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Hospital and Emergency Department Pediatric Capability, Patient Characteristics, and Radiology Imaging for Children

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Abstract

IMPORTANCE Judicious use of radiology imaging is an important quality measure in emergency care for children. Prior studies have shown differences in imaging utilization by insurance status and race and ethnicity.

OBJECTIVE To examine if measures of hospital and emergency department (ED) pediatric capabilities modify the association between insurance, race and ethnicity, and imaging utilization.

DESIGN, SETTING, AND PARTICIPANTS This retrospective cohort study combined data from the 2019 State Emergency Department and State Inpatient Databases of 8 states with the 2019 National Emergency Department Inventory–USA and the 2021 National Pediatric Readiness Project (NPRP) Survey on patients 18 years of age or younger. There were 857 034 total ED visits across 3 cohorts, encompassing patients with asthma, head trauma, or abdominal trauma. Statistical analysis was performed from May 2024 to January 2026.

EXPOSURE Pediatric capability, as measured by presence of a pediatric emergency care coordinator, readiness according to NPRP data, and hospital functional capability (inpatient and intensive care unit bed status).

MAIN OUTCOMES AND MEASURES The association of insurance and race and ethnicity (separate models) with imaging utilization was examined across the 3 cohorts. Chest radiography was evaluated for patients with asthma, head computed tomography (CT) was evaluated for patients with head trauma, and abdominal CT was evaluated for patients with abdominal trauma. Separate mixed-effects logistic regression models were constructed, adjusting for age, sex, presence of a complex chronic condition, diagnostic grouping system severity score, hospital pediatric ED visit volume, and complexity of the hospital patient mix (percentage of patients with complex chronic conditions and mean severity clinical score) with random intercept for hospital. As a sensitivity analysis, these associations were examined separately for discharged patients.

RESULTS There were 857 034 total ED visits in the 3 cohorts, encompassing patients with asthma (380 719 ED visits; mean [SD] age, 9.6 [5.0] years; 210 598 male [55%]), head trauma (435 644 ED visits; mean [SD] age, 7.2 [5.7] years; 264 004 male [61%]), and abdominal trauma (40 671 ED visits; mean [SD] age, 11.0 [5.4] years; 21 632 male [53%]). Children with public insurance were less likely to have undergone imaging across all measures compared with those with private insurance (asthma: adjusted odds ratio [AOR], 0.85 [95% CI, 0.83-0.86]; head trauma: AOR, 0.77 [95% CI, 0.75-0.78]; abdominal trauma: AOR, 0.59 [95% CI, 0.55-0.63]). In the adjusted model, compared with non-Hispanic White patients, non-Hispanic Black and Hispanic patients were less likely to have undergone imaging across all measures (non-Hispanic Black, asthma: AOR, 0.83 [95% CI, 0.81-0.85]; non-Hispanic Black, head trauma: AOR, 0.77 [95% CI, 0.74-0.79]; non-Hispanic Black, abdominal

(continued)

Key Points

Question How do hospital and emergency department pediatric capabilities change the association between patient insurance status, race and ethnicity, and judicious radiology imaging?

Findings In this cohort study comprising 857 034 total emergency department visits among children with asthma, head trauma, or abdominal trauma, pediatric capability was associated with differences in imaging utilization overall, but not with changes in the pattern of association between insurance status or race and ethnicity and imaging utilization.

Meaning This study suggests that additional efforts are needed to ensure that efforts to enhance pediatric capabilities address both the quality and equity of care.

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

Abstract (continued)

trauma: AOR, 0.60 [95% CI, 0.55-0.65]; Hispanic, asthma: AOR, 0.91 [95% CI, 0.89-0.93]; Hispanic, head trauma: AOR, 0.85 [95% CI, 0.82-0.87]; Hispanic, abdominal trauma: AOR, 0.72 [95% CI, 0.66-0.80]). The presence of pediatric capability was associated with differences in imaging utilization, but not with changes in the pattern of association between either insurance or race and ethnicity and imaging utilization. Similar results were observed among those who were discharged.

CONCLUSIONS AND RELEVANCE In this cohort study of pediatric ED visits, increased pediatric capability was not associated with differences in the patterns of imaging utilization by insurance status or race and ethnicity. Additional efforts are needed to ensure that pediatric capability improves quality and equity of care.

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Introduction

Judicious use of radiology imaging in pediatric emergency care is well established as a quality measure.[1,2] However, multiple studies have demonstrated variability in imaging use across hospitals and persistent racial and ethnic differences in pediatric imaging rates, with non-Hispanic White patients consistently more likely to receive imaging compared with non-Hispanic Black patients[3] and Hispanic patients.[4] Hospital-level factors have been also shown to be associated with imaging utilization,[5,6] with prior data demonstrating that hospitals with a higher percentage of patients from racial and ethnic minoritized groups have larger differences in imaging by race and ethnicity.[3]

Pediatric emergency department (ED) readiness, including the presence of a pediatric emergency care coordinator (PECC), has been associated with improved quality of care and outcomes for critically ill children[7] and may reduce unwanted variation of care and improve health equity.[8] However, ability of pediatric readiness interventions to potentially reduce differences in imaging utilization is not well described. Therefore, our goal was to examine how pediatric capability was associated with both health care quality and equity; specifically, if measures of capability modified the association between race and ethnicity or insurance status and imaging utilization.

Methods

Data Sources, Setting, and Participants

Using data from 8 geographically diverse states (Arkansas, Florida, Iowa, Maryland, Nebraska, New York, Vermont, and Wisconsin), we created an analytic cohort combining several databases: the 2019 Agency for Healthcare Research and Quality State ED and State Inpatient Databases (SEDD/SID), the 2019 National ED Inventory (NEDI)–USA,[9] and the 2021 National Pediatric Readiness Project (NPRP) Survey. We chose these states because of their high-quality pediatric linkage in the SEDD/SID data, making it possible to identify pediatric revisits. These are the most recent available NPRP data, so we chose SEDD/SID data that most closely matched the NPRP year among the data available at the time of analysis. The SEDD/SID contain data on ED discharges and inpatient admissions for each state by hospital. The NEDI-USA survey collects information about ED characteristics, including total and child visit volumes, as well as PECC status. The NPRP survey is a web-based assessment of compliance with pediatric readiness guidelines in US hospitals.[10] American Hospital Association data were used as part of the process to identify freestanding children's hospitals. Methods for database linkage for NEDI and SEDD/SID have been previously described,[11] and with similar methods used to link with NPRP data. Our analytic cohort included all pediatric patients (aged ≤18 years) presenting to the ED. This study was reviewed by the Mass General Brigham institutional review board and determined to be exempt from approval and informed consent due to the use of secondary data. This

report followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline for cohort studies.[12]

We selected 3 areas of imaging utilization with prior literature demonstrating patterns of overuse for children: chest radiography for asthma, head computed tomography (CT) for in head trauma, and abdominal CT for abdominal trauma.[4,6,13-15] Similar to previous work, we used *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Procedure Coding System* (*ICD-10-PCS*) and *Current Procedural Terminology* (*CPT*) codes specific to each type of imaging study, if available, along with charge or revenue codes (eTable 1 in Supplement 1).[16] The chest radiography for asthma measure was defined as the proportion of visits with radiography performed during visits for patients aged 2 years or older with any diagnosis of asthma. The CT for head trauma measure was defined as the proportion of visits with a head CT performed during visits with fracture, dislocation, contusion, laceration, or injury of the head, face, or eyes.[2] The CT for abdominal trauma measure was defined as the proportion of visits with CT performed during visits with abdominal trauma (see eTable 1 in Supplement 1 for codes).

Exposures and Covariates

Insurance status was determined as documented in the SEDD/SID and defined as public, private, or other (including self-pay). Race and ethnicity were defined as Hispanic, non-Hispanic Black, non-Hispanic White, non-Hispanic other, and missing, as captured in the SEDD/SID data. Race of non-Hispanic other included Asian or Pacific Islander, Native American, and other (per the Healthcare Cost and Utilization Project's coding, which can include an unspecified race or multiracial designation, depending on the state). We examined race and ethnicity as a proxy for the association of racism and bias with medical decision-making within the health care system, with non-Hispanic White as the reference group and insurance as a surrogate marker of socioeconomic status to assess other potential barriers to accessing and receiving care.[17,18]

We examined 3 definitions of pediatric capacity at each hospital. The first was whether the hospital had a PECC. A PECC is a physician, nurse, advanced nurse practitioner, physician assistant, or administrator who oversees administrative aspects of pediatric care in the ED that may include ensuring appropriate pediatric equipment, protocols for pediatric emergency care, pediatric education for other ED staff, and/or pediatric quality improvement activities[19]; this person is not required to have specialty pediatric training. The presence of a PECC has previously been reported to be an important component of pediatric readiness[20] and has been shown in prior work to be associated with differences in imaging utilization overall.[16] This was operationalized as PECC (yes or no), as defined by the NEDI-USA survey. We specifically chose to use any PECC rather than focusing on a nurse or physician PECC, as the education and quality improvement provided by a nurse PECC may also be associated with physician care patterns, including the use of radiology imaging. The second definition was the pediatric readiness score as obtained from the NPRP survey, with the 75th percentile (score of 84) used as a dichotomous indicator of pediatric readiness. Prior studies have similarly used the top quartile to define high readiness.[8] The third measure was based on the pediatric resources available at the hospital. Freestanding children's hospitals were defined as those that had 70% or more ED visits by children and/or restricted admissions to children according to American Hospital Association data. We categorized the remaining non–children's hospitals into 3 groups: highly pediatric resourced, moderately pediatric resourced, and non–pediatric resourced. The methods for the categorization have been previously described.[16] In brief, highly pediatric resourced hospitals were those that admitted children and had a pediatric intensive care unit (PICU), a moderately pediatric resourced hospital was defined as one that admitted children but did not have a PICU, and a hospital without the capability to admit children and without a PICU was considered to be non–pediatric resourced.

Covariates included age, sex, presence of a complex chronic condition,[21] diagnostic grouping system severity score,[22] hospital pediatric ED visit volume, and complexity of the hospital patient mix (percentage with complex chronic conditions and hospital mean diagnostic grouping severity score).

We used the presence of a complex chronic condition and the severity score as the best available markers of potential clinical severity at the visit.

Measures

The 3 utilization measures were evidence-based quality measures for judicious radiology study utilization: chest radiography for patients with asthma among those aged 2 years or older,[2,23] head CT for patients with head trauma,[2,23] and abdominal CT for patients with abdominal trauma.[14,24]

We used a multistep process to identify radiology procedures in SID/SEDD due to differing reporting methods by state and database, using *ICD-10-PCS* and *CPT* codes specific to each type of imaging study, if available, along with charge or revenue codes, as previously described.[16] Within SID, it is not possible to identify imaging performed specifically within the ED, so we also completed a sensitivity analysis examining only discharged patients.

Statistical Analysis

Statistical analysis was performed from May 2024 to January 2026. For each imaging study cohort, we used descriptive statistics with 95% CIs to describe the characteristics of the cohorts and the unadjusted rates of imaging, stratified by race and ethnicity and insurance type. We fit separate mixed-effects logistic regression models, adjusting for age, sex, presence of a complex chronic condition, diagnostic grouping system severity score, hospital pediatric ED visit volume, complexity of the hospital patient mix (percentage with complex chronic condition and mean severity clinical score), with a random intercept for hospital. From these models, we calculated the mean adjusted rates for each measure based on the estimated probabilities, summed at the hospital level. We further calculated adjusted rates stratified by race and ethnicity and insurance status and each of the definitions of pediatric capability. We then completed a sensitivity analysis to examine the associations for patients discharged from the ED (receiving only ED care), to avoid potential confounding by inpatient imaging. Results are presented as the point estimate (eg, odds ratio [OR]) and 95% CI. For ORs, 95% CIs that exclude 1 were considered to be significant; for comparison across measures (eg, mean rates), values were considered to be significantly different if their 95% CIs did not overlap.

Results

There were 857 034 total ED visits in the 3 cohorts, encompassing patients with asthma, head trauma, or abdominal trauma. There were 380 719 ED visits in the asthma cohort (mean [SD] age, 9.6 [5.0] years; 210 598 male [55%] and 170 112 female [45%]), of whom 97 341 (26%) were Hispanic, 142 095 (37%) were non-Hispanic Black, 100 156 (26%) were non-Hispanic White, 32 130 (8%) were of non-Hispanic other race or ethnicity, and 8997 (2%) were of unknown race or ethnicity (**Table 1**). Among the 435 644 patients in the head trauma cohort (mean [SD] age, 7.2 [5.7] years; 264 004 male [61%] and 171 621 female [39%]), 80 626 (19%) were Hispanic, 84 257 (19%) were non-Hispanic Black, 214 577 (49%) were non-Hispanic White, 37 000 (8%) were if non-Hispanic other race or ethnicity, and 19 184 (4%) were of unknown race or ethnicity. In the abdominal trauma cohort (40 671 ED visits; mean [SD] age, 11.0 [5.4] years; 21 632 male [53%] and 19 036 female [47%]), 7834 (19%) were Hispanic, 9236 (23%) were non-Hispanic Black, 19 174 (47%) were non-Hispanic White, 2803 (7%) were of non-Hispanic other race or ethnicity, and 1624 (4%) were of unknown race or ethnicity. Patients with public insurance made up the majority in all 3 cohorts. Additional demographic and insurance characteristics of all cohorts are shown in Table 1, and hospital characteristics are shown in eTable 2 in Supplement 1.

In total, 122 584 of 380 719 patients (32%) had undergone chest radiography for asthma, 81 791 of 435 466 (19%) had a CT scan for head trauma, and 6838 of 40 671 (17%) had a CT scan for abdominal trauma. Chest radiography for asthma was obtained for 30% of non-Hispanic Black patients (42 933 of 142 095) compared with 36% of non-Hispanic White patients (35 832 of 100 156)

and 31% of Hispanic patients (30 324 of 97 341) (**Table 2**). The corresponding values for CT for head trauma were 18% of non-Hispanic Black patients (14 846 of 84 257), 21% of non-Hispanic White patients (44 378 of 214 577), and 16% of Hispanic patients (12 845 of 80 626). CT for abdominal trauma was obtained for 13% of non-Hispanic Black patients (1224 of 9236), 20% of non-Hispanic White patients (3823 of 19 174), and 13% of Hispanic patients (1002 of 7834). Patients with public insurance received imaging at a lower rate across all 3 measures (Table 2).

In the adjusted model, children with public insurance were less likely to have undergone imaging across all 3 measures, compared with those with private insurance, although the difference for chest radiography was small (asthma: adjusted OR [AOR], 0.85 [95% CI, 0.83-0.86]; head trauma: AOR, 0.77 [95% CI, 0.75-0.78]; abdominal trauma: AOR, 0.59 [95% CI, 0.55-0.63]) (Table 2). Compared with non-Hispanic White patients, non-Hispanic Black patients and Hispanic patients were less likely to have undergone chest radiography for asthma (non-Hispanic Black: AOR, 0.83 [95% CI, 0.81-0.85]; Hispanic: AOR, 0.91 [95% CI, 0.89-0.93]). Non-Hispanic Black patients and Hispanic patients were also less likely to have undergone CT for head trauma (non-Hispanic Black: AOR, 0.77 [95% CI, 0.74-0.79]; Hispanic: AOR, 0.85 [95% CI, 0.82-0.87]) or for abdominal trauma (non-Hispanic Black: AOR, 0.60 [95% CI, 0.55-0.65]; Hispanic: AOR, 0.72 [95% CI, 0.66-0.80]).

Examining the adjusted mean rates for each imaging measure by hospital capability status, we found that hospitals with a PECC had overall lower rates of chest radiography for asthma and of CT for

Table 1. Patient-Level Characteristics Included in Each Measure Denominator

Characteristic	Cohort		
	Asthma	Head trauma	Abdominal trauma
Total ED visits, No.	380 719	435 644	40 671
Age, mean (SD), y	9.6 (5.0)	7.2 (5.7)	11.0 (5.4)
Age, median (IQR), y	9 (5-14)	6 (2-12)	12 (6-16)
Sex, No. (column %)			
Male	210 598 (55)	264 004 (61)	21 632 (53)
Female	170 112 (45)	171 621 (39)	19 036 (47)
Missing	NR[a]	19	NR
Race and ethnicity, No. (column %)			
Hispanic	97 341 (26)	80 626 (19)	7834 (19)
Non-Hispanic Black	142 095 (37)	84 257 (19)	9236 (23)
Non-Hispanic White	100 156 (26)	214 577 (49)	19 174 (47)
Non-Hispanic other[b]	32 130 (8)	37 000 (8)	2803 (7)
Unknown	8997 (2)	19 184 (4)	1624 (4)
Insurance type, No. (column %)			
Private insurance	87 701 (24)	163 743 (39)	14 321 (37)
Public, state, or uninsured	285 296 (76)	257 622 (61)	24 809 (63)
Missing	7722	14 279	1541
CCCs, No. (column %)			
None	369 194 (97)	432 968 (99)	40 183 (99)
≥1	11 525 (3)	2676 (1)	488 (1)
Maximum severity clinical score, No. (column %)			
1	1121 (<1)	7473 (2)	1631 (4)
2	13 028 (3)	95 142 (30)	13 774 (38)
3	318 252 (85)	188 817 (59)	16 364 (45)
4-5	41 551 (11)	29 820 (9)	4963 (14)
Missing	6767	114 392	3939
Disposition, No. (column %)			
Discharged from ED	340 300 (91)	420 161 (98)	36 986 (94)
Discharged after admission	31 587 (8)	6768 (2)	2147 (5)
Died	80 (<1)	294 (<1)	102 (<1)

Abbreviations: CCCs, complex chronic conditions; ED, emergency department; NR, not reported.

[a] Reporting restrictions from the Healthcare Cost and Utilization Project require that cells of 10 or fewer are listed as NR.

[b] Non-Hispanic other included Asian or Pacific Islander, Native American, and other (per the Healthcare Cost and Utilization Project's coding, which can include an unspecified race or multiracial designation, depending on the state).

head trauma, although not of CT for abdominal trauma. A similar pattern was observed for pediatric readiness, and the utilization was variable by hospital pediatric capability (**Figure 1**).

When we examined whether measures of pediatric capability modified the association between insurance status and imaging utilization (**Figure 2**), having a PECC was not associated with a narrowing of the differences in imaging rates between insurance groups, except for head CT. In hospitals with greater readiness and in hospitals with more pediatric resources, there were persistent differences in CT imaging patterns by insurance group. Similarly, while the presence of a PECC was associated with lower utilization of chest radiography and head CT, having a PECC was not associated with a change in the difference in imaging utilization among groups by race and ethnicity (**Figure 3**), with a similar result for pediatric readiness. There was not a clear trend toward narrowing of between-group differences with increased pediatric capability (Figure 3).

When restricted only to patients discharged from the ED (SEDD data), there were 102 622 patients who underwent chest radiography, 76 341 patients who underwent a head CT, and 5160 patients who underwent an abdominal CT (eTable 3 in Supplement 1). Non-Hispanic Black patients, Hispanic patients, and those with public insurance remained less likely to receive imaging across all measures (eFigures 1 and 2 in Supplement 1). However, the between-group differences were similar

Table 2. Patient-Level Associations for Each Measure

Association	Measure present, No./total No. (row %)[a]	Odds ratio (95% CI)	
		Unadjusted	Adjusted[b]
Chest radiography for asthma			
No./total No.	122 584/380 719 (32)	NA	NA
Race and ethnicity			
Hispanic	30 324/97 341 (31)	0.88 (0.86-0.90)	0.91 (0.89-0.93)
Non-Hispanic Black	42 933/142 095 (30)	0.82 (0.80-0.83)	0.83 (0.81-0.85)
Non-Hispanic White	35 832/100 156 (36)	1.00 [Reference]	1.00 [Reference]
Non-Hispanic other[c]	10 447/32 130 (33)	0.96 (0.93-0.99)	0.97 (0.94-1.00)
Unknown	3048/8997 (34)	1.02 (0.93-1.12)	1.04 (0.95-1.14)
Insurance			
Private	31 185/87 701 (36)	1.00 [Reference]	1.00 [Reference]
Public	88 790/285 296 (31)	0.84 (0.83-0.86)	0.85 (0.83-0.86)
CT for head trauma			
No./total No.	81 791/435 466 (19)	NA	NA
Race and ethnicity			
Hispanic	12 845/80 626 (16)	0.80 (0.78-0.82)	0.85 (0.82-0.87)
Non-Hispanic Black	14 846/84 257 (18)	0.83 (0.81-0.85)	0.77 (0.74-0.79)
Non-Hispanic White	44 378/214 577 (21)	1.00 [Reference]	1.00 [Reference]
Non-Hispanic other[c]	5783/37 000 (16)	0.85 (0.82-0.88)	0.90 (0.87-0.94)
Unknown	3939/19 184 (21)	0.97 (0.90-1.04)	1.05 (0.97-1.13)
Insurance			
Private	35 590/163 743 (22)	1.00 [Reference]	1.00 [Reference]
Public	42 928/257 622 (17)	0.68 (0.67-0.69)	0.77 (0.75-0.78)
CT for abdominal trauma			
No./total No.	6838/40 671 (17)	NA	NA
Race and ethnicity			
Hispanic	1002/7834 (13)	0.62 (0.57-0.68)	0.72 (0.66-0.80)
Non-Hispanic Black	1224/9236 (13)	0.58 (0.53-0.63)	0.60 (0.55-0.65)
Non-Hispanic White	3823/19 174 (20)	1.00 [Reference]	1.00 [Reference]
Non-Hispanic other[c]	438/2803 (16)	0.76 (0.68-0.86)	0.79 (0.69-0.91)
Unknown	351/1624 (22)	1.20 (0.98-1.48)	1.03 (0.83-1.28)
Insurance			
Private	3329/14 321 (23)	1.00 [Reference]	1.00 [Reference]
Public	3182/24 809 (13)	0.48 (0.46-0.51)	0.59 (0.55-0.63)

Abbreviations: CCC, complex chronic condition; CT, computed tomography; NA, not applicable.

[a] Measure present means, for example, chest radiography was performed for asthma (vs no chest radiography for asthma).

[b] Separate (for each measure) mixed-effects logistic regression models adjusting for age, sex, presence of a CCC, Diagnostic Grouping System Severity score, hospital pediatric emergency department visit volume, complexity of the hospital patient mix (percentage with CCC and mean severity clinical score), with random intercept for hospital.

[c] Non-Hispanic other included Asian or Pacific Islander, Native American, and other (per the Healthcare Cost and Utilization Project's coding, which can include an unspecified race or multiracial designation, depending on the state).

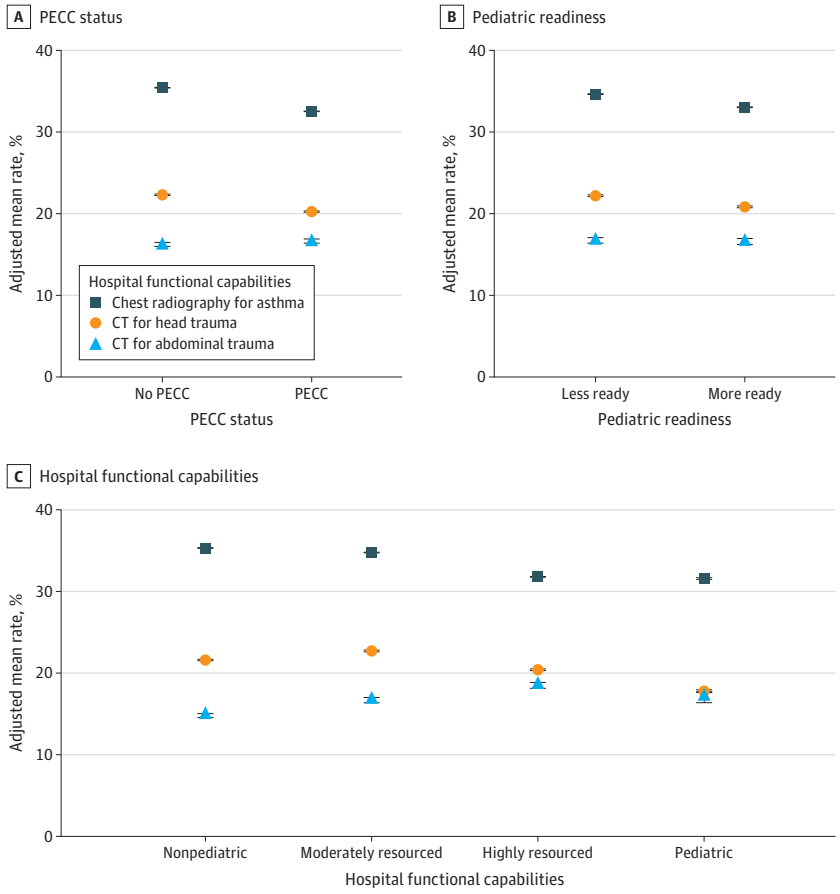
across all definitions and levels of pediatric capability, although they were slightly attenuated for abdominal CT (eFigures 3 and 4 in Supplement 1).

Discussion

In this 8-state cohort study, both race and ethnicity and insurance were associated with variations in imaging utilization in the ED. Although the presence of pediatric capability by any measure was broadly associated with reduced imaging utilization, pediatric capability was not consistently associated with a change in the differences between groups as classified either by insurance or race and ethnicity.

Optimal imaging rates may be challenging to evaluate from administrative data alone, given the association with the severity of presentation, which is imperfectly captured in these data. However, the presence of persistent demographic differences across these measures are consistent with prior reports[3,4,15] regarding the association of race and ethnicity with imaging in pediatrics and may represent potentially unwarranted differences in care. These data newly demonstrate that critical readiness interventions may not be sufficient to reduce these differences. This finding is in contrast to prior reports that found increased pediatric readiness was associated with decreased racial and ethnic disparities in mortality, specifically for Black children with acute medical illness.[8] There are several reasons why our results may differ. In the prior report, Black children had the highest mortality rates, even in the highest quartile of readiness, suggesting that readiness reduces but does not eliminate these disparities. In addition, the association was not significant in the injury cohort in

Figure 1. Dot Plots Showing Adjusted Mean Rates of Each Measure Overall in the Entire Sample by Pediatric Capability Definition

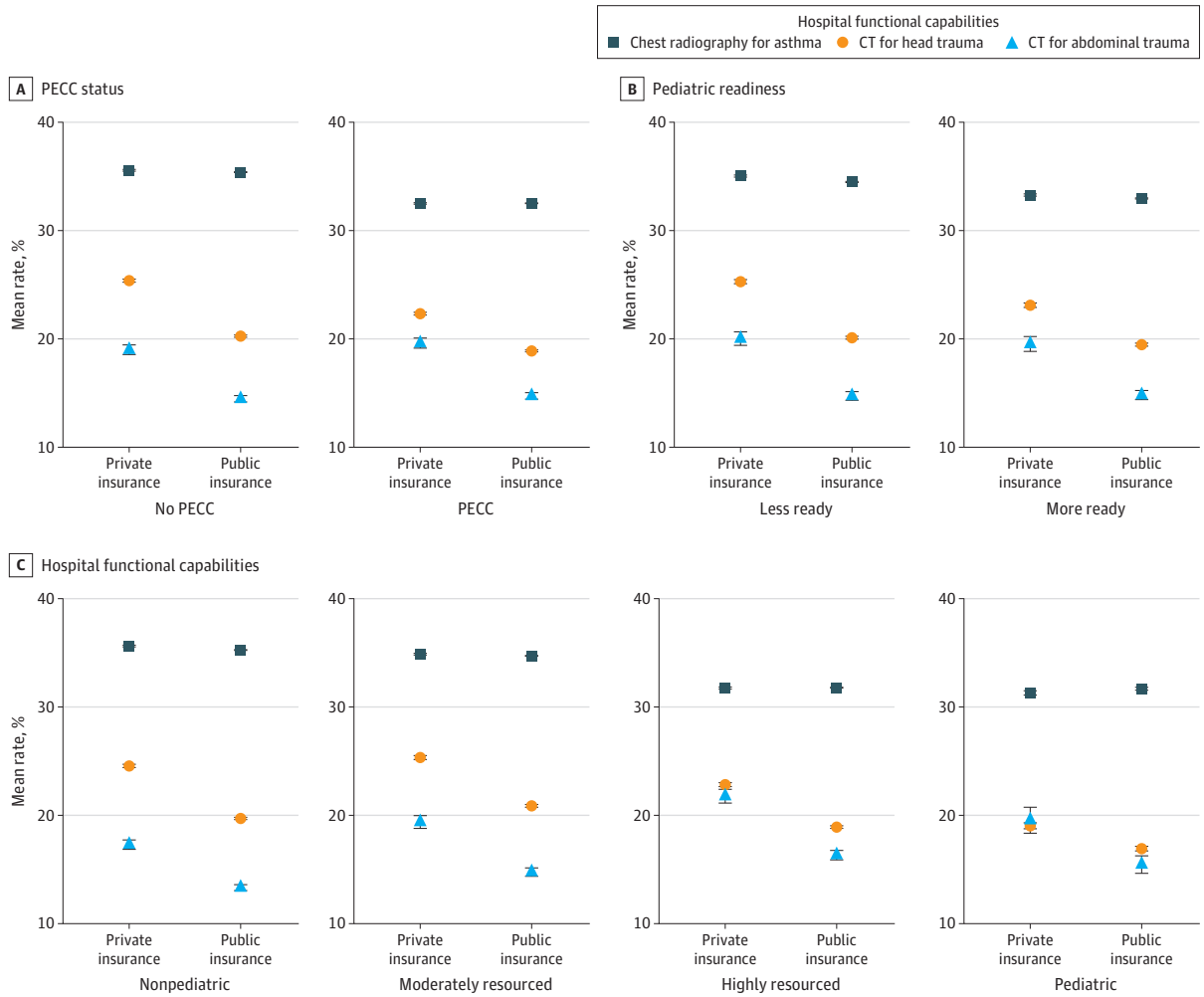


Symbols indicate the point estimate, with horizontal bars representing the 95% CIs. For some estimates, the 95% CI bars overlap due to the sample size and precision of estimates. CT indicates computed tomography; PECC, pediatric emergency care coordinator.

their report, which is likely more similar to the trauma CT population included in our study. In addition, these differences may reflect variation in the association of readiness efforts with process measures such as imaging, where a decrease may not always be the correct outcome, as compared with clinical outcomes such as pediatric mortality, where there is a clear direction for improvement. Given the known heterogeneity in PECC implementation,[25] we examined PECC presence as well as other measures of pediatric resources, specifically pediatric readiness and pediatric capacity, and found the same pattern across all the definitions of pediatric capability.

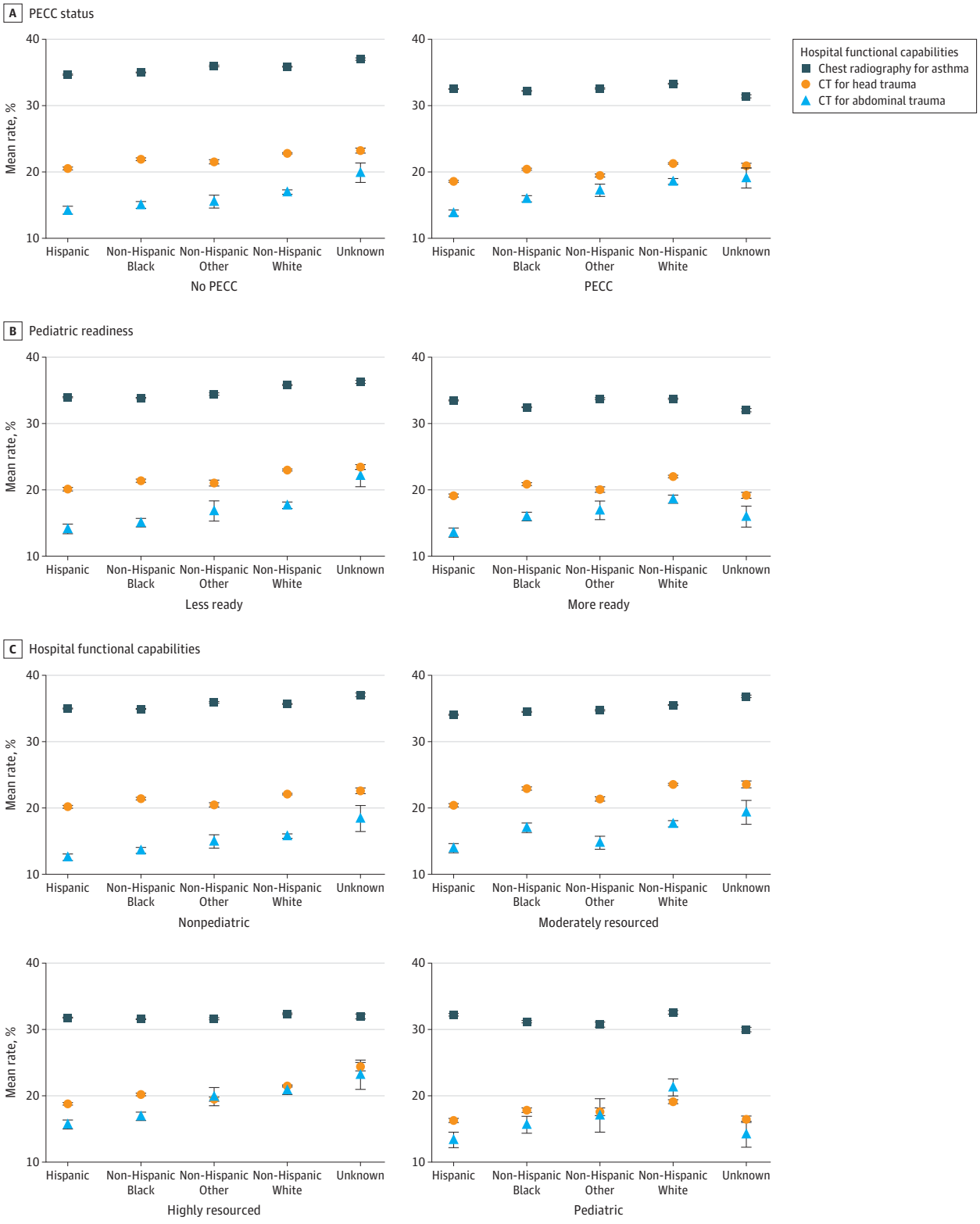
Pediatric capability, as measured in this work, is likely a proxy for additional experience and training in the care of ill and injured children. Pediatric capability was associated with overall decreased rates of imaging utilization for chest radiography and head CT, although not for abdominal CT. This difference may be due to the potentially wider range of indications for chest radiography or head CT; the impact of parental anxiety, education, health literacy, and request in the decision to order these tests[15]; or broader dissemination of head CT and chest radiography guidelines as compared with abdominal CT guidance. Improved dissemination of clinical practice guidelines may help improve the judicious and equitable use of pediatric imaging.

Figure 2. Dot Plots Showing Adjusted Overall Mean Rates of Each Measure by Insurance, Stratified by Pediatric Emergency Care Coordinator (PECC) Status, Pediatric Readiness, and Capabilities



Symbols indicate the point estimate, with horizontal bars representing the 95% CIs. For some estimates, the 95% CI bars overlap due to the sample size and precision of estimates. CT indicates computed tomography.

Figure 3. Dot Plots Showing Adjusted Overall Mean Rates of Each Measure by Race and Ethnicity, Stratified by Pediatric Emergency Care Coordinator (PECC) Status, Pediatric Readiness, and Capabilities



Symbols indicate the point estimate, with horizontal bars representing the 95% CIs. For some estimates, the 95% CI bars overlap due to the sample size and precision of estimates. CT indicates computed tomography.

Overall, these data emphasize that pediatric readiness interventions could impact the judicious use of imaging but were insufficient to ameliorate differences in imaging patterns associated with insurance and race and ethnicity. Additional work will be needed to ensure that pediatric readiness interventions improve both fidelity to evidence-based imaging guidelines and equity of care provided to children in all EDs.

Limitations

The study has several limitations. We used administrative data, and so were limited to the datasets that matched temporally as closely as possible, but may not have captured changes in NPRP components over time. The NPRP has varied rates of data missingness, which we addressed by using the NEDI PECC variable in primary analyses. The implementation of a PECC varied, as described in prior work,[25] and there may be unmeasured confounding by other hospital factors. We also had minimal clinical variables for severity adjustment, including no data on triage acuity, which we addressed by adjusting for complex chronic conditions and diagnostic grouping severity score. We were limited by the availability of administrative data, excluding the patients with missing or unknown race and ethnicity in the dataset. Finally, within SID, the data did not identify imaging performed in the ED. We also conducted a sensitivity analysis examining only patients discharged from the ED, where all imaging can be attributed to ED care, and found similar results.

Conclusions

In this cohort study, increased pediatric capability was associated with decreases in imaging utilization overall, but not with amelioration of differences in imaging utilization by race and ethnicity or insurance status. Although optimal imaging rates are closely linked with the underlying severity of the patient population and may be challenging to describe from administrative data alone, it is critical that imaging decisions are based on clinical factors and not on demographic characteristics. Ongoing efforts to improve pediatric readiness within general EDs should be designed to improve both quality and equity of care.

ARTICLE INFORMATION

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SUPPLEMENT 1.

eTable 1. Codes Used for Ascertainment of Diagnoses and Imaging
eTable 2. Hospital-Level Characteristics
eTable 3. Patient-Level Associations for Each Measure Among Non-Admitted Patients Only
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SUPPLEMENT 2.

Data Sharing Statement