

Medical Home Quality and Readmission Risk for Children Hospitalized With Asthma Exacerbations



WHAT'S KNOWN ON THIS SUBJECT: The medical home likely plays a positive role in outpatient health outcomes. Asthma is a common and frequent reason for pediatric hospitalization. It is unknown whether having a quality medical home can prevent readmission in children hospitalized for asthma exacerbations.



WHAT THIS STUDY ADDS: Poor access to a medical home was associated with increased readmission for asthma, whereas other measured aspects of medical home were not. Children with private insurance and good access to care had the lowest rates of readmission within a year.

abstract

OBJECTIVE: The medical home likely has a positive effect on outpatient outcomes for children with asthma. However, no information is available regarding the impact of medical home quality on health care utilization after hospitalizations. We sought to explore the relationship between medical home quality and readmission risk in children hospitalized for asthma exacerbations.

METHODS: We enrolled 601 children, aged 1 to 16 years, hospitalized for an acute asthma exacerbation at a single pediatric facility that captures >85% of all asthma admissions in an 8-county area. Caregivers completed the Parent's Perception of Primary Care (P3C), a Likert-based, validated survey. The P3C yields a total score of medical home quality and 6 subscale scores assessing continuity, access, contextual knowledge, comprehensiveness, communication, and coordination. Asthma readmission events were prospectively collected via billing data. Hazards of readmission were calculated by using Cox proportional hazards adjusting for chronic asthma severity and key measures of socioeconomic status.

RESULTS: Overall P3C score was not associated with readmission. Among the subscale comparisons, only children with lowest access had a statistically increased readmission risk compared with children with the best access. Subgroup analysis revealed that children with private insurance and good access had the lowest rates of readmission within a year compared with other combinations of insurance and access.

CONCLUSIONS: Among measured aspects of medical home in a cohort of hospitalized children with asthma, having poor access to a medical home was the only measure associated with increased readmission. Improving physician access for children with asthma may lower hospital readmission. *Pediatrics* 2013;131:64–70

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KEY WORDS

asthma, medical home, readmission rates, access, insurance, child

ABBREVIATIONS

ED—emergency department

P3C—Parents' Perception of Primary Care

PCP—primary care provider

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The American Academy of Pediatrics states that all children should have a medical home that is “accessible, comprehensive, continuous, compassionate, culturally effective, and family centered.”¹ The medical home concept has gained considerable attention with health care reform, but its impact on health outcomes, although likely positive,^{2,3} remains unclear. With regard to hospital admission, some studies show the medical home to be protective,^{4–6} but others demonstrate no effect.^{7–10} Potential benefits may result from specific components of the medical home, such as continuity of care.^{6,11} For hospitalized children, the role of the medical home in preventing hospital readmission is unknown.

Medical home quality has been measured by using a variety of tools. The Parents’ Perception of Primary Care (P3C)¹² has undergone “rigorous testing of validity and reliability.”¹³ It yields a total score of medical home quality and 6 subscale scores assessing various medical home components. For children with asthma, additional specific measures of primary care quality also exist.¹⁴ Asthma is one of the most common chronic conditions of childhood. Nationally, asthma exacerbation is among the most frequent reasons for pediatric hospitalization. Children who are hospitalized with asthma exacerbations are at significant risk of readmission.^{15–17} Many hospitalizations for acute asthma exacerbations are considered preventable.¹⁸ Receiving primary care in a medical home is associated with fewer emergency department (ED) visits for asthma.¹⁹ However, the effect of the medical home on asthma hospitalization and readmission is unclear. Access to a medical home is not universal, and significant disparities exist for children with special health care needs^{20,21} and asthma.²² These disparities may contribute to hospitalization rates in children with asthma.

We sought to understand if a higher quality medical home was associated with decreased readmissions for children with asthma. We examined associations between aspects of medical home and readmission in a cohort of children recruited during an index hospitalization for asthma exacerbation.

METHODS

Sample

Children hospitalized for acute asthma exacerbation at a single institution between April 2008 and May 2009 ($N = 601$) were enrolled in a prospective observational cohort study and followed for a minimum of 1 year (or until readmission). Eligible patients were aged 1 to 16 years and resided in the institution’s 8-county primary service area. The institution is a large, freestanding, tertiary-care children’s hospital in a Midwestern urban area. It is the primary site of inpatient pediatric care in the area, managing ~85% of all pediatric asthma admissions.²³

Potential subjects were identified on the basis of admission diagnosis (*International Classification of Diseases, Ninth Revision, Clinical Modification*

493.XX) and initiation of the evidence-based clinical pathway for acute asthma care by the admitting physician. The pathway includes orders for education and the standardized bronchodilator weaning protocol. Institutional quality assurance data indicate that the pathway is used for >98% of all asthma admissions. Patients were excluded if, after the initial assessment, the attending physician removed the patient from the asthma pathway due to an alternative diagnosis (eg, bronchiolitis). Children were also excluded if they had comorbid conditions including cystic fibrosis or congenital heart disease. Caregivers must have been able to participate by using written or oral English (Fig 1). The study was approved by the institutional review board.

Measures

Outcome

Given the hypothesis that medical home would have an impact on readmission risk beyond the traditional 30-day readmission time frame, children were followed prospectively for a minimum of 1 year. Readmission events were captured with discharge diagnosis *International Classification of*

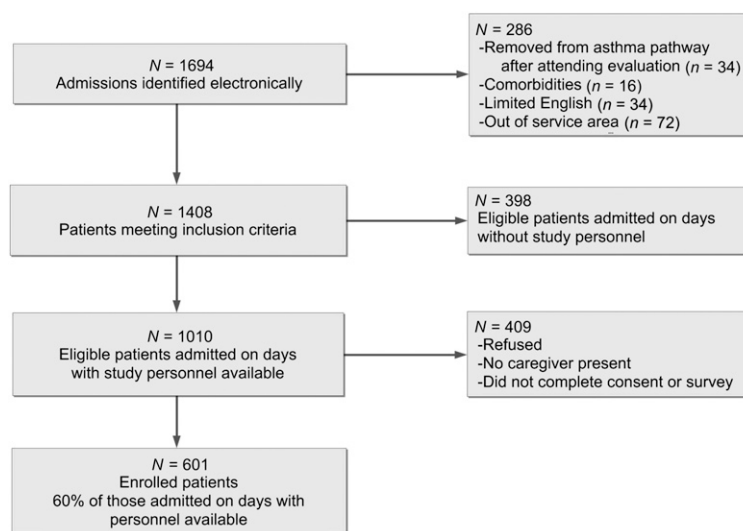


FIGURE 1
Enrollment of the study population.

Diseases, Ninth Revision, Clinical Modification codes (493.XX) from hospital billing data. Time to readmission was calculated as the time interval between the index admission and the first asthma-related hospital readmission. Censoring occurred at the end of the follow-up period (June 2010). A randomly selected 25% of enrolled patients were contacted by phone 12 months after their index admission to assess self-reported readmission events to estimate loss to follow-up.

Medical Home

Research personnel administered a 134-question face-to-face interview with the child's caregiver, with the timing dependent on the availability of caregivers and research assistants. The survey included the 23-item, Likert-based P3C scale. The P3C was initially developed from a group of caregivers with diverse racial, ethnic, and educational backgrounds.¹² To ensure understanding by caregivers with potentially low literacy levels, we administered the survey either written or orally. The P3C is scored by assigning each response a number from 0 to 100. A score of 0 indicates poor quality (eg, the doctor never knows the child's medical history or it is never easy to travel to the doctor), and 100 represents perfect quality (eg, the doctor always knows the child's history or it is always easy to travel to the doctor). The total P3C score, measuring overall quality of the medical home, was calculated as the average of nonmissing questions.

The P3C was developed with 6 subscales assessing continuity, access, contextual knowledge, communication, comprehensiveness, and coordination of care. Continuity assessed the length of the primary care relationship. Access measured items including ease of travel to the primary care provider (PCP) and availability of routine care, sick care, and evening/weekend advice. The contextual knowledge subscale measured

perception of the PCP's knowledge of the child. Communication assessed parental comfort with asking questions and physician explanations. Comprehensiveness measured how well the PCP discusses overall health and safety. Finally, the coordination subscale assessed assistance with accessing other health care sources.

The original continuity subscale gives full credit to patients who have had a single provider for >5 years.¹² If a child was <5 years old, we modified scoring such that the patient received full continuity credit if the child had been with a provider for his or her entire life. Otherwise subscale scores were calculated as an average of the nonmissing questions within each subsection.

Total and subscale responses were analyzed in 3 strata: average scores of always (100), almost always (75–99), or sometimes/often/never adequate (<75). Strata were chosen a priori based on the P3C scoring method such that the cut points corresponded to the response choices and distribution of data. Because of the novel nature of these cut points, we also used an analysis with the scores operationalized as continuous variables, which revealed the same results as the stratified analysis.

Four asthma-specific questions of quality of care were also included in the survey. These included the preferred source of both acute asthma care and prescriptions for asthma, whether the patient had visited their PCP in the week before the admission, and if the caregiver had called the PCP in the week before the admission.¹⁴

Other Predictors

Covariates included child age, race, insurance, household income, maternal education, and past history of inhaled corticosteroids. Past history of inhaled corticosteroid use was used as a marker to adjust for asthma severity.

Analyses

Time-to-event analysis with Cox proportional hazards was used to determine the hazard for readmission. Primary predictors of readmission included medical home quality measures: total P3C score, each subscale P3C score, and the 4 asthma-specific items. Analyses were adjusted for covariates. The proportional hazards assumption was also verified.

Because access and insurance are related,^{3,14,24–27} exploratory post hoc analyses were performed to better understand this relationship. For these analyses, we defined good access as ≥ 75 on the P3C access subscale and poor access as a score of <75. We examined 4 subgroups: children with private insurance and good access, children with Medicaid and good access, children with private insurance and poor access, and children with Medicaid and poor access. We used logistic regression to assess the association between readmission within 1 year and each subgroup. The logistic regression model was adjusted for the same covariates as the primary time-to-event model, with the exception of insurance, because it was used to define the subgroups. Posterior prediction was used to present the adjusted percentage of readmission within 1 year. All analyses were performed with Stata version 12 (Stata Corp, College Station, TX).

RESULTS

Study Sample

Demographic characteristics of children enrolled in the study are presented in Table 1. The population had a median age of 5 years, was 53% African American, and 56% publically insured. Patients were followed for a median of 548 days with a range of 2 days (due to readmission) to 797 days. Compared with enrolled children, eligible but unenrolled children were no

different in terms of age, gender, race, or insurance.

Medical Home and Readmission

At 1 year, 22.5% had been readmitted for an acute asthma exacerbation. Of the 151 children randomly selected to receive a follow-up via phone call, 38 reported being readmitted since study enrollment. We were able to verify through chart review that 34 were readmitted at the primary institution for asthma exacerbations. Three others had been admitted or returned to the ED for a nonasthma visit. One patient reported being hospitalized at an outside institution and did not have a subsequent ED or admission encounter at our institution.

The mean total P3C score was 84. For overall medical home quality, 13% of caregivers had a score correlating to always adequate quality (P3C score = 100), 68% had a score of almost always

adequate (P3C score = 75–99), and 23% had a score of sometimes/often/never adequate (P3C <75). Mean subscale scores were 76, 83, 85, 93, 85, and 89 for continuity, access, contextual knowledge, communication, comprehensiveness, and coordination of care, respectively. Most items had missing responses ranging from 1 to 19 subjects. A group of 10 patients did not answer a majority of the questions after answering that their child did not receive care from a particular person or place. These children were given scores of 0 for the total and subscales. A sensitivity analysis excluding these children did not affect the medical home associations.

Unadjusted Analyses

Total P3C score was not associated with readmission. Among the subscales, having the lowest level of access to care (score <75) was associated with increased hazards of readmission compared with the best access to care (hazard ratio 1.8, $P = .001$). The other P3C subscales were not associated with readmission. Unadjusted time-to-event curves, stratified by total P3C and access subscale scores, are presented in Fig 2.

African American children had significantly higher hazards of readmission compared with white children ($P = .001$). Children with Medicaid had higher hazards of readmission compared with those with private insurance ($P = .05$). Children with mothers who did not complete high school (compared with those with a college degree) and children with a family income <\$90 000 annually (compared with income >\$90 000) had significantly higher hazards of readmission ($P < .05$). Children who had been prescribed inhaled corticosteroids had significantly higher hazards of readmission compared with those who had never been on inhaled corticosteroids ($P = .006$) (Table 2). Age was not associated with readmission.

Adjusted Analyses

Patients with low medical home access (score <75) had a significantly increased risk of readmission compared with those with the highest level of access after adjusting for covariates (adjusted hazard ratio 1.56, 95% confidence interval 1.06–2.32). Total P3C score and other subscale scores were not associated with readmission. The associations of income, insurance, and maternal education with readmission risk were no longer evident in the adjusted model. African American race and history of inhaled corticosteroids remained significant predictors of readmission (Table 2).

In subgroup analyses, children with private insurance and good access (score ≥ 75) had the lowest rate of readmission (adjusted 18.1%) and those with Medicaid and poor access (score <75) had the highest rate of readmission (adjusted 25.9%) within 1 year (Table 3).

We found that 45% of children with good access reported receiving acute asthma care from their PCP compared with 33% among those with poor access. Children with poor access used the ED as their primary source of acute asthma care more frequently than children with good access (53% vs 33%). Finally, 34% of those children with good access visited or called their PCP in the week before admission compared with just 21% of those with poor access.

Children who received acute asthma care or prescriptions from the ED did not have increased hazards of readmission compared with children who received asthma care from their PCP. Children who called or visited their PCP in the week before the index admission had similar readmission risk compared with those who had not.

DISCUSSION

The medical home is a focus of national attention but does not reflect just 1

TABLE 1 Demographics of Enrolled Patients

Characteristic	% ^a
Age, median (interquartile range), y	5.1 (2.4–8.7)
Race	
White/Caucasian	38.9
Black/African American	52.8
Other (includes Hispanic)	8.3
Female	35.9
Insurance status	
Private	38.6
Medicaid	56.7
Other/self-pay	4.7
Maternal education	
≥ 4 y college-degree	20.5
High school degree (or equivalent)	60.7
Less than high school	18.8
Total annual household income, \$	
>90 000	11.8
60 000–90 000	12.0
30 000–59 999	18.8
15 000–29 999	25.8
<14 999	29.6
Not answered	2.0
Asthma severity	
Previous intubation	5.0
Previous hospitalization	47.3
Past inhaled steroids	68.3

^a Data are percents unless otherwise noted.

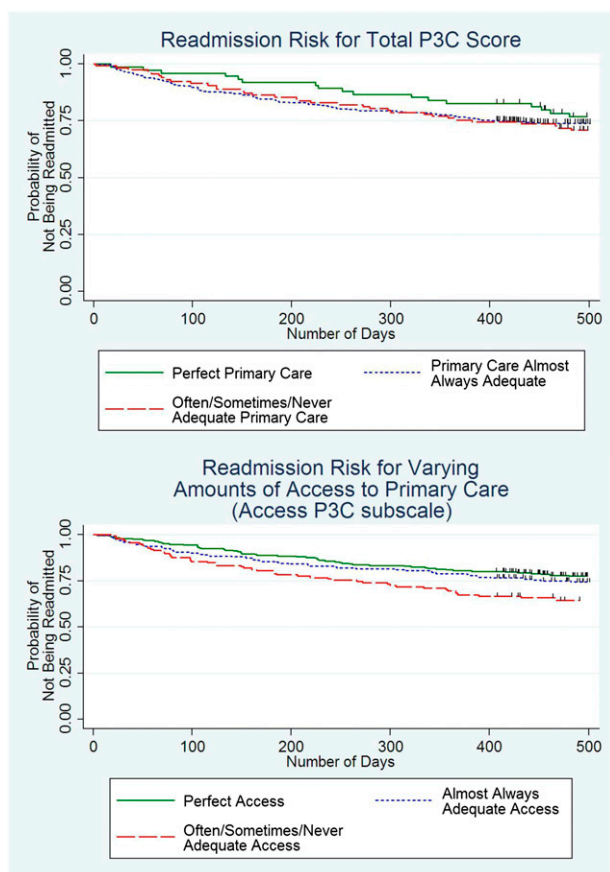


FIGURE 2 Unadjusted time to readmission curves for total P3C score and access P3C subscale.

aspect of care.²⁸ Among children hospitalized with an acute asthma exacerbation, access to primary care was the only aspect of medical home that we found to be significantly associated with readmission. Access to care is an important finding and should also be considered in the context of insurance. A majority of children with private insurance report having good access to care and had the lowest readmission rates within 1 year. In contrast, almost one-third of children with Medicaid reported having poor access to primary care and had the highest adjusted rates of readmission within 1 year.

Our findings complement previous findings of primary care as measured by the P3C scale. P3C score has also been linked to health-related quality of life.¹² In children with asthma, the

score correlates with families' perceptions of barriers to care.^{29,30} Access may be especially important in asthma because children who are able to be seen or receive advice early during an exacerbation may avoid hospitalization. Children with poor primary care access go to the ED during an exacerbation more often than those with good access. It is possible that children with equally severe exacerbations may have different admission rates depending on the site of care (ED versus private practice). If children seen in the ED are more likely to be admitted, this potentially explains the higher readmission risk in children with poor access.

In the analysis of insurance and access, overall the observed readmissions match well with the adjusted predicted percentage of readmission within 1 year. One exception is that we found

children with private insurance and poor medical home access had a higher observed readmission rate within 1 year than predicted by the logistic regression model. The small size of this group makes interpreting this difference challenging. One possibility is children with poor access and private insurance may have higher-cost-sharing insurance plans, which has been associated with higher hospitalization rates in older children with asthma³¹; however, we did not assess the details of the insurance plan in this study. Another possibility is business policies at some primary care offices may unintentionally adversely affect access.

ED utilization for acute asthma care is common and often precedes hospitalization. Not surprisingly, more than half of children with poor PCP access use the ED as their source of acute asthma care. Still, one-third of children with good primary care access also report using the ED as their source of acute asthma care. Although this seems high, within a cohort of children with asthma recruited from the ED, 51% to 70% reported using the ED as their source of acute asthma care with variation depending on insurance type.¹⁴ Thus, our findings, taken from an inpatient cohort, although certainly higher than desirable, seem consistent with the literature. The frequent use of the ED may be attributed to 2 phenomena. First, some children with asthma may have an exacerbating phenotype. Caregivers of these children recognize that, given certain symptoms, their child should be seen in the ED for care. Second, some people might rate the ED as having excellent access (because the ED is always open and available via ambulance). Within our data, we do not know how many caregivers consider the ED as their source for primary care. However, only 1 person reported having good access to care and no particular place for primary care in the P3C continuity assessment.

TABLE 2 Hazard Ratios

	Unadjusted HR (95% CI)	Adjusted ^a HR (95% CI)
Access P3C score		
Average score of always adequate (100; 43%)	—	—
Average score of almost always adequate (75–99; 34%)	1.16 (0.81–1.66)	1.11 (0.77–1.60)
Average score of often/sometimes/never adequate (<75; 23%)	1.80 (1.25–2.58)**	1.56 (1.06–2.32)*
Race		
White/Caucasian	—	—
Black/African American	1.78 (1.27–2.48)**	1.48 (1.02–2.17)*
Other (includes Hispanic)	1.30 (0.72–2.35)	0.98 (0.53–1.80)
Insurance status		
Private	—	—
Medicaid	1.37 (1.00–1.88)*	0.28 (0.51–1.34)
Other/self-pay	0.98 (0.45–2.15)	0.80 (0.36–1.81)
Maternal education		
≥4 y college degree	—	—
High school degree (or equivalent)	1.52 (0.98–2.34)	1.25 (0.75–2.06)
Less than high school	2.00 (1.21–3.28)*	1.71 (0.93–3.15)
Total annual household income, \$		
>90 000	—	—
60 000–90 000	2.19 (1.03–4.65)*	1.97 (0.92–4.24)
30 000–59 999	2.28 (1.13–4.62)*	1.90 (0.90–4.04)
15 000–29 999	2.02 (1.11–4.38)*	1.53 (0.68–3.45)
<14 999	2.93 (1.50–5.70)*	1.82 (0.78–4.23)
Severity		
No inhaled steroids in the past	—	—
Past inhaled steroids	1.65 (1.16–2.35)*	1.49 (1.03–2.15)*

CI, confidence interval; HR, hazard ratio.

^a Adjusted for age, race/ethnicity, insurance, maternal education, income, and past history of inhaled corticosteroids.

* $P \leq .05$.

** $P \leq .001$.

TABLE 3 Rates of Readmission Within 1 Year by Access Level and Insurance Type

	Readmitted Within 1 y (Unadjusted), %	Readmitted Within 1 y (Adjusted ^a With 95% CI), %
Private insurance/good access ($n = 208$)	15.9	18.1 (17.4–18.9)
Medicaid insurance/good access ($n = 226$)	23.9	25.0 (24.0–25.9)
Private insurance and poor access ($n = 23$)	43.5	20.8 (18.1–23.5)
Medicaid insurance and poor access ($n = 108$)	28.7	25.9 (24.5–27.4)

^a Adjusted for age, race/ethnicity, maternal education, and past history of inhaled corticosteroids.

The mean P3C score in our study was 84, which is higher than the mean scores previously published in various populations ranging from 48 to 81.^{12,30,32,33} The lowest previously published mean score (48) was for children without health insurance, which was infrequent in our population. The higher mean score in our population might reflect regional differences between our Midwest setting and California, where these previous studies were performed. It is also possible that medical home scores may be higher at our institution as a result of an outpatient asthma

pay-for-performance initiative that occurred before our study.³⁴

Caregivers may respond to the P3C questionnaire differently in the setting of a hospitalization. Under the stress of an acute illness, caregivers may respond more negatively about their primary care experience or have fresh recall of a problem with access. Conversely, during a face-to-face interview while awaiting discharge, caregivers may respond more positively about their primary care experience to avoid any potential discharge delay caused by caregiver's concerns about follow-up

plans. Additional qualitative work will be necessary to understand more fully how these competing issues affect how caregivers answer the P3C during a hospitalization.

Our study had some limitations. First, the observational study design leaves open the possibility of unknown confounders. However, our analysis adjusted for the most plausible covariates including asthma severity, income, maternal education, and insurance. Second, we do not know if a child's medical home remained the same throughout the follow-up period. One would hypothesize that children with a lower-quality medical home would be more likely to change PCPs than children with higher-quality medical homes. This change would make it less likely for initially "at-risk" children to be readmitted. Such a change would make it more difficult to detect an association between medical home quality and readmission, if it existed. Third, this study was done at a single tertiary-care children's hospital and included only English-speaking patients. Thus, the patients in our cohort may not be nationally representative. Finally, although the P3C was validated in the outpatient setting, we used it as an assessment of medical home in hospitalized children.

CONCLUSIONS

Among measured aspects of medical home in a cohort of hospitalized children with asthma, poor access was associated with increased readmission risk. Other measures of primary care quality were not associated with readmission. Children with private insurance and good access had the lowest rates of readmission within a year compared with other combinations of insurance and access. Improving physician access for children with asthma may decrease hospital readmission.

REFERENCES

- American Academy of Pediatrics Council on Children with Disabilities. Care coordination in the medical home: integrating health and related systems of care for children with special health care needs. *Pediatrics*. 2005; 116(5):1238–1244
- Homer CJ, Klatka K, Romm D, et al. A review of the evidence for the medical home for children with special health care needs. *Pediatrics*. 2008;122(4). Available at: www.pediatrics.org/cgi/content/full/122/4/e922
- Starfield B, Shi L. The medical home, access to care, and insurance: a review of evidence. *Pediatrics*. 2004;113(suppl 5):1493–1498
- Cooley WC, McAllister JW, Sherrieb K, Kuhlthau K. Improved outcomes associated with medical home implementation in pediatric primary care. *Pediatrics*. 2009;124(1): 358–364
- Palfrey JS, Sofis LA, Davidson EJ, Liu J, Freeman L, Ganz ML; Pediatric Alliance for Coordinated Care. The Pediatric Alliance for Coordinated Care: evaluation of a medical home model. *Pediatrics*. 2004;113(suppl 5): 1507–1516
- Christakis DA, Mell L, Koepsell TD, Zimmerman FJ, Connell FA. Association of lower continuity of care with greater risk of emergency department use and hospitalization in children. *Pediatrics*. 2001;107(3):524–529
- Klitzner TS, Rabbitt LA, Chang RK. Benefits of care coordination for children with complex disease: a pilot medical home project in a resident teaching clinic. *J Pediatr*. 2010; 156(6):1006–1010
- Homer CJ, Forbes P, Horvitz L, Peterson LE, Wypij D, Heinrich P. Impact of a quality improvement program on care and outcomes for children with asthma. *Arch Pediatr Adolesc Med*. 2005;159(5):464–469
- Berman S, Rannie M, Moore L, Elias E, Dryer LJ, Jones MD Jr. Utilization and costs for children who have special health care needs and are enrolled in a hospital-based comprehensive primary care clinic. *Pediatrics*. 2005;115(6). Available at: www.pediatrics.org/cgi/content/full/115/6/e637
- Gavin LA, Wamboldt MZ, Sorokin N, Levy SY, Wamboldt FS. Treatment alliance and its association with family functioning, adherence, and medical outcome in adolescents with severe, chronic asthma. *J Pediatr Psychol*. 1999;24(4):355–365
- Cree M, Bell NR, Johnson D, Carriere KC. Increased continuity of care associated with decreased hospital care and emergency department visits for patients with asthma. *Dis Manag*. 2006;9(1):63–71
- Seid M, Varni JW, Bermudez LO, et al. Parents' Perceptions of Primary Care: measuring parents' experiences of pediatric primary care quality. *Pediatrics*. 2001;108(2): 264–270
- Malouin RA, Starfield B, Sepulveda MJ. Evaluating the tools used to assess the medical home. *Manag Care*. 2009;18(6): 44–48
- Ferris TG, Crain EF, Oken E, Wang L, Clark S, Camargo CA Jr; MARC (Multicenter Airway Research Collaboration) Investigators. Insurance and quality of care for children with acute asthma. *Ambul Pediatr*. 2001;1(5): 267–274
- Reznik M, Hailpern SM, Ozuah PO. Predictors of early hospital readmission for asthma among inner-city children. *J Asthma*. 2006; 43(1):37–40
- Bloomberg GR, Trinkaus KM, Fisher EB Jr, Musick JR, Strunk RC. Hospital readmissions for childhood asthma: a 10-year metropolitan study. *Am J Respir Crit Care Med*. 2003;167(8):1068–1076
- Mitchell EA, Bland JM, Thompson JM. Risk factors for readmission to hospital for asthma in childhood. *Thorax*. 1994;49(1): 33–36
- Flores G, Abreu M, Tomany-Korman S, Meurer J. Keeping children with asthma out of hospitals: parents' and physicians' perspectives on how pediatric asthma hospitalizations can be prevented. *Pediatrics*. 2005;116(4):957–965
- Diedhiou A, Probst JC, Hardin JW, Martin AB, Xirasagar S. Relationship between presence of a reported medical home and emergency department use among children with asthma. *Med Care Res Rev*. 2010; 67(4):450–475
- Strickland B, McPherson M, Weissman G, van Dyck P, Huang ZJ, Newacheck P. Access to the medical home: results of the National Survey of Children with Special Health Care Needs. *Pediatrics*. 2004;113 (suppl 5):1485–1492
- Strickland BB, Singh GK, Kogan MD, Mann MY, van Dyck PC, Newacheck PW. Access to the medical home: new findings from the 2005-2006 National Survey of Children with Special Health Care Needs. *Pediatrics*. 2009; 123(6). Available at: www.pediatrics.org/cgi/content/full/123/6/e996
- Stevens GD, Pickering TA, Seid M, Tsai KY. Disparities in the national prevalence of a quality medical home for children with asthma. *Acad Pediatr*. 2009;9(4):234–241
- INSIGHT Database. Columbus, OH: Ohio Hospital Association; 2009. Available at: http://www.ohanet.org/services-and-products/?service_community=DATA_AND_TECHNOLOGY. Accessed October 18, 2012
- Berk ML, Schur CL. Access to care: how much difference does Medicaid make? *Health Aff (Millwood)*. 1998;17(3):169–180
- Long SK, Coughlin T, King J. How well does Medicaid work in improving access to care? *Health Serv Res*. 2005;40(1):39–58
- DeVoe JE, Petering R, Krois L. A usual source of care: supplement or substitute for health insurance among low-income children? *Med Care*. 2008;46(10):1041–1048
- Stevens GD, Seid M, Halfon N. Enrolling vulnerable, uninsured but eligible children in public health insurance: association with health status and primary care access. *Pediatrics*. 2006;117(4). Available at: www.pediatrics.org/cgi/content/full/117/4/e751
- Zickafoose JS, Gebremariam A, Clark SJ, Davis MM. Medical home disparities between children with public and private insurance. *Acad Pediatr*. 2011;11(4):305–310
- Seid M, Opiari-Arrigan L, Gelhard LR, Varni JW, Driscoll K. Barriers to care questionnaire: reliability, validity, and responsiveness to change among parents of children with asthma. *Acad Pediatr*. 2009;9(2):106–113
- Seid M. Barriers to care and primary care for vulnerable children with asthma. *Pediatrics*. 2008;122(5):994–1002
- Karaca-Mandic P, Jena AB, Joyce GF, Goldman DP. Out-of-pocket medication costs and use of medications and health care services among children with asthma. *JAMA*. 2012; 307(12):1284–1291
- Seid M, Stevens GD, Varni JW. Parents' perceptions of pediatric primary care quality: effects of race/ethnicity, language, and access. *Health Serv Res*. 2003;38(4): 1009–1031
- Seid M, Stevens GD. Access to care and children's primary care experiences: results from a prospective cohort study. *Health Serv Res*. 2005;40(6 pt 1):1758–1780
- Mandel KE, Kotagal UR. Pay for performance alone cannot drive quality. *Arch Pediatr Adolesc Med*. 2007;161(7):650–655