# Perceived Access to Outpatient Care and Hospital Reutilization Following Acute Respiratory Illnesses

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## ABSTRACT

***OBJECTIVE:*** Efforts to decrease hospital revisits often focus on improving access to outpatient follow-up. Our objective was to assess the relationship between perceived access to timely office-based care and subsequent 30-day revisits following hospital discharge for 4 common respiratory illnesses.

***METHODS:*** This was a prospective cohort study of children 2 weeks to 16 years admitted to 5 US children's hospitals for asthma, bronchiolitis, croup, or pneumonia between July 2014 and June 2016. Hospital and emergency department (ED) (in the case of croup) admission surveys administered to caregivers included the Consumer Assessments of Healthcare Providers and Systems Timely Access to Care. Access composite scores (range 0−100, with greater scores indicating better access) were linked with 30-day ED revisits and inpatient readmissions from the Pediatric Health Information System. The relationship between access to timely care and repeat utilization was assessed using multivariable logistic regression adjusting for demographics, hospitalization, and home/outpatient factors.

***RESULTS:*** Of the 2438 children enrolled, 2179 (89%) reported an office visit in the previous 6 months. Average access composite score was 52.0 (standard deviation, 36.3). In adjusted analyses, greater access scores were associated with greater odds of 30-day ED revisits (odds ratio [OR] = 1.07; 95% confidence interval [CI], 1.02−1.13)—particularly for croup (OR = 1.17; 95% CI, 1.02−1.36)—but not inpatient readmissions (OR = 1.02; 95% CI, 0.96−1.09).

***CONCLUSIONS:*** Perceived access to timely office-based care was associated with significantly greater odds of subsequent ED revisit. Focusing solely on enhancing timely access to care following discharge for common respiratory illnesses may be insufficient to prevent repeat utilization.

**KEYWORDS:** access to care; acute respiratory illness; hospitalization; readmissions

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## WHAT'S NEW

Greater caregiver perception of access to care was associated with greater odds of repeat emergency department visits, particularly for croup. Efforts to decrease repeat hospital utilization for acute respiratory illnesses may need to focus beyond enhanced routine office-based care access.

ACUTE RESPIRATORY ILLNESS is the most common reason for hospitalization in children, accounting for 22% of all nonneonatal pediatric hospital stays.[1] Several acute respiratory illnesses, including asthma, bronchiolitis, upper respiratory tract infection, and pneumonia, are also among the top 10 reasons for which children are readmitted to the inpatient setting.[2] Some of these hospitalizations and readmissions, particularly asthma, may be preventable with timely and appropriate outpatient care.[3,4] Given these data, a potential strategy to reduce emergency department (ED) revisits and inpatient readmissions for pediatric respiratory illnesses is to improve timely access to

office-based care.[5] Further, the rates of ED visits and potentially preventable asthma hospitalizations are more than twice as high in low-income children, and inpatient asthma readmissions are twice as common for black children than for white children.[3,6,7] Families of black and Hispanic children are more likely to perceive poor access to primary care,[7,8] and thus timely access to outpatient care following hospitalization may be particularly important for low-income minorities.

Empirical evidence supporting the relationship between timely access to care and acute care revisits, however, is conflicting. Two large retrospective studies of children enrolled in Medicaid demonstrated fewer pediatric ED visits with more timely perceived access to care.[9,10] In contrast, a large, randomized controlled trial seeking to assess the effect of scheduling follow-up appointments with primary care and outlining availability of after-hours medical advice demonstrated no effect on ED revisits following an index ED visit.[11] With respect to inpatient readmissions, 2 large pediatric retrospective studies demonstrated higher readmission rates with better access to[12] or planned follow-up with primary care,[13] whereas a prospective, single-center study showed an association between access to a medical home and less frequent readmission.[14] The authors are aware of no multicenter prospective pediatric studies assessing access to timely office-based care and inpatient readmissions.

We sought to investigate the association between caregiver perception of timely access to office-based care and 30-day ED revisits and inpatient readmissions following an index hospital discharge for 4 common pediatric respiratory illnesses: asthma, bronchiolitis, croup, and community-acquired pneumonia (CAP). We hypothesized that better perceived access to timely care would be associated with a lower odds of 30-day ED revisits following discharge for all 4 respiratory conditions, as timely access to office-based care should serve as a replacement for low acuity ED care. We also hypothesized that better perceived access to timely care would be associated with lower odds of 30-day inpatient readmissions following discharge for croup and asthma, 2 conditions for which there are effective and relatively fast-acting treatments available in the primary care setting. Finally, given previous research demonstrating the greater rate of ED visits and readmissions and lower access to care in low-income minorities, we hypothesized that child race/ethnicity would explain, in part, the association between lower access to office-based care and reutilization.

## METHODS

### STUDY DESIGN AND SETTING

This is a prospective cohort study of children admitted to 1 of 5 children's hospitals in the Pediatric Research in Inpatient Settings Network between July 2014 and June 2016. Enrolled families completed a survey assessing perceived access to office-based care at the time of index admission. Survey data were linked to utilization outcomes available in the Children's Hospital Association Pediatric Health Information System (PHIS) database.

### PARTICIPANT ELIGIBILITY AND RECRUITMENT

Families of hospitalized children were eligible to participate if the child was 2 weeks to 16 years old, the primary caregiver spoke English or Spanish, and the child had 1 of the following admitting diagnoses: asthma, bronchiolitis, CAP, or croup. The study team set out to enroll a total of 600 patients per institution and enroll evenly across these 4 conditions. Because the number of children admitted to the inpatient setting for croup was lower than anticipated during year 1 of recruitment, we expanded enrollment for croup to also include index ED visits without hospital admission for the second year. The focus of the study was on children with these 4 conditions who were otherwise healthy. Thus, children with chronic medical conditions other than asthma and those with moderate to severe developmental delays were excluded. We also excluded children diagnosed with bronchiolitis who were >2 years of age, children diagnosed with asthma who were <2 years of age, children diagnosed with croup who were >4 years of age, and children who were previously enrolled.

Families were approached for study participation if their admitting diagnoses or admission note was consistent with at least 1 of these 4 respiratory conditions. Trained research assistants used a standard study protocol for recruitment during the first 72 hours of the child's admission to the hospital. Families were not approached while their child was in the intensive care unit (ICU) but could be approached if the child was transferred to a non-ICU ward within the first 72 hours of admission. For children who were admitted with more than 1 eligible diagnosis (eg, asthma and CAP), their condition group assignment was determined based on the needed sample for each condition at the time of enrollment. If a child's primary diagnosis changed during the course of the hospitalization (eg, from asthma to pneumonia), the discharge diagnosis noted on the discharge summary was used for condition group assignment. Enrolled children were not included in >1 condition group in analyses. If the child's final discharge diagnosis was anything other than the 4 respiratory diagnoses targeted in the study, the case was excluded from further analyses.

### PREDICTORS

Perceived access to timely care was assessed using the Consumer Assessment of Healthcare Providers and Systems—Clinician and Group Survey (CG-CAHPS), version 2.0, Getting Timely Appointments, Care, and Information composite.[15] Respondents who reported that their child visited a health care provider's office for care at least once in the previous 6 months were asked to rate each perception of timeliness survey item using a 4-point Likert scale ranging from "never" to "always" (the Box presents survey items used to compute composite score). Respondents who reported no

office visits in the previous 6 months did not complete the perception of timeliness survey items and thus were excluded from the analysis. Consistent with previous literature analyzing CAHPS surveys, top-box scoring was used such that the best-possible category (in this case, the highest rating of 3 on a 0−3 Likert scale) was assigned 100 points and any other response was assigned 0 points.[16−18] The mean score among each participant's eligible responses was calculated then, resulting in the access composite score. For example, if 3 of the 5 survey items scored 3, then the top-box score was 60% for the entire composite.

## BOX. CAHPS GETTING TIMELY ACCESS, CARE, AND INFORMATION SURVEY ITEMS

1. In the last 6 months, when you phoned a health care provider's office to get an appointment for care your child needed right away, how often did you get an appointment as soon as your child needed?
2. In the last 6 months, when you made an appointment for a check-up or routine care for your child, how often did you get an appointment as soon as your child needed?
3. In the last 6 months, when you phoned a health care provider's office during regular office hours, how often did you get an answer to your medical question that same day?
4. In the last 6 months, when you phoned the health care provider's office after regular office hours, how often did you get an answer to your medical question as soon as you needed?
5. Wait time includes time spent in the waiting room and exam room. In the last 6 months, how often did your child see a health care provider within 15 minutes of his or her appointment time?

Additional covariates included demographic factors (child age and race/ethnicity, parental education), hospitalization factors (length of stay, ICU stay, hospital site, and discharge diagnosis), and home/outpatient factors (exposure to smoking at home, frequency of office-based health care visits in the preceding 6 months). Race and ethnicity items were combined into 1 child race/ethnicity variable with the following 4 categories: non-Hispanic white, non-Hispanic black, Hispanic, and other. The number of hospitalizations in the preceding 6 months (0, 1, ≥2), length of stay, ICU stay during the study enrollment encounter, and primary payer were obtained from the PHIS. Primary payer was categorized as either private or public/other, where "other" includes uninsured.

### OUTCOMES

The 2 main study outcomes were all-cause 1) 30-day ED revisits, from which children were discharged home, and 2) 30-day inpatient readmissions (both "observation" and "inpatient" classes). Both outcomes were obtained from the PHIS database, a pediatric database that includes clinical and resource utilization data for >45 children's hospitals in the United States, including the 5 sites of this study.[19]

### ANALYSIS

Two main multivariable logistic regression models were constructed using a priori selection of previously described covariates to estimate the association between perceived access composite scores and the odds of 1) 30-day ED revisit and 2) 30-day inpatient readmission. Stratified analyses were conducted to examine associations between perceived access and utilization grouping participants by 1) asthma and croup diagnoses (conditions for which there are effective and relatively fast-acting treatments available in primary care that may obviate subsequent hospital admission) compared with bronchiolitis and CAP diagnoses, and 2) individual diagnoses.

To further investigate how child race/ethnicity influenced the relationship between perceived access to care and revisits, additional analyses were performed. One-way analysis of variance (ANOVA) was performed to assess differences in access composite scores by child race/ethnicity. A Pearson chi-square test was used to assess differences in frequency of 30-day ED revisits and 30-day inpatient admissions by child race/ethnicity. In addition, we assessed for differences by race/ethnicity, as well as parental education and insurance status, by interacting these variables with access composite score sequentially in the 2 main multivariable models described previously.

Finally, we conducted several post hoc sensitivity analyses. These analyses were identical to the main models with the following modifications: 1) restricting our ED revisit and readmission outcomes to same-cause All Patient Refined Diagnosis-Related Groups, 2) exclusion of index visits that were ED discharges for croup, and 3) exclusion of croup cases altogether.

All analyses were conducted with Stata, version 12.1 (Stata Corp LP, College Station, Tex). Institutional review boards at each of the participating institutions approved this study.

## RESULTS

Overall, 2438 of 3428 parent/child dyads (68%) enrolled in the study. Mean age at admission was 3.5 years, 22% were non-Hispanic black, 24% were Hispanic, and 35% of caregivers had less than a high school education. The proportion of patients within each discharge diagnoses category was as follows: bronchiolitis (32%), asthma (28%), pneumonia (25%), and croup (14%). A total of 139 patients (6%) had been hospitalized at the same institution in the 6 months preceding enrollment. Mean length of stay for those hospitalized was 2.2 days, with 87% of patients staying ≤3 days and 160 children (7%) requiring ICU care during their hospital stay (Table 1).

### PERCEIVED ACCESS TO TIMELY CARE

Of enrolled participants, 2431 (99%) completed the Child CG-CAHPS questions, 2179 of whom (89%) reported that their child attended ≥1 office-based visit during the previous 6 months and thus were eligible to

**Table 1.** Study Participant Characteristics (N = 2438)

| Characteristic | Value |
|---|---|
| Child age, y, mean (SD) | 3.54 (3.75) |
| Child race/ethnicity, n (%) | |
| Non-Hispanic white | 958 (39.6) |
| Non-Hispanic black | 535 (22.1) |
| Hispanic | 591 (24.4) |
| Other | 335 (13.8) |
| Parent education, n (%) | |
| Some high school or less | 247 (10.3) |
| High school graduate or equivalent degree | 586 (24.3) |
| Some college or more | 1580 (55.4) |
| Diagnosis, n (%)* | |
| Asthma | 680 (27.9) |
| Bronchiolitis | 789 (32.4) |
| Croup | 351 (14.4) |
| Pneumonia | 618 (25.3) |
| Length of stay, d, mean (SD)† | 2.23 (3.7) |
| Intensive care unit admission, n (%) | 160 (6.6) |
| Hospitalizations in previous 6 months, n (%) | |
| None | 2299 (94.3) |
| 1 time | 128 (5.3) |
| ≥2 times | 11 (0.4) |
| Office visits in previous 6 months, n (%) | |
| None | 252 (10.3) |
| 1 | 458 (18.8) |
| 2 | 522 (21.4) |
| 3 | 426 (17.5) |
| 4 | 323 (13.3) |
| 5–9 | 371 (15.2) |
| ≥10 | 83 (3.4) |
| Smoker in home | 555 (24.7) |

SD indicates standard deviation; ED, emergency department; LOS, length of stay; and PHIS, Pediatric Health Information System.

*We attempted to sample cases evenly across conditions and institutions, but the number of children admitted to inpatient setting for croup was lower than anticipated in year 1, so enrollment was expanded to include index ED visits without hospital admission in the second year. Sixty-five croup patients were enrolled in the ED setting and did not experience an inpatient admission.

†Participants with croup who were not hospitalized were assigned the minimal LOS in PHIS of 1. Excluding those patients, average LOS was 2.26 (SD = 3.75).

answer the subsequent perceived access to timely care survey items. The average access composite score was 52.0 ± 36.3. There was no significant relationship between perceived access composite scores and number of visits to the office-based setting in the previous 6 months (Pearson correlation coefficient, 0.03; $P = .43$, ANOVA). Compared with those with no office-based visits in the previous 6 months, children with ≥1 visit were more likely to be white, younger, and diagnosed with bronchiolitis, but there were no significant differences in either ED revisits (4.0% vs 5.8%; $P = .23$) or readmissions (2.4% vs 4.7%; $P = .10$).

### 30-Day ED Revisits and Inpatient Readmissions

In total, 236 children (10%) had an ED revisit or inpatient readmission within 30 days of their index discharge. This included 137 ED revisits (6%) (51 of which were same cause) and 107 inpatient readmissions (4%) (58 of which were same cause). Eight children had both an ED revisit from which they were discharged, as well as an inpatient readmission within 30 days of index discharge.

### Perceived Access to Timely Care and Revisits

Adjusted results from the multivariable models demonstrated that each 10-unit increase in the access composite score was associated with a 1.07 greater odds of a 30-day ED revisit (95% confidence interval [CI], 1.02−1.13; $P < .011$). Access composite scores were not significantly associated with inpatient readmissions (odds ratio [OR] = 1.02; 95% CI, 0.96-1.09; $P = .488$) (Table 2).

In the stratified analyses, each 10-unit increase in the access composite score was associated with a greater odds of ED revisits in the combined asthma and croup stratum (OR = 1.12; 95% CI, 1.02−1.23; $P = .015$) but not in the combined bronchiolitis and pneumonia stratum (Fig. 1). Applying this same stratification schema to the inpatient readmissions outcome yielded no significant associations with the access composite score (Fig. 2). When stratified by individual condition, only children with croup demonstrated a significant relationship between greater access composite scores and ED revisits (OR = 1.17; 95% CI, 1.02−1.36; $P = .024$).

### Perceived Access to Timely Care and Revisits by Child Race/Ethnicity

In bivariate analysis, there was a significant difference in mean access composite scores by child race/ethnicity, with Hispanic (44.5 ± 37.0) and non-Hispanic black (50.6 ± 34.5) families having lower mean composite scores compared with white families (58.1 ± 34.5; $P < .001$, ANOVA). A similar proportion of white, black, and Hispanic families had ED revisits (5%, 6%, and 7%, respectively; Pearson chi-square = 3.7; $P = .30$) and inpatient readmissions (5%, 4%, and 5%, respectively; Pearson chi-square = 1.5; $P = .68$).

In multivariable analysis, the race/ethnicity × access composite score interaction term, when added to the main models, was not significant, indicating that the relationship between the access composite score and the odds of 30-day ED revisits or 30-day inpatient readmissions did not significantly differ by race/ethnicity. Similarly, interaction terms for parent education × access composite score and insurance status × access composite score were not statistically significant.

### Additional Characteristics Associated With Revisits

In addition to these main results, the multivariable model revealed that compared with asthma, the reference condition with the lowest rate of reutilization, bronchiolitis was associated with a significantly greater odds of both 30-day ED revisits (OR = 2.59; 95% CI, 1.19−5.63; $P = .016$) and inpatient readmissions (OR = 4.14; 95% CI, 1.67−10.20; $P = .002$), whereas croup was associated with an increased odds of ED revisits only (OR = 3.47; 95% CI, 1.55−7.76; $P = .002$), and pneumonia was associated with an increased odds of inpatient readmissions only (OR = 2.31; 95% CI, 1.03−5.21; $P = .042$). There

**Table 2.** Results of Nonstratified Multivariable Models for 30-day ED Revisits and Inpatient Readmissions

| Parameter | ED Revisit | | Inpatient Readmission | |
|---|---|---|---|---|
| | OR | 95% CI | OR | 95% CI |
| Access composite score (10-unit difference) | 1.07* | 1.02–1.13 | 1.02 | 0.96–1.09 |
| Age | 1.03 | 0.95–1.12 | 1.01 | 0.92–1.10 |
| Race (reference, white) | | | | |
| Non-Hispanic black | 1.47 | 0.80–2.67 | 0.9 | 0.47–1.70 |
| Hispanic | 1.63 | 0.93–2.85 | 1.1 | 0.58–2.07 |
| Other | 1.44 | 0.79–2.61 | 0.92 | 0.44–1.91 |
| Parent education (reference, some college or more) | | | | |
| Some high school or less | 1.36 | 0.64–2.90 | 1.94 | 0.71–5.30 |
| High school graduate or equivalent degree | 1.34 | 0.63–2.82 | 1.97 | 0.73–5.36 |
| Diagnosis (reference, asthma) | | | | |
| Bronchiolitis | 2.59* | 1.19–5.63 | 4.14† | 1.67–10.23 |
| Croup | 3.46† | 1.54–7.73 | 1.76 | 0.63–4.95 |
| Pneumonia | 1.63 | 0.81–3.25 | 2.32* | 1.03–5.22 |
| Length of stay | 1.09 | 1.00–1.19 | 1.08 | 0.99–1.18 |
| ICU stay (reference, no ICU) | 0.90 | 0.40–2.03 | 1.27 | 0.54–2.96 |
| Hospitalizations in previous 6 months (reference, 0) | | | | |
| 1 | 0.92 | 0.39–2.20 | 1.01 | 0.42–2.44 |
| ≥2 | 1.09 | 0.12–9.50 | 1.62 | 0.19–13.98 |
| Office visits in previous 6 months (reference, 1) | | | | |
| 2 | 1.36 | 0.74–2.47 | 0.53 | 0.26–1.07 |
| 3 | 1.15 | 0.60–2.18 | 0.56 | 0.27–1.13 |
| 4 | 1.02 | 0.50–2.08 | 0.94 | 0.48–1.83 |
| 5–9 | 1.51 | 0.80–2.84 | 0.77 | 0.39–1.50 |
| ≥10 | 2.46 | 0.98–6.13 | 0.82 | 0.29–2.37 |
| Any smokers in home (reference, none) | 0.95 | 0.59–1.52 | 0.86 | 0.51–1.45 |
| Site (reference, site 1) | | | | |
| Site 2 | 0.95 | 0.50–1.81 | 0.55 | 0.28–1.10 |
| Site 3 | 1.75 | 0.96–3.17 | 0.42* | 0.20–0.91 |
| Site 4 | 1.49 | 0.78–2.86 | 0.58 | 0.27–1.25 |
| Site 5 | 0.87 | 0.46–1.62 | 1.10 | 0.62–1.96 |
| Nonprivate insurance (reference, private) | 1.39 | 0.86–2.23 | 1.1 | 0.65–1.86 |

ED indicates emergency department; OR, odds ratio; CI, confidence interval; and ICU, intensive care unit.
*$P < .05$.
†$P < .01$.

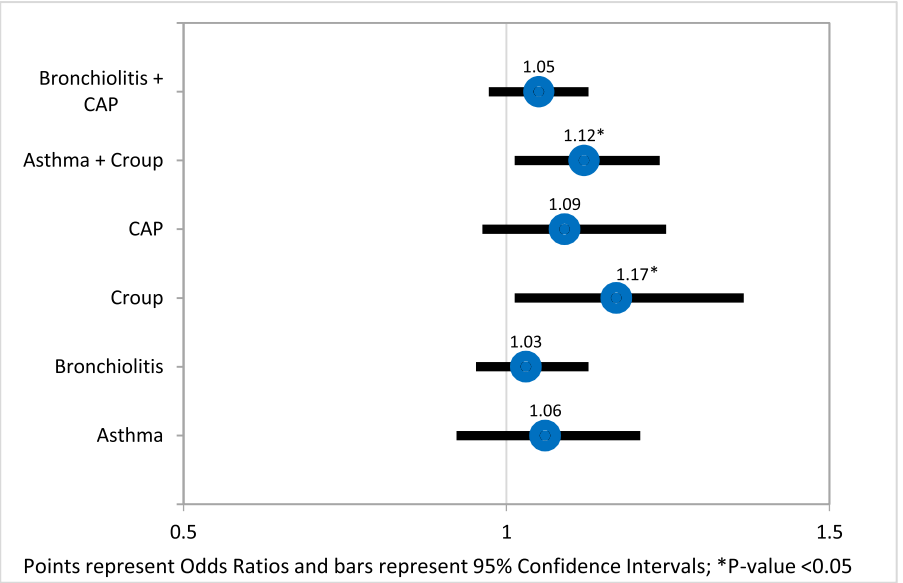


**Figure 1.** *Odds of 30-day emergency department revisit for each 10-point increase in access composite score stratified by diagnoses. CAP indicates community-acquired pneumonia.*

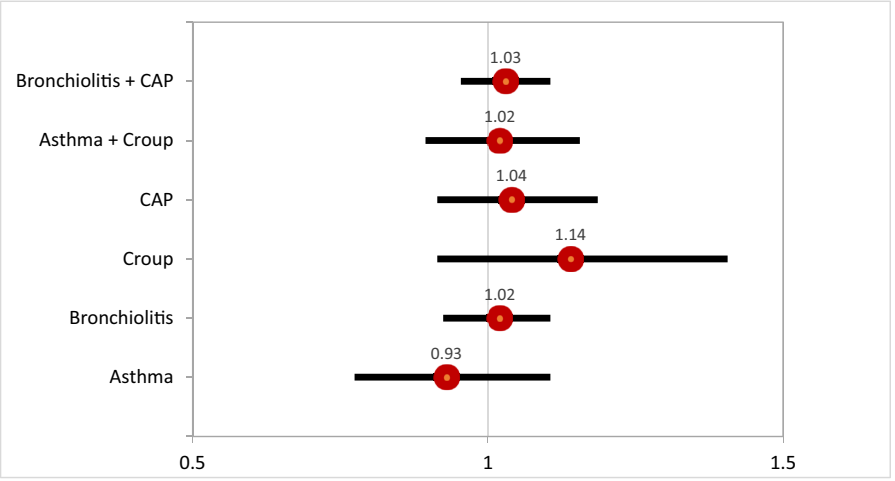


**Figure 2.** *Odds of 30-day inpatient readmission for each 10-point increase in access composite score stratified by diagnoses. CAP indicates community-acquired pneumonia.*

was no difference in return visits associated with ICU admission, number of office visits in the previous 6 months, or the presence of smokers in the home (Table 2).

### SENSITIVITY ANALYSES

We ran several post hoc sensitivity analyses to further investigate our findings. They included 1) restricting our ED revisit and readmission outcomes to same-cause All Patient Refined Diagnosis-Related Groups, 2) exclusion of index visits that were ED discharges for croup, and 3) exclusion of croup cases altogether. Although the statistical significance of the access composite score coefficient dropped below the 0.05 alpha threshold for the same-cause revisit model and the model that excluded croup altogether, the point estimates remained essentially unchanged for both ED revisits and inpatient readmissions (Supplementary Appendix Table 1). For the sensitivity analysis models that excluded ED discharges for croup, the point estimates also were essentially unchanged and same ORs were statistically significant as in the main models (Supplementary Appendix Table 2).

## DISCUSSION

In this large, multicenter, prospective cohort study, we examined the relationship between perceived access to timely office-based care assessed during index admission and 30-day ED revisits and inpatient readmissions following discharge for 4 common acute respiratory illnesses. We found that perceived access to timely care was associated with a small but significantly greater odds of ED revisits, adjusting for demographic, hospitalization, and home/outpatient factors. This relationship was most pronounced for children with croup. Counter to what we hypothesized, better perceived access to timely office-based care was not associated with a lower odds of any of the revisit outcomes for any of the conditions. Further, we found no clear evidence that these relationships between perceived access and repeat visits were explained by or differed by race/ethnicity.

There are several possible explanations for these findings. First, the influence of perceived access to timely care on health care utilization outcomes may vary by type of health care utilization outcome (eg, primary ED visits vs repeat ED visits). Previous retrospective studies found that better perceived access to primary care is associated with lower rates of primary emergency care utilization,[9,10] but when following an index hospitalization, better access and planned follow-up with primary care was associated with greater rates of revisits.[12,13,20] These previous studies suggest that better access to primary care may prevent index ED visits but may either have no effect or increase repeat ED or inpatient use, as has been described in pediatric asthma[21] and complex chronic conditions.[22] This may be particularly true for acute pediatric respiratory illnesses when caregivers have ready access to office-based care. In this scenario, outpatient clinical staff who are presented with a recently hospitalized child may have heightened vigilance and thus may be more likely to instruct caregivers to return to the ED with recurrent symptoms compared with a patient who ends up having to "wait it out" because the caregivers were unable to reach their primary care clinic.

Croup, the condition associated with the greatest odds of repeat ED visit, may provide the most illustrative example of this. In its severe form, croup represents a potential airway emergency for which caregivers of recently discharged children with recurrent or residual symptoms and ready access to office-based care may be directly referred to the ED on contacting their provider, either by phone or in person. The ED revisit association was most pronounced for croup, which may partially explain why greater perceived access in the combined asthma and croup strata was associated with greater odds of ED revisit but not the greater acuity outcome of readmission. In this case, the ED may have served a triage or definitive treatment function for these 2 ambulatory

care−sensitive conditions. We did not assess whether families contacted office-based providers following discharge, however, so this potential explanation remains speculative and a suggested focus area for future study. In addition, our post hoc sensitivity analysis excluding croup demonstrated a similar OR for the association between access composite scores and ED revisits but was not statistically significant ($P = .07$), suggesting that this relationship may be similar but less pronounced for the other respiratory conditions.

Another possible explanation for these findings is that better perceived access to office-based care served as a proxy for better overall access to care, including ED care. The positive relationship between increased access to care—in the form of less cost sharing, for example—and increased use of care is well established.[23,24] This relationship remains similar regardless of the effectiveness of the care provided.[25] Thus, if the relationship between perceived access to timely care and ED revisits was confounded by better access to care based on less costs, caregivers with lower copayments for both may be more likely to use the ED for recurrent symptoms than those with less access, regardless of whether their medical home can provide similarly effective treatments. This explanation seems less likely, given that CAHPS Getting Timely Appointments, Care, and Information is a validated instrument for which a greater access score has been associated with fewer ED visits in several prior studies.[10,15]

When taken in context of this existing literature, the current findings suggest that a strategy of simply increasing access to existing office-based care following hospitalization is unlikely to lead to lower revisit rates and may yield greater rates of repeat emergency care use.[20] Given this, hospitals and health systems aiming to reduce repeat utilization following hospital admission should also seek to implement protocols designed to reduce low-acuity referrals to the ED, such as dedicating individuals or teams specifically charged to prevent ED revisits that may be cared for in the medical home[26] and ensuring medication fulfillment at the time of index discharge.[27,28]

With respect to potential care disparities, we found an association between child race/ethnicity and perceived access to care but not 30-day revisits in bivariate analysis, and no significant associations in our multivariate modeling. The association of lower access to care and minority race/ethnicity is consistent with previous literature.[7,8] The lack of significant association between child race/ethnicity and revisits, as well as the nonsignificant interaction term, may be explained by power limitations, given the infrequency of the 30-day reutilization outcomes.

This study has several additional limitations. First, the association between access to timely care and greater odds of 30-day revisits did not extend to inpatient readmissions. Because inpatient readmissions were less frequent, our study may have been underpowered to detect this association. Second, we assessed perceived access to timely care at the time of index admission and not objective measures of timely care, such as wait times following hospital discharge; this may have led to misclassification of our primary exposure, although any misclassification would likely be nondifferential. In addition, the CAHPS survey that we used does not assess other specific practical barriers to access, such as geography and transportation. An additional limitation is that we did not assess reutilization at hospitals outside the 5 participating hospitals. Because about 14% of pediatric readmissions occur at other institutions,[29] we are likely undercounting the primary outcomes, which would bias our results toward the null. Finally, this study was not a randomized trial, so the observed associations may be influenced by residual confounding. For instance, caregivers who perceived greater access to primary care may have had children with greater acute illness severities or burdens of comorbidity. However, we adjusted for several proxies of illness severity−namely length of stay and ICU admission—and excluded patients with chronic diseases other than asthma, suggesting that this scenario is less likely.

In conclusion, we found an association between better perceived access to timely office-based care and ED revisits following an index acute respiratory hospitalization, particularly for croup. This finding should prompt further study of mediators of this relationship and provide caution for health systems implementing access-focused interventions to prevent reutilization.

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## SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at http://dx.doi.org/10.1016/j.acap.2018.07.001.

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