

Evaluation of a Statewide Medical Home Program on Children and Young Adults with Asthma

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Abstract

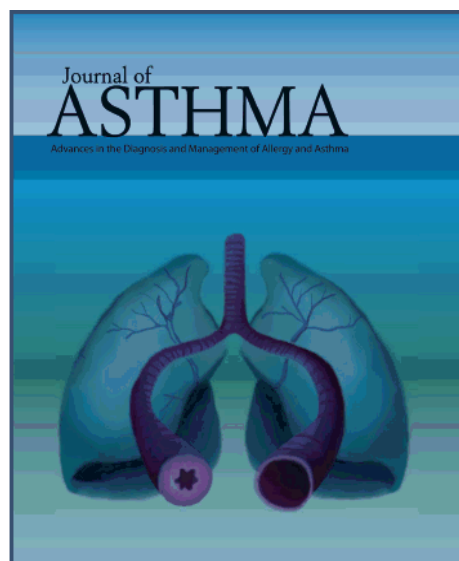
Objective: Asthma, the most common chronic condition among children, accounts for significant health care utilization and impact on quality of life. Care coordination in a medical home is considered standard practice, but has not been rigorously evaluated.

Methods: We initiated this pilot study of children/young adults with asthma (n=967), ages birth to 24 years, receiving care from a subset of pediatric practices (n=20) participating in the Pennsylvania Medical Home Initiative, Educating Practices in Community-Integrated Care (92 practices statewide). We hypothesized children and youth with asthma receiving care coordination in the context of a formal medical home program would

experience favorable associations with health care utilization and quality of life measures.

Results: A total of 9,240 care coordination encounters for this cohort of children/youth occurred over 100 days. The average length of care coordination encounter was 20.7 minutes. The most common care coordination activity was referral management (21%) and the care coordinator in the practice most often contacted parent/family and specialists (75%). Children with more severe asthma had more hospitalizations and emergency department visits than children with less severe asthma. There was a significant decrease in school absences, emergency department visits, and acute care visits for children/youth with asthma with increasing length of time in a medical home program ($p < 0.05$).

Conclusion: Care coordination for children/youth with asthma is feasible and may yield improvements in health care utilization, expenditures, and quality of life. Larger scale implementation of care coordination and medical home models for children/youth with asthma and other diagnoses are warranted.



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coordination in the context of a formal medical home program would experience favorable associations with health care utilization and quality of life measures.

Results: A total of 9,240 care coordination encounters for this cohort of children/youth occurred over 100 days. The average length of care coordination encounter was 20.7 minutes. The most common care coordination activity was referral management (21%) and the care coordinator in the practice most often contacted parent/family and specialists (75%). Children with more severe asthma had more hospitalizations and emergency department visits than children with less severe asthma. There was a significant decrease in school absences, emergency department visits, and acute care visits for children/youth with asthma with increasing length of time in a medical home program ($p<0.05$).

Conclusion: Care coordination for children/youth with asthma is feasible and may yield improvements in health care utilization, expenditures, and quality of life. Larger scale implementation of care coordination and medical home models for children/youth with asthma and other diagnoses are warranted.

Introduction

Asthma is the most common chronic health condition among U.S. children and young adults (youth). Approximately 11.4% of adolescents (11-17 years) and 7 million (10%) children (under 18 years) have asthma with increasing prevalence. [1] In 2010, 58.3% of children/youth with asthma had at least one exacerbation the previous year. [2] Asthma accounts for more missed school days than any other chronic disease with 60% of asthmatic children/youth missing at least one school day, [3] and 14.4 million missed school days in 2008. [4] Asthma is also associated with significant health care utilization and staggering expenditures, accounting for 157,000 hospitalizations and 640,000 emergency department (ED) visits for children/youth. [3]

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Children/youth with asthma, especially the youngest, have an increased risk of repeat hospitalization compared to peers with other diagnoses. [5] Annual direct health care costs (prescriptions, outpatient visits, ED visits, and hospitalizations) of asthma across all ages are approximately \$50.1 billion. Prescription medications account for more than 50% of these costs. [6] Indirect costs (lost productivity due to missed work/school days or death) add \$5.9 billion, for a total cost of \$56 billion. [6]

Conceptual Framework: The Broader Context

Consideration of multiple factors is required to improve pediatric asthma health outcomes. McLeroy's Ecological Model [7] is informed by individual, environmental, and societal factors. In this model, behavior is determined by factors in five levels: Individual (Intrapersonal), Interpersonal, Organizational (Institutional), Community, and Public Policy. The factors within each level are described elsewhere [7] as are benefits and limitations of using social-ecological models in health promotion interventions. [8] The model suggests interventions targeting factors within the layers will increase environmental/societal supports facilitating individual behavior change and improved health outcomes.

Figure 1 depicts a social-ecological approach demonstrating factors influencing individuals with asthma and broader societal impact. McLeroy did not include influential factors such as culture, gender, and social, economic, and racial disparities, which are included within our Community level (**Figure 1**). Additional significant factors (individual and community economic resources, individual change of residence/school), is beyond the scope of this article. A general understanding of the broader context of asthma care and health promotion, including family

needs, strengths, and the home environment, is essential for successful interventions.

Recognizing and addressing roles of community elements, such as providers daycares, schools, environmental control programs, and policy issues (insurance, access to care, service coverage), in the prevention and treatment of asthma improves outcomes.

Provider Challenges

Preventing asthma exacerbations and ensuring treatment adherence remains challenging for providers. [3, 9] Despite updated guidelines and treatment regimens, U.S. asthma burden remains unacceptably high. [2, 10] In 2007, clear guidelines to assist providers managing asthma were published. [11] However, many providers fail to fully utilize these guidelines [12-14], often citing lack of time and/or infrastructure [15], making improvements in outcomes difficult. [16] Notably, in 2008, only 44% of caregivers of children/youth with asthma received an asthma action/care plan and only about half of families were advised on controlling environmental triggers. [3] Although these rates are increased since 2003, they reflect suboptimal asthma care.

Control of environmental triggers and the unpredictability of exacerbations require significant preventive planning and care coordination. Primary care providers (PCPs) often are responsible for developing action/care plans requiring communication with families and coordination with providers (medical specialists, insurance companies, education system, and community partners). PCPs are responsible for implementing treatment regimens optimizing adherence with medications and environmental modifications (smoking cessation and dust control). [11, 17] Factors associated with poor treatment adherence [18] and differing perceptions among providers, parents, and patients regarding preventive care[19], quality of life, and asthma control

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may affect adherence to asthma guidelines and treatment recommendations. [20, 21] PCPs supporting proactive home interventions reduce non-adherence and risk of adverse patient outcomes. [22] Unfortunately, many needs of parents and children/youth with asthma too often go unmet. [23] Increased communication and partnerships among patients, families, and providers will likely improve care. [20, 24, 25] Such care and communication can be promoted/provided via medical home practice models.

A Role for Medical Home and Care Coordination

Providing high quality health care to children/youth in a medical home is the standard. [26] This care is coordinated, compassionate, culturally competent, comprehensive, accessible, family-centered, and provided by trained personal health care providers. Providing care in the context of a medical home ensures patients' and families' needs drive delivery and care is coordinated among providers, partners, systems, and agencies necessary maximizing potential of children/youth. [27, 28] The medical home is associated with improvements in health care quality, child/family functioning [29], and fewer asthma-related ED visits. [30] Poor access to a quality medical home is associated with increased hospital readmission for asthma. [31] Care coordination is central in the medical home model and facilitates consideration of broader influences on patient care at the individual, family, community and societal levels of McLeroy's model. [7] Care coordination embraces patient- and family-centered care, providing necessary services, supports, and resources through partnerships with the medical home teams, communities, and families/children/youth [32] and is associated with improvements in pediatric clinical outcomes. [33-35]

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Care coordination is a central construct of the medical home [36] yet there is a dearth of literature examining its impact. Gaps in coordinating care occur often, accounting for inefficiencies, duplication, and increased costs. [37] The Pennsylvania Medical Home Initiative-Educating Practices in Community-Integrated Care (EPIC-IC) is a statewide quality improvement program working with 92 pediatric practices on medical home adoption, implementation, and evaluation. [35] EPIC-IC is part of the PA Chapter of the American Academy of Pediatrics (AAP) with state and federal funding. The EPIC-IC medical home program is based on the Educating Physicians in their Communities (EPIC) model, using office-based change as the key to improving care of children/families. The goal of EPIC-IC is operationalizing the medical home model and care coordination at practice levels. The primary aim of this pilot study was to assess the association of care coordination provided for children/youth with asthma in an established statewide medical home program (EPIC-IC) with clinically relevant health outcomes. The hypothesis of this study was: children/youth with asthma receiving formal care coordination in a medical home model would experience favorable associations with health care utilization and quality of life.

Methods

A sample of EPIC-IC practices participated in this study (**Tables 1 & 2**). These practices were a subset of the larger EPIC-IC practice network throughout Pennsylvania. Their selection was based on an application process and a minimum of 6 months participation in EPIC-IC. The participating practices were from 13 Pennsylvania counties representing urban, suburban, and rural areas and both privately owned (n=14) and hospital/system affiliated (n=6) practices. The study practices received modest mini-grants from EPIC-IC (\$5,000-\$10,000 annually)

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supporting care coordination services for children/youth with special health care needs, including asthma. The practices also received formal training in care coordination and medical home, including training for personal Health Care Providers (HCP). Personal HCPs (personal doctor or nurse/care coordinator) at each site were trained by EPIC-IC staff via a five session training series that enhanced care coordination activities and standardized the provision of care coordination efforts in this study.

Participating practices identified children/youth in a patient registry as part of QI efforts. The personal HCP(s) recorded care coordination activities as encounters delivered by practice team members on a time tracking form (**Figure 2**) during the study. Encounters included any contact between team members and patients/families where linkages were provided for services, supports, or resources. Care coordination activities are shown in **Figure 2**. Personal HCPs/care coordinators assessed individual/family needs and gaps in care and directed activities accordingly. Social determinants of health were addressed by assessing insurance needs, coordinating appointments for patients with multiple medical needs, assisting families address household triggers (dust, mold, infestations), obtaining necessary prior authorizations for medications, or engaging school nurses in implementing care plans. Coordinators facilitated treatment adherence by creating and maintaining asthma action/care plans, reviewing plans with patients/families, and using pictures when indicated (patients with low literacy). Each encounter tracked contact name, encounter focus, care coordination activities, care coordination duration, and outcome variables: 1) health care utilization (hospitalizations or ED visits), 2) child/family quality of life measures (school days missed or work days missed by parent/caregiver), and 3) linkages to resources and services. Linkages to resources and services included referrals to sub-

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specialists; engaging school nurses; and linking families to community agencies for household/environmental services (obtaining pillow/mattress covers or pest removal services).

Data were linked via unique patient identifiers to patient registry information, stored, and analyzed in a central database. This study was informed by the work of Antonelli, [39] regarding care coordination tracking and outcome evaluation in a pediatric primary care setting.

Subjects

Subjects were part of a larger cohort of patients for a study on care coordination for all children with special health care needs in EPIC-IC practices. Subjects for this study were children/youth with a diagnosis of asthma as identified on practice patient registries. Enrollment was staggered during the 100 day study period (spring season). Age ranged from birth to 24 years.

Missing/incomplete data (n=14 encounters) were removed prior to analysis. This study was approved by the Pennsylvania Department of Health-Institutional Review Board.

Study Variables

Variables included data from patient registries (date of birth, diagnoses, insurance status, home nursing/durable medical equipment, and severity score) and variables tracked on the time tracking form (**Figure 2**). Hirsch's Complexity Index was used as a general assessment of health complexity/disease severity for children/youth with asthma. [40] In comparison to national asthma classifications [11] which focus on asthma control and severity, Hirsch's Index is applicable all patients because it is a systems-based approach to account for overall medical complexity. It also allows for comparisons among children/youth with co-morbid conditions that may impact outcomes, and it accounts for psychosocial factors possibly informing health care utilization. Severity score was measured both as an outcome and risk factor for other outcomes

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(hospitalizations or school days missed); it was treated as an ordinal variable. It is measured on a scale of 0-4 based on increasing organ system involvement and an “S” designation if a complicating psychosocial concern was present. The presence of this social component was a risk factor in analyses.

Variables, including missed school/work days, were measured using parental recall.

Hospitalizations and ED utilization were measured by parental recall if families went to institutions not affiliated with their home practice. Calls to home practices by families were tracked. Families were asked about ED visits and hospitalizations at every care coordination encounter (phone or patient visit). Variables were tracked throughout the 100 day study period, electronically when electronic health records were available. Time spent on care coordination activities was calculated.

Risk factors examined included: age at encounter, time in the EPIC-IC program (days), severity score, insurance type (public, private, or both), and presence of a complicating social issue.

Data Analysis

The goal of the analyses was to determine the relationship between occurrence, amount, and type of care coordination and the quality of life and health care utilization of children/youth with asthma among EPIC-IC practices. Descriptive statistics examined the distribution of variables. Frequencies of outcomes (e.g. hospitalizations, ED visits, school days missed, or parental work days missed) occurred and prevented were examined. Repeated measures analysis was performed testing for possible changes in time tracking outcomes, (e.g. hospitalizations or ED

visits occurred/prevented) over time. As the date of each care coordination encounter was available for each subject, analyses incorporated the change in severity score and rates of outcomes over time in EPIC-IC. The 20th, 40th, 60th, and 80th percentiles of the distribution of days in EPIC-IC for every patient were generated and used to create quintiles from 1 to 5 as a block of follow-up time. The counts used were the number of times each outcome was observed during each quintile period for each patient. An offset term was used to correct for the differential follow-up times for each count for each patient. If the mean of each respective outcome was equal/about equal to the variance then repeated measures analysis for a Poisson distribution was employed. Otherwise, repeated measures analysis for a negative binomial distribution was used. Most analyses were done using negative binomial to correct for under-dispersion. The risk factors (potential confounders) for each model were: time in EPIC-IC, severity score (treated as categorical), insurance type, and the presence of a complicating social/family issue (compared to the absence). Each fitted model was tested for possible interactions between these terms.

To study risk factors associated with the baseline severity score, ordinal, multilevel, outcome variable regression analysis for a multinomial distribution with a cumulative logit model was considered. In this case, statistically significant ($p < 0.05$) results represent the odds of having a lower score (i.e. less severe asthma). However, due to the failure of the proportional odds assumption ($p = 0.0012$) a generalized logit model was used to identify the significant risk factors. All statistical analyses were performed using SAS 9.1 statistical software. [41]

Results

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There were 967 subjects enrolled in the study from 20 EPIC-IC practices. About 12% of subjects had co-morbid conditions as documented in patient registries. **Tables 1 and 2** provide demographic and baseline characteristics, including baseline severity scores which did not change throughout the study. There were approximately 9.6 (9,240 encounters/967 patients) care coordination encounters per person. Total time spent on care coordination activities was 191,317 minutes (~3,189 hours) among all practices. There was an average of 198 total minutes per patient or 20.7 minutes per care coordination encounter for each patient.

Over 1,700 sub-specialist appointments were scheduled resulting from care coordination activities. Referrals to sub-specialists were made in concordance with national clinical guidelines and included instances such as unavailability of pulmonary function tests or when risk of impairment indicated need for referral.

Care coordination activities were associated with the prevention of: 54 hospitalizations, 281 ED visits, 122 missed school days, and 38 missed parental work days. These results were calculated based on the ability of practices to intervene, coordinate care, and prevent children/youth from the above outcomes. For example, practices had a symptomatic child/youth seen in the office and/or prescribed necessary medication to prevent an ED visit. Outcomes during the intervention were compared to outcomes for the same patient in a similar previous clinical situation when available using patient medical records.

Table 3 depicts the frequency of care coordination activities by focus and contact. The most common focus was referral management (21%) and the majority of contacts were parent/family and sub-specialists (75%).

Baseline Severity Score

Baseline age was not significantly associated with severity score ($p>0.05$). It was found to have significant inverse associations with ED visits, hospitalizations, follow-up, school days missed, and both sick and well office visits (results not shown).

Table 4 provides odds ratios for variables significantly associated with severity score. Children with public insurance and mixed public/private insurance had increased odds of higher severity scores than children with private insurance. This effect is magnified when comparing the highest severity score of 4 to that of 1 (OR= 10.48 for public vs. private, 26.22 for public/private vs. private).

The presence of a social component was associated with baseline severity score. The odds of having a score of 4 compared to a score of 1 are 10.12 times higher in children/youth with a complicating social or family issue than those without ($p< 0.001$).

Hospitalizations

Based on repeated measures analysis for rate of hospitalizations, severity score was the only statistically significant risk factor. This model suggests hospitalization rates increased with higher severity scores. Hospitalization rates for subjects with severity score of 4 are higher by an

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amount of 2.5 ($p=0.020$) when compared to severity score of 3, higher by 3.8 ($p = 0.006$) than a score of 2, and higher by 9.4 ($p < 0.001$) than a severity score of 1 (least severe).

ED Visits

The rate of ED visits decreased with time in EPIC-IC ($p=0.0174$) by 0.24% after 1 day in the program and by over 21% after 100 days. The rate of ED visits was also significantly associated with severity scores. The rate for subjects with severity score of 4 (most severe) is 5 times higher than a score of 3 ($p=0.0057$), 8 times higher than a score of 2 ($p = 0.043$), and over 16 times higher a score of 1 ($p < 0.001$). There was significant interaction effect between time in EPIC-IC and severity score ($p=0.0189$) suggesting the change in rate of ED visits varies by level of severity. The rate of ED visits decreased faster across time for subjects with severity score of 1 (-0.62% compared to -0.24% for those subjects with higher scores) (**Figure 3**).

School Days Missed

The rate of school days missed decreased with time in EPIC-IC ($p=0.025$) by approximately 0.2% after 1 day in the program and by just over 18% after 100 days. The decrease was significantly associated with severity score ($p = 0.0032$, severity 1 vs. severity 4 and $p = 0.0097$, severity 2 vs. severity 4). Higher rates of school days missed for children with lower severity scores (7.1 times higher for severity 1, 4 times higher for severity 2, and 6 times higher for severity 3 when compared to those with severity score 4) were observed.

Acute Care Visits

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The rate of acute care visits decreased with time in EPIC-IC ($p=0.0028$) by about 0.24% after 1 day in the program and by about 21.3% after 100 days. Patients with private insurance had a 35% higher rate of office visits than those with public insurance ($p=0.0024$).

Follow-up visits

Patients with complicating social/family issues had a higher rate of follow-ups than those without this component (RR 2.24; 95% CI: 1.65 - 3.04). Patients with private insurance had a 47% higher rate of follow-ups than those with public insurance ($p=0.0032$).

Parental Work Days Missed

There were no statistically significant associations between care coordination and parental work days missed.

Discussion

The intervention described consists of medical home and care coordination training and subsequent implementation in a population of asthmatic children/youth. Findings support the hypothesis that formal care coordination in a statewide medical home program is favorably associated with health care utilization (ED visits and acute care visits) and quality of life (school absences). The rate of ED visits and school days missed showed a statistically significant decrease over time for asthmatic children/youth with increasing time in EPIC-IC. Decreasing ED visits represents an important factor when aiming to reduce asthma health care expenditures. All children/youth with asthma in EPIC-IC, regardless of severity scores, experienced a decrease in ED visits. The slope or magnitude of this decrease was steepest for children with mild asthma

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(severity score 1) compared to children with severe asthma (severity score 4). This represents a significant modifiable area for intervention at the practice level. Children with severe asthma may require acute care in an ED setting regardless of care coordination intensity due to inherent pathophysiology and severity of their asthma. Children/youth with mild asthma that can be managed in an outpatient, non-acute setting, represent a population for whom care coordination interventions may most favorably impact quality of life and health outcomes. Care coordination for this population could focus on adherence to guidelines, access to medications and specialists, asthma action/care plans, home care coordination, and environmental/social supports.

Organized asthma management programs can improve adherence to national guidelines [11] and have a direct impact on hospitalizations and ED visits. [42, 43] Efforts fostering implementation, quality improvement, and system redesign ensuring adherence to guidelines could favorably impact asthmatic children/youth. [42] Further incorporating these guidelines into statewide medical home initiatives is worthwhile.

Referral management and self/family care represented the largest focus of care coordination. This is important in designing practice asthma programs, engaging team members (referral coordinators), and planning practice-based asthma care coordination.

Families/parents and sub-specialists represented the largest group of contacts in care coordination, underscoring the importance of family-centered care and provider partnerships. [36] Engaging parents/families in care plans will foster adherence, understanding, and favorable outcomes. [44]

The average care coordination encounter was approximately 21 minutes representing a reasonable, not cost prohibitive, amount of time. [45] Pay for performance, quality incentives, community programs, and reimbursement strategies supporting additional time associated with care coordination represent potential favorable returns on investment for payers and providers. The American Medical Association recently added two CPT codes allowing providers to bill for time involved in care coordination. [46, 47] It would behoove providers to increase familiarity and use of these codes. The recent AAP policy statement on the care coordination framework contains valuable information and tools aiding providers in implementing such frameworks clinically. [48]

Children/youth of racial/ethnic minorities and lower socioeconomic status experience higher rates of asthma and increased morbidity. [49] Consistent with prior studies, [50] children/youth with public insurance did not access health care at the same rates as those with private insurance. Children/youth with asthma insured by Medicaid experience higher utilization patterns for acute care (hospitalizations and ED visits) and an under-utilization of primary care compared to privately insured children/youth. [51] Explanations for ED usage include: decreased access to (primary) care, poor communication, paucity of care coordination, and lack of education about preventive therapy. [52]

Children/youth with a complicating social/family issue have higher rates of follow-up visits. Through care coordination activities, they may be linked with social workers/community agencies because of complicating social situations resulting in more follow-up visits. Families

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with co-existing social issues may require additional support related to their children's medical issues.

This study has several limitations. A large sample size allows repeated measures analyses through generalized estimating equations, however a limited number of risk factors were available. There may be other confounding variables not accounted for (access, geography, socioeconomic status, education, family income, better adherence with controller medicine regimens, improved communication between patients/providers). The data provided on care coordination encounters and outcomes were reported by parents and practice team members and may reflect recall or reporting bias. Parental recall bias was limited using patient registries at each site and ensuring regular contact with subjects (maximum of 4-6 weeks between contacts). The data may under-represent care coordination provided due to staff time constraints in data recording/entry. Since subjects were part of a larger study not specific to asthma, certain asthma-specific data was not captured for use in this study. Standard asthma classification data for all patients were not available. Although all practices adhere to the classifications, it was not tracked as a variable at all participating sites. Instead, a disease severity score was utilized to demonstrate relative patient health. It assesses general patient health and is not meant to be a substitute for standard classifications. The study results show only an association between care coordination and reported outcomes. A direct causal link cannot be assumed based on these findings. The study did not attempt to assess the degree of similarity among the EPIC-IC practices. Therefore, whether certain components of the medical home domains in each practice may have influenced outcomes measured cannot be determined.

Conclusion

This analysis suggests favorable associations among access to care provided via pediatric practices participating in a statewide medical home program and health-related outcomes of children/youth with asthma. Decreasing rates of ED visits and acute care visits will lower asthma-related expenditures. Results indicate asthma severity is affected by complicating social issues which strengthens the case for community-based interventions. Provision of statewide medical home efforts/programs and care coordination [53] may improve quality of life for children/youth with asthma and other conditions. These programs could be resources for practices implementing quality improvement and embracing practice transformation as part of medical home implementation. Incorporating incentives for providers in provision of care coordination and medical home principles hold promise.

More rigorous studies utilizing specific asthma parameters, standard classifications, and accounting for potential confounders described are needed to establish direct causal links between care coordination through the medical home model and asthma-related outcomes. Longitudinal studies may demonstrate a more intense effect of care coordination. Further research is warranted to discern the impact of care coordination and provision of medical homes on diagnoses beyond asthma and on practice performance. Attributing true cost savings to such initiatives requires data and analyses with claims data from third party payers.

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Declaration of Interest

The authors report no financial disclosures or conflicts of interest. The authors alone are responsible for the content and writing of the paper. This research and work was presented at the Pediatric Academic Societies Meeting in May, 2009.

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Tables

Table 1: Practice Socio-demographic Characteristics

Risk Factor	Frequency	%
Insurance Type:		
Private.....	330	34.2
Public.....	525	54.4

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Public/Private.....	106	10.98
Social Component:		
Yes.....	132	13.68
No.....	833	86.32
Severity Score:		
1.....	418	43.42
2.....	178	18.45
3.....	289	29.95
4.....	80	8.29

Table 2: Mean and S.D. for Age in Years and Days in EPIC-IC by Quintile

Risk Factor	Mean	S.D.
Age (years).....	8.42	5.16
Days in EPIC-IC (by quintile):		
1.....	7.08	10.26
2.....	93.48	28.86
3.....	200.32	32.37
4.....	334.15	42.15
5.....	577.48	331.16

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Table 3: Focus and Provider of Care Coordination Activities

		<i>Care coordination encounter contact</i>	
Focus	%		%
Referral Management.....	21.28	Parent/Family.....	75.44
Self/Family Care.....	8.03	PCP.....	48.84
Social Service.....	6.28	Homecare Personnel.....	12.77
Education/School.....	5.82	Subspecialist.....	10.71
Financial/Insurance.....	4.07	DME Supplier.....	9.95
Behavioral Development.....	2.50	Insurance Company.....	7.89
Growth/Nutrition.....	2.33	Pharmacy.....	7.51
Mental Health.....	2.15	Community Agency.....	5.07
Legal.....	0.89	School.....	4.16
Transition.....	0.13	Transportation.....	2.43
		Therapeutic Service.....	1.88

Table 4: Odds Ratios Showing the Odds of Having Severity Scores Higher than 1 for Public & Public/Private Insurance vs. Private and for the Presence of a Social Component

Risk Factor (Severity Score)	O.R.^a	95% C.I.	p-value
Public vs. Private:			
(4 vs 1).....	10.48	(3.67, 29.93)	< 0.001
(3 vs 1).....	2.46	(1.73, 3.51)	< 0.001
(2 vs 1).....	1.49	(1.01,2.21)	0.045
Public/Private vs. Private:			
(4 vs 1).....	26.22	(7.94, 86.63)	< 0.001
(3 vs 1).....	5.82	(3.37, 10.03)	< 0.001
(2 vs 1).....	2.07	(1.04, 4.09)	0.038
Social Component^b:			
(4 vs 1).....	10.12	(5.19, 19.73)	< 0.001
(3 vs 1).....	3.13	(1.77, 5.51)	< 0.001
(2 vs 1).....	4.21	(2.30, 7.70)	<.00001

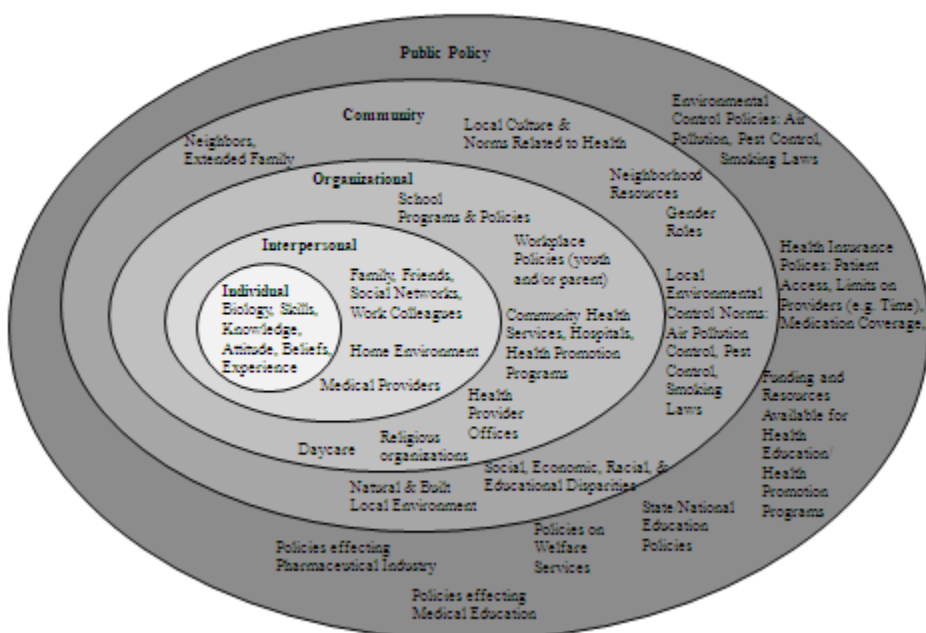
^a Odds of severity score compared to 1 for respective risk factor e.g. odds of having a severity score of 4 compared to 1 are 10.48 times higher in children with Public insurance vs. Private

^b For children *with* a complicating social or family issue vs. those *without*

Figure Captions

Figure 1: Figure adapted from the work of McLeroy et al, 1988. An ecological perspective on health promotion programs. Health Educ Behav. 1988;15(4):351-377.

Figure 1: A Social-ecological Approach to Childhood Asthma



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Figure 2: Adapted from Antonelli RC & Antonelli DM. Providing a medical home: the cost of care coordination services in a community-based, general pediatric practice. Pediatrics. 2004;114:1522-1528.

Figure 2: RA Medical Home Program-EPIC-IC : Care Coordination Time Tracking Form

Time Tracking Form									
Please complete for each coordinator time spent per activity, per month per month									
Practice Name:		Date:		Pt. Number:					
Completed By:		Care Coordinator	Social Worker	PCP	NP	Nurse/PA	PA	Admin/Support	Other:
Issues	CC Contacted with:	Activity	Outcome	Time	Cost	U/F	U/F	U/F	U/F
☐ chronic health	☐ parent/child	☐ face-to-face office, other	☐ p- presented, n- occurred	☐ <15 min	☐ if yes, check one below				
☐ developmental	☐ transportation	☐ telephone	☐ p- presented, n- occurred	☐ 15-30 min	☐ 00000-04	☐ well			
☐ educational	☐ sub specialist	☐ email	☐ p- presented, n- occurred	☐ 30-45 min	☐ 00045-05	☐ consult			
☐ legal	☐ community agency	☐ form preparation	☐ p- presented, n- occurred	☐ 45-60 min	☐ 00060-06	☐ consult			
☐ coordination	☐ therapeutic service	☐ make appointment	☐ p- presented, n- occurred	☐ 60-75 min	☐ 00075-07	☐ consult			
☐ referral request	☐ pharmacy	☐ chart review	☐ p- presented, n- occurred	☐ 75-90 min	☐ 00090-08	☐ consult			
☐ clinical/med mgmt	☐ insurance co.	☐ patient-focused learning	☐ p- presented, n- occurred	☐ 90-105 min	☐ 00105-09	☐ consult			
☐ social service	☐ school	☐ meeting/conference	☐ p- presented, n- occurred	☐ 105-120 min	☐ 00120-10	☐ consult			
☐ transition	☐ PCP	☐ developmentally care plan	☐ p- presented, n- occurred	☐ 120-135 min	☐ 00135-11	☐ consult			
☐ authority care	☐ home care personnel	☐ transition services	☐ p- presented, n- occurred	☐ 135-150 min	☐ 00150-12	☐ consult			
☐ financial/insurance	☐ DMC/qualtrics	☐ other	☐ p- presented, n- occurred	☐ 150-165 min	☐ 00165-13	☐ consult			
☐ other	☐ other	☐ other	☐ p- presented, n- occurred	☐ 165-180 min	☐ 00180-14	☐ consult			
Notes:									

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Figure 3: Note the same decrease in rate of ED visits over time for scores 2, 3, and 4 (i.e. same slope) but a greater decrease (i.e. bigger slope) for a score of 1 due to the interaction between severity score of 1 and days in the program.

Figure 3: Decrease in Rate of ED Visits over Time in EPIC-IC by Severity Score

