

JOURNAL CLUB

A Randomized Controlled Trial of Parental Asthma Coaching to Improve Outcomes Among Urban Minority Children

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Objectives: To investigate whether asthma coaching decreases emergency department (ED) visits and hospitalizations and increases outpatient asthma monitoring visits.

Design: Randomized controlled trial.

Setting: Urban tertiary care children's hospital.

Participants: Primary caregivers (hereafter referred to as parents) of children aged 2 to 10 years with asthma who have Medicaid insurance coverage and are urban residents who were attending the ED for acute asthma care.

Intervention: Eighteen months of participating in usual care (control group) vs receiving coaching focused on asthma home management, completion of periodic outpatient asthma monitoring visits, and development of a collaborative relationship with a primary care provider (intervention group).

Main Outcome Measures: The primary outcome was ED visits. Secondary outcomes were hospitalizations and asthma monitoring visits (nonacute visits focused on asthma care). Outcomes were measured during the year before and 2 years after enrollment.

Results: We included 120 intervention parents and 121 control parents. More children of coached parents had at least 1 asthma monitoring visit after enrollment (relative risk [RR], 1.21; 95% confidence interval [CI], 1.04-1.41), but proportions with at least 4 asthma monitoring visits during 2 years were low (20.0% in the intervention group vs 9.9% in the control group). Similar proportions of children in both study groups had at least 1 ED visit (59.2% in the intervention group vs 62.8% in the control group; RR, 0.94; 95% CI, 0.77-1.15) and at least 1 hospitalization (24.2% in the intervention group vs 26.4% in the control group; 0.91; 0.59-1.41) after enrollment. An ED visit after enrollment was more likely if an ED visit had occurred before enrollment (RR, 1.46; 95% CI, 1.16-1.86; adjusted for study group), but risk was similar in both study groups when adjusted for previous ED visits (1.02; 0.82-1.27).

Conclusion: This parental asthma coaching intervention increased outpatient asthma monitoring visits (although infrequent) but did not decrease ED visits.

Trial Registration: clinicaltrials.gov Identifier: NCT00149500


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MORBIDITY FROM ASTHMA is high and disproportionately affects urban children of lower socioeconomic status.¹⁻⁹ Although national asthma guidelines¹⁰ recommend regular visits to primary care providers (PCPs) to monitor

ist for parents and PCPs to foster collaborative relationships that are important for effective long-term care.¹⁷



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asthma control, adjust medications, and provide education and guidance, these visits occur infrequently, especially among children with Medicaid insurance coverage.¹¹⁻¹⁶ Therefore, few opportunities ex-

Numerous approaches have been proposed to improve pediatric asthma management. Some have targeted medical providers with programs to enhance therapeutic and communication skills, including providing specific tool kits with resources for parents.¹⁸⁻²² Other interventions have focused on parents and children and provided educational and support programs to increase follow-up and medication adherence.²³ Although some programs have had modest suc-

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cess, those targeting underprivileged Medicaid-insured patients have noted outcomes that are limited by low adherence to medications and follow-up and by poor receptiveness to behavioral and environmental modifications.²²

In previous investigations, researchers from our group studied peer coaching to influence multiple behaviors associated with asthma care, targeting parents of Medicaid-insured children in St Louis, Missouri. Studies^{16,17,24} showed that coaching after emergency department (ED) visits increased PCP follow-up visits but did not decrease ED visits and that coaching after hospitalizations reduced rehospitalizations but not ED visits. Lay coaches were effective in engaging parents in meaningful discussions of asthma care, and parents preferred telephone instead of in-person contacts.²⁵ Building on the findings of these prior studies, we evaluated long-term coaching to reduce ED visits. The intervention described herein focused on key behaviors (asthma management strategies), including daily management using an asthma action plan, attending asthma monitoring PCP visits, and developing a parent-PCP partnership. We hypothesized that 18 months of coaching would increase asthma self-management and asthma monitoring visits, thereby decreasing ED visits and hospitalizations.

METHODS

STUDY DESIGN

This was a randomized controlled trial conducted through St Louis Children's Hospital, a university-affiliated tertiary care hospital. Primary caregivers serving in the parent role (usually mothers [hereafter referred to as parents]) were enrolled for 24 months (an 18-month intervention period and 6 months of continued medical record auditing). The Human Research Protection Office approved study procedures, and all the participants provided informed consent.

PARTICIPANTS, RECRUITMENT, AND STUDY GROUP ALLOCATION

During ED visits between September 1, 2003, and May 15, 2005, we enrolled a convenience sample of parents of eligible children treated for asthma exacerbations in our ED who spoke English, had working telephones, and agreed to the study procedures. Eligible children were aged 2 to 10 years, resided in local urban zip codes, had Medicaid insurance coverage, received at least 1 albuterol dose during the enrollment visit, and had an asthma diagnosis based on parent report and at least 1 other visit to the PCP or an ED for acute asthma during the preceding 15 months.

We estimate that 10% of approached parents declined to participate. Participation was limited to 1 parent-child dyad per household. Emergency department physicians independently directed treatment and determined disposition.

Before completing baseline questionnaires, parents were randomly allocated by a computerized formal probability model that masked enrollers, parents, and ED staff to group assignment. Randomization was blocked and stratified by PCP practice (20 strata) to reduce selection bias and to adjust for differences between practices. Within each practice, study group allocation was balanced. Primary care providers were aware that the study was ongoing but were not alerted after enrollment occurred.

The intervention was modeled after the coaching process described by Fisher et al²⁴ and was based on the transtheoretical model of behavior change.²⁶ The targeted asthma management strategies were to avoid environmental triggers, to use controller medication as prescribed, to have and use an updated asthma action plan, to complete asthma monitoring PCP visits every 3 to 4 months, and to develop a collaborative partnership with the PCP (parent feels empowered to manage asthma and dialogue regarding asthma care).

Two female lay coaches (both with personal experience in asthma care) were involved throughout the study, and each intervention group parent was assigned to a coach. Coaches were taught the pathogenesis, symptoms, and management principles of asthma and how to communicate effectively, provide psychosocial support to parents during times of stress, assess parents' readiness to engage (stage of change) in targeted management strategies, and promote behavior change using nondirective nonthreatening methods appropriate for the assessed stage of change. The coach would assess the parent's understanding of the management strategies and his or her willingness and self-confidence to initiate or continue them, including motivators, barriers, and possible solutions to barriers. The coaches were encouraged to use a consistent approach and delivery, including a checklist of management strategies; no specific script was used.

Stage of change was categorized according to the standard transtheoretical model of behavior change stages.²⁶ Parents who were using the asthma management strategy for longer than 6 months were categorized as "I still am" (maintenance) and for 6 months or less as "I am" (action). Parents who were not yet performing the strategy but had a strong motivator, knew barriers, and could discuss solutions were categorized as "I will" (preparation); if there was no strong motivator, barriers were unknown, or solutions were lacking, as "I may" (contemplation); if the parent seemed overwhelmed, stating many reasons why the strategy could not be done, as "I can't" (precontemplation); and if reluctant to even discuss the strategy, as "I won't" (precontemplation).

During each contact, the coach discussed as many management strategies as possible based on her assessment of the parent's readiness and willingness. It was expected that the parent would likely be in different stages for each strategy, so the coach began with the strategy for which the parent seemed most ready and then shifted to strategies for which there was less confidence. The coaches sought to empower parents to identify motivators, understand barriers, and seek solutions to barriers while being active managers of their child's asthma.

The intervention was implemented in a flexible manner without a strict schedule of contacts, allowing the coaches to tailor to the parents' needs.^{27,28} The goals were to complete initial in-person visits or telephone calls during 2 weeks after enrollment and at least 1 contact (by telephone or in person) per month or more frequently according to need as perceived by the coach or as communicated by the parent. Based on experience, we anticipated that contact frequency would decrease as the intervention proceeded toward completion.²⁴ We expected that some parents would be less willing to engage, some parents would become more empowered and self-sufficient (needing less coaching), and some parents would be difficult to consistently contact because of their busy schedules. For all the parents, the intervention continued for 18 months regardless of the number of contacts or stage achieved.

The coaches maintained computerized records of contacts and recorded their assessments of parents' stages of change for each management strategy discussed. For quality improvement, the coaches met weekly with their supervisor (G.R.H.) to discuss intervention delivery (eg, what their experiences with parents were and how they handled challenging situations). This

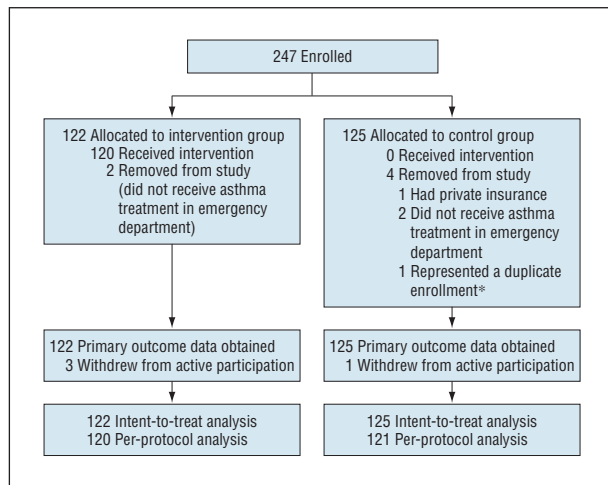


Figure. Participant flowchart. *Duplicate enrollment involved a parent enrolled again during a subsequent emergency department visit with a different child; she was allocated to the control group each time and continued with data collection only for the first child.

process sharpened the coaches' skills and ensured similar and consistent approaches.

Coached parents were also telephoned 2 and 6 months after enrollment by a pediatric nurse who was experienced in telephone management of acute asthma to assess understanding of acute symptoms and usefulness of asthma action plans and to answer questions about asthma care. Information obtained was shared with the coaches.

USUAL CARE

As per routine, patients discharged from the ED received an instruction sheet²⁹ that functioned as a short-term asthma action plan. Hospitalized patients were evaluated by specialized nurses and were given discharge instructions that emphasized controller medication use and PCP follow-up visits.³⁰

OUTCOMES

The primary outcome was the proportion of children per study group with at least 1 asthma-related ED visit during the 2 years after enrollment. Secondary outcomes were proportions with at least 1 asthma-related hospitalization, at least 1 asthma monitoring visit, and at least 1 PCP visit for acute asthma. These outcomes were measured by medical record review.

Trained research assistants who were masked to study group assignment audited PCP and hospital records for each participating child, and they abstracted data for office visits, ED visits, and hospitalizations that occurred during the year before and 2 years after enrollment. Emergency department visits ending in hospitalizations were counted as ED visits in determining the primary outcome. Asthma-related PCP visits were subcategorized by the presence of acute asthma symptoms and the treatment administered or prescribed. Asthma monitoring visits were nonacute visits focused on asthma care, including well-child care visits with asthma documented. Routine visits to the hospital asthma clinic were included in outpatient asthma monitoring visit counts. The research assistants also recorded when controller medications (inhaled corticosteroid or leukotriene modifiers) and asthma action plans were documented during PCP visits. We did not measure prescription dispersal, filling, or adherence. After study completion, investigators (K.A.N., S.R.S., and R.C.S.) who were masked to research assistants' assessments verified visit categorizations.

STATISTICAL ANALYSIS

Commercially available statistical software (SAS, version 9.1.3; SAS Institute, Inc, Cary, North Carolina) was used for analysis. We estimated that a sample size of 210 would detect a 20% difference in the primary outcome (proportion with at least 1 ED visit over 2 years) between groups with $\alpha = .05$ and power of 80%. We overenrolled, assuming a potential 15% dropout rate.

Relative risks (RRs) of ED visits, hospitalizations, and outpatient visits were compared between groups using Cochran-Mantel-Haenszel methods. We analyzed rates of ED visits according to intent to treat, including all enrolled participants, and as per protocol, including all eligible enrolled participants. The comparison of asthma-related ED visits was adjusted for practice strata and for the presence of a prior-year asthma-related ED visit (excluding the enrollment visit). The effect of the number of coach contacts on asthma-related ED visits was estimated using logistic regression analysis. The effect of coaching on asthma-related hospitalizations and on asthma monitoring visits was adjusted for similar prior-year events (excluding hospitalization at the enrollment visit). The effect of the number of coaching contacts on asthma monitoring visits was examined using logistic regression analysis.

RESULTS

CHARACTERISTICS OF PARTICIPANTS

We enrolled 247 parents, 122 allocated to an asthma coach (AC) and 125 to usual care (UC). Six parents were withdrawn because of ineligibility (**Figure**). The per-protocol analysis included the remaining 241 parents and children. Baseline characteristics are summarized in **Table 1**. Four parents withdrew from ongoing contact; 3 of these were in the AC group. Medical record audits were completed for all children except 1 whose parent also withdrew consent to obtain further outcomes.

INTERVENTION IMPLEMENTATION OF COACHING CONTACTS AND STAGE-OF-CHANGE MOVEMENT

The ACs completed initial contacts with 66.7% of parents within 2 weeks of enrollment, with 83.6% of parents within 4 weeks, and with all parents by 127 days (median time, 8 days [25th and 75th percentiles, 3 and 19.5 days, respectively]). During the 18-month intervention, 90.1% of contacts were phone calls, the mean (SD) number of contacts per parent was 7.3 (4.0), and the mean (SD) number of attempts per contact was 8.1 (8.0). As anticipated, contact frequency decreased over time, with 98.3% of intervention group parents having at least 1 AC contact in the first quarter, 75.8% in the second, 61.7% in the third, 45.8% in the fourth, 49.2% in the fifth, and 41.7% in the sixth.

For all the coached parents, the intervention continued for 18 months regardless of the number of contacts or stage-of-change achieved. We examined 3 specific management strategies and found that ACs were able to engage parents more often in the use of asthma action plans, less often for completion of asthma monitoring visits, and least often for partnership between parents and PCPs (**Table 2**).

Table 1. Baseline Characteristics of Parents and Children

Characteristic	Intervention Group (n=120)	Control Group (n=121)
Parents		
Female sex, No. (%)	116 (96.7)	117 (96.7)
Age, mean (SD), y	29.6 (7.6)	29.3 (7.3)
Race/ethnicity, No. (%)		
African American	113 (94.2)	114 (94.2)
White	5 (4.2)	7 (5.8)
American Indian and African American	1 (0.8)	0
Other	1 (0.8)	0
Relationship to child, No. (%)		
Mother	112 (93.3)	113 (93.4)
Father	4 (3.3)	4 (3.3)
Grandparent	4 (3.3)	3 (2.5)
Aunt	0	1 (0.8)
Children in home, median (IQR) [range]	3 (1.5) [1-8]	3 (2.0) [1-7]
Adults in home, median (IQR) [range]	1 (1) [1-5]	1 (1) [1-4]
Highest education level completed, No. (%)		
Did not complete high school	30 (25.0)	29 (24.0)
High school graduate, no college	39 (32.5)	45 (37.2)
Some college or technical school	47 (39.2)	36 (29.8)
College graduate	4 (3.3)	11 (9.1)
Work status, No. (%) ^a		
Employed full time	48 (40.0)	59 (48.8)
Employed part time	24 (20.0)	14 (11.6)
Self-employed	4 (3.3)	5 (4.1)
Homemaker	12 (10.0)	11 (9.1)
Student	15 (12.5)	8 (6.6)
Retired	1 (0.8)	0
Unable to work	1 (0.8)	3 (2.5)
Out of work	19 (15.8)	25 (20.7)
Social isolation, No. (%) ^b	56 (46.7)	50 (41.3)
Percentage below federal poverty level, median (IQR) [range] ^c	28 (22) [1-78]	28 (21) [1-57]
Children		
Male sex, No. (%)	77 (64.2)	69 (57.0)
Age, mean (SD), y	5.1 (2.5)	5.2 (2.6)
Race/ethnicity, No. (%)		
African American	113 (94.2)	115 (95.0)
White	2 (1.7)	2 (1.7)
African American and white	2 (1.7)	4 (3.3)
American Indian or Alaska Native	1 (0.8)	0
Other	2 (1.7)	0
Asthma symptom score, median (IQR) [range] ^d	5 (6) [0-19]	5 (6) [0-18]
Emergency department visits during preceding year, median (IQR) [range]	0 (1) [0-5]	1 (1) [0-6]
Hospitalizations during preceding year, median (IQR) [range]	0 (1) [0-3]	0 (1) [0-3]
Visits with PCP during preceding year, median (IQR) [range]		
For acute asthma symptoms	0 (0) [0-3]	0 (0) [0-3]
For asthma monitoring	0 (1) [0-8]	0 (1) [0-5]
Hospitalized at study enrollment during emergency department visit, No. (%)	29 (24.2)	25 (20.7)

Abbreviations: IQR, interquartile range; PCP, primary care provider.

^aMultiple responses per participant possible.

^bMeasured using a nonvalidated tool. Parents were asked how many friends or relatives they can “talk with” or “ask a favor of.” Data reflect the number of participants reporting fewer than 7 (median).

^cBased on parents’ addresses at study enrollment and census block group from the 2000 US census.

^dParents were asked 3 questions about the number of days with symptoms within the week preceding the current exacerbation (1) at any point, (2) awakening from sleep, and (3) interfering with play. The maximum score was 21. Although not validated, these questions are based on constructs assessing asthma impairment and severity in the National Asthma Education and Prevention Program.¹⁰

EFFECT OF COACHING ON OUTPATIENT VISITS

Coaching increased asthma monitoring visits and non-asthma PCP visits (**Table 3**). The AC children were more likely than the UC children to have at least 1 asthma monitoring visit during 2 years after enrollment (RR, 1.21; 95% confidence interval [CI], 1.04-1.41) and to have at least

4 asthma monitoring visits (2.02; 1.06-3.84), although proportions with at least 4 asthma monitoring visits during 2 years were low (20.0% among AC children and 9.9% among UC children). Among AC children, the probability of an asthma monitoring visit increased with each additional coaching contact (odds ratio, 1.27; 95% CI, 1.08-1.50). Having an asthma monitoring visit after enrollment

Table 2. Frequency of Stage-of-Change Assessment and Progress for 3 Asthma Management Strategies Among 120 Intervention Group Parents

Variable	Use of Asthma Action Plan	Asthma Monitoring Visits	Partnership Between Parent and PCP
Staged at least once for management strategy, %	97	92	85
Staging episodes per parent, mean No.	5.3	3.5	2.9
Months to forward movement ≥ 1 stage, mean No.	3	14	17
Began in action or maintenance stage, %	10	26	8
Ended in action or maintenance stage, %	54	46	18

Abbreviation: PCP, primary care provider.

Table 3. Health Care by Study Group^a

Variable	Intervention Group (n=120)	Control Group (n=121)	Relative Risk (95% CI)
Emergency Department Visits			
For asthma			
Children with ≥ 1 visit, No. (%)	71 (59.2)	76 (62.8)	0.94 (0.77-1.15)
Total No. of visits, median (range)	1 (0-11)	1 (0-9)	
Time until first visit, mean (range), mo	4.4 (0.13-22.00)	5.9 (0.03-21.80)	
For any reason			
Children with ≥ 1 visit, No. (%)	92 (76.7)	95 (78.5)	0.98 (0.85-1.12)
Total No. of visits, median (range)	2 (0-24)	2 (0-14)	
Hospitalizations for Asthma			
Children with ≥ 1 hospitalization, No. (%)	29 (24.2)	32 (26.4)	0.91 (0.59-1.41)
Total No. of hospitalizations, median (range)	0 (0-6)	0 (0-4)	
Time until first hospitalization, mean (range), mo	6.0 (0.79-22.10)	7.9 (0.16-23.40)	
Asthma Monitoring Visits^b			
No. of visits			
Children with ≥ 1 visit, No. (%)	97 (80.8)	81 (66.9)	1.21 (1.04-1.41)
Children with ≥ 4 visits, No. (%)	24 (20.0)	12 (9.9)	2.02 (1.06-3.84)
Total No. of visits, median (range)	2 (0-10)	1 (0-11)	
With controller medication documentation			
Children with ≥ 1 visit, No. (%)	70 (58.3)	52 (43.0)	1.36 (1.05-1.75)
Total No. of visits, median (range)	1 (0-5)	0 (0-4)	
Visits With PCP			
With asthma documentation			
Children with ≥ 1 visit, No. (%)	12 (10.0)	13 (10.7)	0.93 (0.44-1.96)
Total No. of visits, median (range)	0 (0-3)	0 (0-2)	
Visit for acute asthma symptoms			
Treatment documented			
Children with ≥ 1 visit, No. (%)	27 (22.5)	17 (14.0)	1.60 (0.92-2.78)
Total No. of visits, median (range)	0 (0-7)	0 (0-3)	
No treatment documented			
Children with ≥ 1 visit, No. (%)	39 (32.5)	28 (23.1)	1.40 (0.93-2.13)
Total No. of visits, median (range)	0 (0-10)	0 (0-4)	
Without asthma action plan documentation			
Children with ≥ 1 visit, No. (%)	16 (13.3)	14 (11.6)	1.15 (0.59-2.26)
Total No. of visits, median (range)	0 (0-2)	0 (0-2)	
Nonasthma visit			
Children with ≥ 1 visit, No. (%)	51 (42.5)	35 (28.9)	1.47 (1.04-2.08)
Total No. of visits, median (range)	0 (0-5)	0 (0-7)	

Abbreviations: CI, confidence interval; PCP, primary care provider.

^aData represent events occurring during 2 years following study enrollment (n = 241) for the per-protocol analysis. Medians are compared using Wilcoxon rank sum test.

^bThere were similar proportions per study group with at least 1 asthma monitoring visit in the hospital asthma clinic (21.6% for the intervention group and 14.9% for the control group; $P = .19$, Fisher exact test).

was more likely if an asthma monitoring visit had occurred before enrollment (RR, 1.33; 95% CI, 1.14-1.54; adjusted for study group). After adjusting for having prior-year asthma monitoring visits, AC children were more

likely to have asthma monitoring visits after enrollment (RR, 1.20; 95% CI, 1.04-1.39). Although AC children were more likely to have at least 1 asthma monitoring visit at which a controller medication was documented, this per-

centage was still low (58.3%); the median number of such visits over the 2-year follow-up was 1. Asthma action plan documentation in PCP records was similar between study groups and was too infrequent for further analysis.

EFFECT OF COACHING ON ED VISITS

Similar proportions of children in both study groups had at least 1 asthma-related ED visit during 2 years after enrollment (59.2% of AC children and 62.8% of UC children, intent-to-treat analysis) (Table 3). An ED visit after enrollment was more likely if an ED visit had occurred before enrollment (RR, 1.46; 95% CI, 1.16-1.86; adjusted for study group), but risk was similar in both study groups when adjusted for previous ED visits (1.02; 0.82-1.27). Indicators of more severe disease at enrollment (hospitalization or symptom score exceeding the median) did not change the effect of coaching on ED visits. The number of ED visits did not vary with the number of asthma coaching contacts. The total numbers of asthma-related ED visits and ED visits for any reason were similar between groups.

EFFECT OF COACHING ON HOSPITALIZATIONS

The proportions of children with at least 1 asthma-related hospitalization after enrollment were similar between groups (Table 3). Hospitalization after enrollment was more likely if hospitalization had occurred before enrollment (RR, 2.45; 95% CI, 1.59-3.77; adjusted for study group), but the risk of hospitalization after enrollment was similar in both study groups when adjusted for hospitalization before enrollment (0.86; 0.56-1.30).

EFFECT OF COACHING AND ASTHMA MONITORING VISITS ON ED VISITS

Controlling for study group and prior-year ED visits, neither having an asthma monitoring visit (RR, 1.18; 95% CI, 0.92-1.52) nor having an asthma monitoring visit with documented controller medication (1.29; 1.05-1.58) decreased the likelihood of having at least 1 asthma-related ED visit. Only 14.1% of ED visits were preceded by PCP visits within 2 weeks, and this interval was longer than 4 weeks for 73.4% of ED visits, with no difference between study groups.

COMMENT

We investigated parental asthma coaching to improve important aspects of care and reduce morbidity in a high-risk population. Although coaching increased self-reported use of asthma action plans and medical record audit-confirmed asthma monitoring visits, including visits with documented controller medications, these changes were not associated with fewer ED visits. Other investigators have shown that continuity of care can reduce ED visits³¹ and that collaborative patient-PCP partnership is important for high-quality long-term care.¹⁷ It seems that the asthma monitoring visits we achieved were too infrequent to affect these outcomes. Fostering effective collaborative patient-PCP partnerships remains a challenge.

Reducing ED visits is an important but elusive goal of asthma management.¹⁰ A 2009 Cochrane Collaboration review²³ reported that “educational interventions” for children (and caregivers) treated in the ED for asthma lower the risk for ED visits and hospitalizations but noted “significant heterogeneity” among interventions and populations studied. Of 3 randomized controlled trials^{23,32,33} that enrolled low-income urban disadvantaged families and measured ED visits as the primary outcome, 2 studies^{32,33} reported benefit and measured ED visits by parent report, with 1 study³² reporting outcomes for only 6 months. We measured visits for 2 years after enrollment using medical record review rather than relying on parent report, important differences in design that may explain the variation in findings.

The factor most associated with an ED visit after study enrollment was a prior ED visit. What drives this phenomenon is unclear. Other investigators³⁴ have reported that many urban parents of children with asthma have barriers to care and prefer the ED “because they perceived it provides the best quality care.”^{35(p516)} In our study, PCP visits for acute asthma were rarer than ED visits for asthma, few ED visits were preceded by a PCP visit, and 27.8% of children had a PCP visit for acute asthma symptoms but no documented treatment. If overreliance on the ED is owing to lack of an alternative source of effective acute management guidance, one solution may be a nurse-staffed call center that uses an asthma management protocol.³⁶

Like similar investigations, we experienced challenges in providing this intervention. By design, the intervention was implemented flexibly without a strict schedule or mandatory number of contacts. However, maintaining consistent contact was challenging in part because of parents’ frequent telephone service disconnections. It is possible that more frequent AC contacts may improve sustainability and effectiveness of the program.

Our study has limitations not yet discussed. We enrolled a convenience sample and did not collect data about those not enrolled. However, in another coaching study¹⁶ in this ED using a similar recruitment strategy, the potential for selection bias was carefully characterized, and no evidence of bias was found.³⁷ For ED visits and hospitalizations, only records from this hospital were reviewed, and another children’s hospital with an ED is located in St Louis. However, according to a 2003 study,⁹ our hospital accounted for 70% of asthma-related hospitalizations among children 14 years or younger in the zip codes assessed herein, and only 5% were subsequently admitted to the other hospital. It is unlikely that underestimation of visits by this small amount biased the results. We did not measure PCP care beyond medical record review and acknowledge inherent limitations with such data. Consequently, we may have underestimated the provision of controller medications, treatment at visits, and asthma action plans, but any measurement error is unlikely to have differed by study group.

In conclusion, this parental coaching intervention increased asthma monitoring visits, although such visits remained infrequent and did not reduce ED visits or hospitalizations. Future interventions to reduce morbidity for this patient population should include strategies targeting both the parent and the PCP to accomplish the goals of a collaborative model of chronic disease management as described by Wagner et al.¹⁷ Lay ACs were

well accepted by this high-risk population and could be included in such a system of care delivery.

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