalization ($p = 0.021$), more intruding events ($p < 0.001$), and less social support ($p = 0.048$). In univariable models, three factors were associated with forward movement at least one stage for all three behaviors: more coach contacts overall, fewer attempts per successful contact, and more discussion/staging episodes for the particular behavior. In multivariable models adjusting for characteristics of participants and coaching process, the strongest predictor of any forward stage movement for each behavior was having more contacts ($p < 0.05$).

Conclusions—Improvement in readiness to adopt and maintain asthma management behaviors was mostly associated with factors reflecting more engagement of participants in the program.

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Similar coaching interventions should focus on early and frequent contacts to achieve intervention goals, recognizing that parents of children with less severe disease and who have more social support may be more difficult to engage.

Keywords

asthma; child; parent; coach; stage-of-change; engagement

Introduction

Peer coaches or lay (community) health workers have been successfully employed in a variety of health interventions, including some designed to improve pediatric asthma outcomes.[1–12] However, few studies have examined factors associated with ability of a coach to engage with a parent and achieve specific coaching goals in addition to the clinical outcomes of interest.

We conducted a randomized controlled study of a peer coaching intervention, based on the Transtheoretical Model of Behavior Change (TTM), [13] to improve outcomes related to pediatric asthma management.[14] According to our conceptual framework, trained lay asthma coaches could promote and facilitate adoption and maintenance of asthma management strategies (behaviors) related to improved asthma care, which would lead to improved clinical outcomes, including more primary care provider (PCP) visits focused on asthma planning and fewer emergency department (ED) visits. The intervention was successful in increasing the rate of PCP visits focused on asthma planning, even though it did not achieve the primary outcome, reducing ED visits.[14]

In this paper, we initially examined factors associated with increasing number of substantial coach contacts, as more contacts would provide more opportunities to deliver the intervention. Subsequently we examined how characteristics of the study subjects (parents), their children, and the coaching process are associated with attaining coaching goals - improved readiness (stage-of-change) to adopt and maintain asthma management strategies (behaviors). We also examined the relationship between improved stage-of-change for the management strategy to complete PCP visits focused on asthma planning and the occurrence of asthma planning visits documented by chart audit.

Materials and Methods

Study Design, Setting, and Participants

We enrolled parents of children treated for asthma in the study hospital ED from 9/1/03 to 5/15/05, into an 18-month asthma coaching intervention trial.[14] Subjects were a convenience sample of “parents” (caregivers serving in the parent role, usually mothers) of eligible children, who spoke English, had working telephones, and agreed to study procedures. Eligible children were age 2–10 years; had, by parent report, an asthma diagnosis and 1 other visit to the PCP or an ED for acute asthma during the preceding 15 months; resided in local urban zip codes; had Medicaid insurance; and received 1 albuterol dose during the enrollment visit. Participation was limited to one parent-child dyad per household. The Washington University Institutional Review Board approved the study, and all subjects gave written consent.

During enrollment, parents completed in-person questionnaires to describe demographic characteristics and the children’s asthma. We randomly allocated parents to intervention or control group with assignment masked until baseline questionnaires were completed. This

paper includes data only for the 120 subjects in the intervention group, described in detail in Nelson et al.[14]

Transtheoretical Model (TTM) of Behavioral Change as the Intervention Framework

Coaches and their training—We assigned each parent to one of two coaches who were involved throughout the study. Both coaches were women with personal experience in asthma care; one has asthma and the other a child with asthma. The coach supervisor, (GH), completed her doctoral training with those who developed the TTM and has experience applying it to coaching. She trained and supervised the coaches regarding details of the TTM, including its four components – Stage-of-Change, Decisional Balance, Self-efficacy and Processes-of-Change – and its application for this study along with communication skills. The principal investigator and asthma nurses from the study hospital trained the coaches regarding clinical aspects of asthma and the rationale for the management strategies (behaviors) encouraged during the study.

Targeted Asthma Behaviors—Coaches encouraged parents to adopt and maintain these behaviors: 1) having an updated asthma action plan (Action Plan), understanding the plan, having explained it and made it available to all the child's caregivers and ultimately having implemented it early in the course of worsening asthma; 2) making appointments with the PCP for visits specifically for asthma planning and monitoring every 3–4 months and successfully completing the visits (Asthma Planning Visits); and 3) developing a collaborative partnership with the PCP (Partnership) that included the parent having a dialogue with the PCP with emphasis on sharing their child's personal first signs of an impending exacerbation with the PCP putting the child's particular first signs on the Action Plan.

Assignment of Stage-of-Change—The coach assessed a parent's stage of readiness (stage-of-change) for each targeted behavior after every discussion of that behavior during a coaching contact. Traditionally, interventions based on the TTM rely on self-assessed stage of readiness by the subject using a questionnaire with personalized feedback depending on the assessment scores provided after some time.[13,17] The method of staging was modified for the coaching intervention for two reasons: 1) the desired asthma management behaviors are complex and comprised several sub-behaviors making accurate staging difficult, and 2) to allow the tailored intervention to be delivered in real time during the coaching contact.

The stages represent the continuum of change [13]: “I won't” and “I can't” (precontemplation) are followed by “I may” (contemplation), “I will” (preparation), “I am” (action) and “I still am” (maintenance). The coaches assigned parents to the “I won't” stage-of-change if they were unwilling to discuss the possibility of doing the targeted behavior, and to the “I can't” stage if they reported many reasons why they cannot do the behavior. The person in the “I can't” stage generally has a high emotional component and displays as overwhelmed by past failures and present situation. The coaches assigned parents to the “I may” stage if they had not completed all three foundation cognitive/affective tasks: 1) having a strong motivator (Pros), 2) knowing one's major barriers (Cons), and 3) identifying possible solutions to overcome these barriers. The coaches assigned parents to the “I will” stage if they had accomplished all three foundation tasks. The appropriate goal for the person in the “I will” stage is testing possible solutions. The coaches assigned parents to the “I am” stage if they had accomplished all foundation tasks, had tested possible solutions and reported consistently completing the behavior. The coaches assigned parents to the “I still am” stage if they reported completing the behavior for more than 6 months.

Ten Processes-of-Change are important across the continuum of behavior change. Five are cognitive or affective: *consciousness raising*, or “getting information”; *environmental reevaluation*, or “being a good role model”; *dramatic relief*, or “being moved emotionally”; *social liberation*, or “joining social norm group”; and *self-reevaluation*, or “assessing one’s self image”. These are generally most useful during the early stages (precontemplation, contemplation, and preparation). The other five Processes-of-Change are more behavioral: *self-liberation*, or “making a commitment”; *stimulus control* or “cues”; *counter-conditioning* or “substitution”; *helping relationship* or “social support”; *reinforcement management* or “rewards”. They are generally more useful during action and maintenance stages. The coach emphasized specific Processes-of-Change activities according to the parent’s stage-of-change.

The coaches met with their supervisor weekly to discuss their experiences with parents, to review the assignment of stage-of-change, and to guide subsequent work in recognizing stage-of-change and applying appropriate TTM processes. In addition, the supervisor regularly reviewed recorded coach telephone calls and discussed performance with each of the coaches. These measures helped to ensure the fidelity of the intervention with a standardized approach and accurate staging between coaches.

Flexible Implementation—We implemented the intervention without a strict schedule of coach contacts. The coaches employed a nondirective approach with social support and emphasized a cooperative, flexible stance that accepts rather than directs parents’ choices and perspectives.[13,16] While the coaches sought to discuss as many management strategies as possible during each contact, they discussed them based on their impression of the parent’s readiness and willingness. It was expected that the parent would likely be in different stages for each management strategy so the coach started with the strategy for which the parent seemed most ready, and then shifted to those for which there was less confidence. In this way, we tailored the intervention according to individual readiness [17] and incorporated aspects of behavioral shaping.[18] The coaches maintained computerized records of all attempted and successful contacts.

Central to the approach of the coaches was the concept that people do not make efforts to adopt behaviors unless they believe they will benefit (get something they want and value). Everyone has barriers to making changes and they must identify these barriers and “own” their solutions. Moreover, during the change process, challenging situations arise, and the individual must strengthen his or her self-efficacy through learning from those situations instead of being overwhelmed by them. Throughout the intervention, many parents reported a variety of “intruding events” including employment problems, domestic and marital problems, and problems with gaining social welfare and health benefits. When parents verbalized discouragement or seemed to be discouraged about their situation, the coaches discussed these issues, were supportive and promoted and, when possible, facilitated access to available resources.

Measurement

Participant Characteristics—Baseline characteristics included parent age, gender, relationship to child, employment status and education; address and number of persons living in the household; social support; child age and gender; and asthma control.[14] For Social Support, subjects reported numbers of friends or relatives they can “call on when they need a favor” and numbers of friends or relatives “that they feel at ease with and can talk to about a private matter”. Parent’s asthma-related quality of life was measured with the Parental Asthma Caregiver’s Quality of Life Questionnaire (PACQLQ).[15]

Coaching Contacts—A substantive coaching contact was defined as one for which the coach documented discussion and staging of at least one targeted behavior.

Movement in Stage-of-Change—We defined “beginning stage” for each behavior as the lowest stage assigned during the three month interval following first substantial contact, or, if no staging episodes for that behavior occurred during this interval, the first assigned stage whenever it occurred. We have experienced that such an interval allows time for multiple contacts and development of a trusting relationship between coach and parent, increasing the likelihood that the parent was sharing her true situation rather than giving socially desirable responses. We defined “final stage” as the last assigned stage for the behavior whenever it occurred. Some parents were staged on a behavior only once, generally because it was well established and did not need discussion, or because they were unwilling to discuss it. Both situations suggest that the behavior did not change during the study, so these parents had the same beginning and final stage. A three-level ordinal variable (stage-of-change movement groups) represented differences between beginning and final stages. Pre-contemplation, contemplation, and preparation stages were designated “Pre-Action” stages; action and maintenance stages were designated “Action” stages. We categorized this variable as: 1) remained in Pre-action without stage change or moved backwards in Pre-action, or moved backward from any “Action” stage to any “Pre-action” stage; 2) forward stage movement within “Pre-action” stages; 3) forward movement from any “Pre-action” stage to any “Action” stage or remained in “Action” stages.

Health Care Visits—Trained research assistants blinded to study group assignment audited medical records from the study hospital and the children’s PCP offices, abstracting details of ED visits, hospitalizations, and PCP visits. These data were retrospective for the year preceding enrollment and prospective for two years afterward. Asthma Planning Visits were those without acute asthma symptoms and/or treatment, during which chronic asthma care seemed to be the focus and reason the parent came to the visit. The Asthma Planning Visits management strategy focused on the parent regularly completing such visits focused on asthma care but not other issues; i.e. not “well-child” visits that included discussion of asthma among other topics. Visits were categorized by the RA with a confirmatory audit by the study physicians. Any disagreements were resolved by consensus.

Analysis

We used SAS 9.1.3 software (Cary, North Carolina) for this analysis and performed univariable and multivariable analysis to examine association of factors with the number of coach contacts and the stage-of-change movement.

Different factors were examined for association with increasing number of substantial coach contacts including: process variables of time to first contact and number of attempts per successful contact; whether an in-person contact occurred; variables that might indicate distress in the parents’ lives (intruding events) and whether they had social support; child factors; and parent factors. Associations between the process variables in Table 1 days from enrollment to first contact, attempts per successful contact, and in-person contacts, were examined using Spearman correlation coefficients. The multivariable analysis was modeled using the square root of number of contacts in order to more closely approximate a Gaussian distribution and improve the fit of the model.

We expected variability in the frequency of coach contacts and episodes during which stage-of-change was assigned (staging episodes), as well as variability in movement between stage-of-change, with some parents moving forward or backwards one or more stages and some remaining in the same stage during the intervention. Therefore we analyzed stage-of-

change movement in two ways: 1) any forward movement at least one stage (adjusted for initial stage); and 2) difference between beginning and final stages, which allowed examination of magnitude and direction of change. We calculated hazard ratios from Cox proportional models. For each targeted behavior, all parents with at least one staging episode were included in the analysis.

We also examined the association of improved stage for the Asthma Planning Visits behavior with the occurrence of documented Asthma Planning Visits in the PCP records. We compared the proportion of subjects with documented visits among the stage-of-change movement groups for that behavior and used logistic regression to estimate the odds of at least one asthma planning visit while on study by stage-of-change movement group.

Results

Participants

The sample comprised mothers (93%), who were African American (94%), with a mean age of 29.5 years, and 60% were employed full- or part-time (15% reported being out of work). Twenty-eight percent lived below the federal poverty level and 89% reported at least one source (relative or friend) of social support. Their mean Pediatric Asthma Caregiver's Quality of Life Questionnaire score was 4.3 (score ranges from 1 best to 7 worst).[15] The children had a mean age of 5.2 years (range 2–10), 64% were male, 94% were African American, and all had Medicaid insurance. Twenty-three percent were hospitalized at their enrollment ED visits.

Implementation of the Coaching Intervention

We successfully implemented the intervention, completing first substantial contacts in a median of 8 days (25th to 75th percentile = 3 to 20; max 127 days), and were able to maintain contact over the 18 months of study with a median number of substantial contacts per subject of 7 (25th to 75th percentile = 4 to 10; max 18 contacts). The median number of attempts per successful contact was 5.6 (25th to 75th percentile = 4 to 9; max 59 attempts). Ninety percent of contacts were via telephone; 55% of parents had at least one in-person contact.

For the Asthma Action Plan behavior, 119/120 (99.2%) parents were staged at least once; among those staged, the mean number of staging episodes was 5.3 ± 3.2 (standard deviation); and 9 (8%) were staged only once. For the Asthma Planning Visits behavior, 112/120 (93.3%) were staged at least once; among those staged, mean number of staging episodes was 3.2 ± 2.8 (standard deviation); and 39 (35%) were staged only once. For the Partnership behavior, 104/120 (86.7%) were staged at least once; among those staged, the mean number of staging episodes was 2.8 ± 2.6 (standard deviation); and 29 (28%) were staged only once.

Factors Associated with Completing More Asthma Coach Contacts

Factors associated with completing more coach contacts are presented in Table 1. Having more contacts was associated with the process indicators of greater success in reaching subjects soon after enrollment and the ease of contacting the parents as indicated by fewer attempts per successful contact. Having more in-person contacts, which were offered to all parents but accomplished for only 55%, was also associated with more contacts. Characteristics of the parent-child dyad that were associated with more coach contacts included a younger participating child, hospitalization for asthma during the year preceding enrollment, greater social isolation (reported fewer people for social support) and more intruding events.

A multiple variable analysis was performed of the variables included in Table 1. Factors retained in the final model were days from enrollment to first coach contact, $p=0.0035$, number of in-person contacts between the parent and the coach, $p=0.0021$, and number of intruding events brought to the coach's attention during the coaching process, $p<0.0001$. The global p -value was <0.0001 and an R-squared value of 0.55. Further examination of the process measures, days from enrollment to first contact, attempts per successful contact, and in-person contacts, indicated strong associations between these variables (Table 2).

Forward Stage-of-Change Movement

For the Asthma Action Plan behavior, 69% of parents moved forward at least one stage, in a median time of approximately 3 months. For the Asthma Planning Visits behavior, 45% moved forward at least one stage, in a median time of approximately 14 months. For the Partnership behavior, 43% moved forward at least one stage in a median time of approximately 17 months. Overall, 25% of parents moved forward at least one stage on all three behaviors.

In univariable analysis, for all three behaviors the consistent predictors of forward movement at least one stage were more substantial coach contacts, more staging episodes, and fewer attempts per successful contact (Table 3). Participant characteristics inconsistently predicted forward movement for the 3 behaviors: lower caregiver quality-of-life, more intruding events, and hospitalization at enrollment were associated with forward movement for Asthma Planning Visits; and less social support was associated with forward movement for Partnership. In multivariable models, for each behavior, the number of coach contacts was the strongest independent predictor any forward movement ($p<0.05$ for each behavior).

Stage-of-Change Movement Groups

The patterns of beginning and final stages for each behavior are shown in Figure 1, and the proportions per stage-of-change movement group are shown in Figure 2. For each behavior, small proportions of parents moved backward from Action to Pre-action (3% for Asthma Action Plan, 1% for Asthma Planning Visits, and 2% for Partnership) and small proportions moved backward within Pre-action (5% for Asthma Action Plan, 3% for Asthma Planning Visits, and 2% for Partnership). The Partnership behavior had the largest proportion (52%) of parents that moved backward from Action to Pre-action stages or remained in Pre-action without moving forward; most of them remained in Pre-action. The proportions of parents remaining in Action were 6% for Asthma Action Plan, 22% for Asthma Planning Visits, and 6% for Partnership.

For all three behaviors, parents who remained in Pre-action without moving forward or moved backward from Action to Pre-action stages had fewer substantial coach contacts and fewer staging episodes compared to those who moved forward within Pre-action, moved forward from Pre-action to Action or remained in Action (Table 4). While the number of intruding events seemed to differ among stage-of-change movement groups, other characteristics of participant were similar among stage-of-change movement groups (p -values >0.05).

Completing Asthma Planning Visits

Completing Asthma Planning Visits after enrollment was associated with completing such visits before enrollment and with stage-of-change movement. The proportion with a documented Asthma Planning Visit after enrollment was higher according to whether a visit was completed in the year before enrollment (81% versus 40%). After adjusting for this effect, parents ending in Action stages (action or maintenance) for this behavior were 2.5 times more likely to complete an Asthma Planning Visit than those ending in Pre-action

stages [OR = 2.54, 95% confidence interval (1.11, 5.77)]. In fact, parents who moved from Pre-action to Action stages were 3.5 times more likely to complete an Asthma Planning visit compared to those who moved backward from Action to Pre-action stages or remained in Pre-action stages without forward movement (OR = 3.47, 95% confidence interval, 1.14, 10.58)

Discussion

We examined factors associated with improved readiness (stage-of-change) to adopt and maintain important asthma management strategies (behaviors) among parents of children with asthma who were coached to improve care. The most significant factor associated with forward stage-of-change movement was having more substantial contacts with the coach. Intuitively, more contacts provide more opportunities to deliver the intervention, and suggest more engagement by the subject in the program. Establishing and maintaining consistent contact with parents was challenging, and many attempts were required for each successful contact. Factors related to having more contacts included earlier first contact, fewer attempts, willingness to have in-person contacts, having intruding events, younger child, hospitalization before enrollment, and more social isolation. The multivariable model included the process related variables of days from enrollment to first coach contact and in-person contacts, and intruding events. Other characteristics of the parents and children were not significantly associated with having more coach contacts. Together, these predictors suggest a rational model of coaching contacts. Those parents with greater need (e.g., prior asthma hospitalization, greater social isolation and more willingness to share intruding events) are more likely to engage with the coaches and, consistent with satisfaction leading to repeat contacts, the number of prior contacts predicts subsequent contacts. These findings suggest similar interventions may enhance success by identifying subjects more difficult to contact early in the intervention and increasing engagement efforts.

Process-related factors associated with more coach contacts were also associated with forward stage movement. Having fewer attempts per successful contact (ease of contact) and having in-person visits, which allowed face-to-face contact as well as the possibility for the coach to better understand social and environmental factors, were associated with forward movement for Asthma Action Plan and Asthma Planning Visits behaviors. Also, having more staging episodes (i.e. more times when the behavior was discussed) was associated with forward movement.

In addition to these factors related to the engagement of the parent in the coaching process, we identified factors that may predict those most likely to respond to the coaching intervention. Lower asthma caregiver quality of life as measured by the PACQLQ activity subscore [15] and hospitalization at enrollment were both associated with forward movement for Asthma Planning Visits behavior. This suggests that those with greater asthma burden may be more receptive to efforts to complete visits with the PCPs to discuss chronic asthma care. Parents with greater social isolation (reporting fewer persons for social support) were also more likely to move from Pre-action to Action stages on all three behaviors. This suggests that the coaches were able to establish rapport and influence these parents, possibly filling gaps in their social networks. This aspect of coaching was seen in another study of a community based program to reduce health care utilization for acute asthma, in which investigators found that subjects who had more social isolation had more engagement and more improvement in outcomes.[9] Although some of these personal factors were associated with stage movement for behaviors, the strongest predictor was having more coach contacts.

This analysis has some limitations. First, the coaches assigned stage-of-change based on their subjective impressions and may have been motivated to identify improvement in stage-of-change, the goal of their interactions with parents. To guard against this, we implemented a rigorous process of quality control involving weekly meetings between the coaches and their supervisor to review interactions, designed to promote accuracy and consistency of staging across coaches and time. Some parents were staged only once for a behavior and coded as no change, confounding the measurement of stage movement with frequency of staging episodes and limiting the precision in assessing trends in stage-of-change. The coaches' impressions of parents' readiness to adopt and maintain these behaviors appears to be validated by the association between improved stage-of-change for the Asthma Planning Visits behavior and increased number of documented Asthma Planning Visits, which was obtained independently from audit of medical records.

In conclusion, achieving the coaching goals of improved readiness (stage-of-change) to adopt and maintain asthma management behaviors (behaviors) in this intervention was most significantly related to having more coach contacts and with some personal characteristics of the parents and children. Having more contacts was associated with relatively greater social isolation and prior hospitalization. These results may be important considerations for other investigators. For similar interventions or programs, researchers should consider measuring social support and monitor numbers of contacts early in the process to identify participants at risk for not achieving forward movement.

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Figure 1.
Beginning and Final Stages-of-Change by Asthma Management Strategy

Figure 2.
 Stage-of-Change Movement Groups by Asthma Management Strategy

Table 1

Factors Associated with Increasing Number of Substantial Coach Contacts

	<u>P-value</u>
Days from enrollment to first contact, fewer days -> more contacts	<0.001
Attempts per successful contact, fewer attempts -> more contacts	<0.001
In-person contacts, more in person -> more contacts	<0.001
Intruding events, more intruding events -> more contacts	<0.001
Child age, younger child -> more contacts	0.015
Hospitalization for asthma during preceding year, 1 or more -> more contacts	0.021
Social Support, # friends or relatives < median -> more contacts	0.048
Child gender	0.11
Children in household, 1 vs. 2 vs. 3 vs. >3	0.11
Caregiver education, high school graduate or beyond	0.14
Hospitalized at enrollment visit	0.36
Percent living below poverty level in caregiver's census block, > median	0.49
PACQLQ (total score), > median	0.54
Caregiver age	0.59
Caregiver employment, full-time, part-time, or self-employed vs. not employed	0.63
Emergency Department visits for asthma during preceding year; 0, 1, >1	0.99

Single-variable analysis using general linear models. PACQLQ = Parental Asthma Caregiver's Quality of Life Questionnaire (Juniper et al. Qual Life Res. 1996;5:27-34). For Social Support, subjects reported numbers of friends or relatives they can "call on when they need a favor" and numbers of friends or relatives "that they feel at ease with and can talk to about a private matter"

Table 2

Correlations between process variables among the factors associated with increasing numbers of substantial coach contacts

Spearman Correlation Coefficients and p-values, (N = 120)				
	Number of Substantial Contacts	Days to 1 st Contact	Average Number of Attempts/Contact	Number of In-Person Visits
Number of Substantial Coach Contacts (with >= 1 Targeted Behavior Staged)	1.00	−0.435 (p<.0001)	−0.914 (p<.0001)	0.585 (p<.0001)
Days from Enrollment to 1st Coach Contact		1.00	0.442 (p<.0001)	−0.272 (p 0.0024)
Average Number of Attempts Per Substantial Contact			1.00	−0.548 (p<.0001)
Number of In-Person Coach Contacts				1.00

Table 3

Factors Associated with Any Forward Movement in Stage-of-Change by Asthma Management Strategy

	Asthma Action Plan (n=119)	Asthma Planning Visits (n=112)	Partnership (n=104)
# of Substantial Contacts	1.10 (1.03–1.17)	1.16 (1.08–1.24)	1.12 (1.03–1.22)
# of Staging Episodes for that management strategy	1.19 (1.12–1.27)	1.42 (1.30–1.55)	1.28 (1.18–1.38)
# In-person Contacts	1.38 (1.10–1.74)	1.47 (1.04–2.08)	1.42 (0.97, 2.07)
# Attempts per Successful contact	0.93 (0.86–0.998)	0.85 (0.76–0.96)	0.79 (0.67–0.94)
# Intruding Events	1.01 (0.81–1.26)	1.29 (1.03–1.62)	0.78 (0.56–1.07)
PACQLQ Activity Score	1.02 (0.86–1.20)	1.24 (1.03–1.50)	0.88 (0.72–1.09)
Hospitalized at Enrollment	0.88 (0.52–1.48)	2.04 (1.08–3.74)	1.04 (0.46–1.35)
Social Support (< median)	1.06 (0.68–1.65)	1.20 (0.68–2.11)	2.10 (1.06–4.16)

Univariable analysis. Results adjusted for initial stage-of-change. Data reported as hazard ratio (95% confidence interval). PACQLQ = Parental Asthma Caregiver's Quality of Life Questionnaire (Juniper et al. Qual Life Res. 1996;5:27–34). For Social Support, subjects reported numbers of friends or relatives they can "call on when they need a favor" and numbers of friends or relatives "that they feel at ease with and can talk to about a private matter". Bolded items have p<0.05

Table 4

Factors Associated with Stage of Change Movement Groups by Asthma Management Strategy

	Stage of Change Movement Groups		
	Remained in Pre- action without moving Forward, or Backward from Action to Pre- action	Forward within Pre-action	Forward from Pre-action to Action, or Remained in Action
Asthma Action Plan			
# of Coach Contacts *	4 (3–7)	8 (6–12)	7 (6–10)
# of Attempts per Successful Contact *	8 (5–12)	5 (4–7)	5 (4–7)
# of Staging Episodes *	3 (2–4.5)	6 (4–8)	6 (4–7)
# of Intruding Events *	0 (0–1)	1 (0–3)	0 (0–2)
Asthma Planning Visit			
# of Coach Contacts *	5.5 (4–8)	7.5 (6–10)	7.5 (6–10)
# of Attempts per Successful Contact	6 (4–11)	5 (4–7)	5 (4–7)
# of Staging Episodes *	1 (1–2)	5 (3–5)	3 (1–6)
# of Intruding Events	0 (0–1)	1 (0–2)	0 (0–2)
Partnership			
# of Coach Contacts *	5 (4–8)	9 (8–11.5)	8 (6–10)
# of Attempts per Successful Contact *	7 (5–11)	4 (3–5)	4 (3–6)
# of Staging Episodes *	2 (1–3)	5 (3–6)	2.5 (1–6)
# of Intruding Events *	0 (0–1)	2 (1–3)	0 (0–1)

Data reported as median (25th–75th percentiles). Analyzed using Kruskal-Wallis Test.

*
p < 0.05