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Association of Race and Ethnicity With Management of Abdominal Pain in the Emergency Department

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WHAT'S KNOWN ON THIS SUBJECT: Racial/ethnic differences in care for adult and pediatric patients in the emergency department have been documented.

WHAT THIS STUDY ADDS: This study reveals racial/ethnic differences in analgesic administration and prolonged length of stay for pediatric emergency department visits for abdominal pain. Documenting such disparities is an important first step needed to improve the equity of care for this and other conditions.

abstract

OBJECTIVE: To determine if race/ethnicity-based differences exist in the management of pediatric abdominal pain in emergency departments (EDs).

METHODS: Secondary analysis of data from the 2006–2009 National Hospital Ambulatory Medical Care Survey regarding 2298 visits by patients ≤21 years old who presented to EDs with abdominal pain. Main outcomes were documentation of pain score and receipt of any analgesics, analgesics for severe pain (defined as ≥7 on a 10-point scale), and narcotic analgesics. Secondary outcomes included diagnostic tests obtained, length of stay (LOS), 72-hour return visits, and admission.

RESULTS: Of patient visits, 70.1% were female, 52.6% were from non-Hispanic white, 23.5% were from non-Hispanic black, 20.6% were from Hispanic, and 3.3% were from "other" racial/ethnic groups; patients' mean age was 14.5 years. Multivariate logistic regression models adjusting for confounders revealed that non-Hispanic black patients were less likely to receive any analgesic (odds ratio [OR]: 0.61; 95% confidence interval [CI]: 0.43–0.87) or a narcotic analgesic (OR: 0.38; 95% CI: 0.18–0.81) than non-Hispanic white patients (referent group). This finding was also true for non-Hispanic black and "other" race/ethnicity patients with severe pain (ORs [95% CI]: 0.43 [0.22–0.87] and 0.02 [0.00–0.19], respectively). Non-Hispanic black and Hispanic patients were more likely to have a prolonged LOS than non-Hispanic white patients (ORs [95% CI]: 1.68 [1.13–2.51] and 1.64 [1.09–2.47], respectively). No significant race/ethnicity-based disparities were identified in documentation of pain score, use of diagnostic procedures, 72-hour return visits, or hospital admissions.

CONCLUSIONS: Race/ethnicity-based disparities exist in ED analgesic use and LOS for pediatric abdominal pain. Recognizing these disparities may help investigators eliminate inequalities in care. *Pediatrics* 2013;132:e851–e858

Emergency departments (EDs) are a health care safety net for underserved patients, regardless of their insurance status, ability to pay, and race/ethnicity. However, there are race/ethnicity-based differences in pediatric ED care. For example, white children are more likely than other children to undergo diagnostic procedures (eg, blood tests, electrocardiograms, and chest radiographs) for chest pain.[1] White children with intermediate or low-risk injury-severity head trauma are also more likely to undergo head computed tomography (CT) than similarly injured black and Hispanic children.[2] Black female teenagers with abdominal pain or genitourinary symptoms are more likely than whites to be tested for sexually transmitted diseases, even when reporting no sexual activity (Holland C, et al., unpublished data presented at Pediatric Academic Societies Meeting, Section of Emergency Medicine, April 2011).[3] Black and Hispanic infants with traumatic brain injury are more likely than white infants to have a skeletal survey to evaluate for child abuse.[4] Similarly, black children with fractures are more likely than whites to be reported for suspected child abuse.[5,6] Black and Hispanic children also have longer ED wait times compared with white children.[6,7] Findings of race/ethnicity-based differences in ED care are concerning because minority children are less likely to have a usual source of care[8] and more likely to visit EDs for common complaints.[9]

No study to date has examined race/ethnicity-based differences in the management of pediatric abdominal pain, a common complaint. For children presenting to EDs with abdominal pain, we hypothesized that compared with non-Hispanic white patients, minority patients would be less likely to have a pain score documented, receive analgesics for their pain (both narcotic and non-narcotic), undergo diagnostic testing, or be admitted to the hospital and more likely to have a prolonged ED length of stay (LOS) or return visit for the same complaint. To test our hypotheses, we performed a secondary analysis of data reported in the National Hospital Ambulatory Medical Care Survey (NHAMCS) from 2006 to 2009 for ED visits by patients ≤21 years old with abdominal pain.

METHODS

Data Source

With the University of Pittsburgh's Institutional Review Board approval, we used data from NHAMCS, an annual nationwide survey designed to collect ED service data. Details of recruitment, sampling methods, and study procedures are available from the Centers for Disease Control and Prevention.[10] Briefly, the NHAMCS uses a national probability sampling design that produces unbiased estimates when weighting procedures are applied. Hospital staff, trained by census representatives, review charts for a systematic random sample of patient visits during a 4-week reporting period. Standardized patient record forms are used to abstract and record data.

Study Population

During the 2006–2009 study period, the NHAMCS surveyed 140 415 visits, representing a national sample of 495 827 143 visits. We examined data from 2298 ED visits by pediatric patients (defined by the American Academy of Pediatrics as ≤21 years old[11]) whose primary reason for visit was documented as either "stomach pain," "abdominal pain," "abdominal cramps," or "abdominal spasms."

Independent Variables

Our main independent variable was race/ethnicity. Unless it was the individual hospital's policy to obtain self-reported race/ethnicity, hospital staff reported patient race/ethnicity on the basis of observation. The NHAMCS used 5 race categories: (1) white, (2) black, (3) Asian, (4) Native Hawaiian or other Pacific Islander, and (5) American Indian or Alaskan Native. A dichotomous variable was used to report ethnicity if the patient was Hispanic. Because of the small number of patients in the third, fourth, and fifth categories, we collapsed race/ethnicity into 4 categories for our analyses: non-Hispanic white, non-Hispanic black, Hispanic, and other. For patient visits with missing race/ethnicity, the NHAMCS used hot deck imputation, randomly assigning a value from another patient record with similar characteristics.

Dependent Variables

Our main dependent variables were related to pain management. Analgesics for severe pain (defined as ≥7 on a 10-point scale) was chosen as the primary pain management variable because we believed this variable met an "appropriateness" threshold on the basis of proposed performance measures for pediatric emergency care.[12] Analgesic use included nonnarcotics (eg, acetaminophen, ibuprofen, and ketorolac) and narcotics (eg, morphine and oxycodone), which were identified by using the National Drug Code Directory. Additional pain management outcomes included documentation of pain score, receipt of any analgesics overall, and receipt of narcotic analgesics specifically.

Secondary outcome variables, chosen from proposed performance measures for pediatric emergency care,[12] were the use of diagnostic tests (blood test, urinalysis, pregnancy test, or radiographic imaging), ED LOS (categorized as prolonged if >6 hours), 72-hour return visit rate for the same condition, and hospital admission rate.

Covariates

We examined patient biological (age and gender), clinical (pain and triage

level at presentation), system-level (type of hospital ownership and geographic region), and socioeconomic (income and insurance status) factors as potential confounders.

Age (categorized as <2, 2–5, 6–11, 12–14, 15–18, and 19–21 years) and gender are biological factors that affect the differential diagnosis of abdominal pain and can influence management. Young age (<2 years) and female gender are also linked with ED oligoanalgesia, and therefore were adjusted for in our models.[13,14]

Patients' pain and triage level at presentation are clinical factors that can influence diagnostic test ordering and administration of analgesics.[15,16] Pain was measured on a 10-point scale and grouped into 4 categories: none (0), mild (1–3), moderate (4–6), and severe (7–10). Triage level is the level of urgency of the visit, determined by focused assessment of the patient's acuity on the basis of vital sign stability, likelihood of an immediate life-threatening condition, and expected resources needed during the visit (eg, laboratory testing, intravenous therapy, consultations, or other procedures). Triage level was used as a proxy for illness severity, defined as follows: level 1, immediate care; level 2, emergent care (<15 minutes); level 3, urgent care (15–59 minutes); level 4, semiurgent care (1–2 hours); and level 5, nonurgent care (>2 hours).[17] For our analyses, we collapsed triage level into 3 groups: immediate or emergent, urgent, and semiurgent or nonurgent.

System-level factors, such as variation in available resources and management practices between different hospitals, are known contributors to differences in care.[18–20] For example, adult minorities are more likely to receive care in poorer performing institutions than whites, and these between-facility variations in quality contribute to disparities.[19,20] Also, children seen in

EDs in the South and West are more likely to receive opioid analgesics than in the Northeast.[21] We adjusted for type of hospital (categorized as voluntary/nonprofit, government/nonfederal, or proprietary) and geographic region (Northeast, Midwest, South, or West) in our analyses.

Socioeconomic factors are also associated with differences in care.[18,22–24] Patient zip codes and census data were used to determine the percentage of the area population living below the federal poverty line as a proxy for income.[22,23] Insurance status, determined by expected source of payment documented, was categorized into 5 groups: private insurance, Medicaid or the Children's Health Insurance Program, self-pay, other (eg, no charge/charity, worker's compensation), and unknown.

Statistical Analyses

We used descriptive statistics to summarize patient and hospital characteristics, stratified by race/ethnicity. We used prescribed weighting procedures to generate national estimates.

To determine the association between race/ethnicity and outcome variables, we used logistic regression for dichotomous variables and linear regression for continuous variables. If variables showed a strong association ($P < .10$) with race/ethnicity in our bivariate models, we included them in our multivariate models. To assess the association of race/ethnicity with each outcome variable, we used hierarchical multivariate logistic regression models that adjusted for age, gender, pain level, triage level, type of hospital ownership, geographic region, income, and insurance status. We used non-Hispanic white patients as the referent group.

For all analyses, we used Stata version 11 (StataCorp, College Station, TX) and considered a P value <0.05 to be significant. We reported results as odds

ratios (ORs) and 95% confidence intervals (CIs).

RESULTS

Our sample consisted of 2298 pediatric ED visits for abdominal pain, representing 8 137 774 visits nationally during the 4-year study period. Patients' mean age was 14.5 years (Table 1). Of the patients, 70.1% were female, 52.6% were non-Hispanic white, 23.5% were non-Hispanic black, 20.6% were Hispanic, and 3.3% were from other racial/ethnic groups. Whereas 17.9% had an unknown or undocumented pain score, there was no significant difference between these patients and those with a documented score.

Overall, non-Hispanic white patients were more likely to receive analgesics (23.7%) than non-Hispanic black (16%), Hispanic (19%), and other race (17.9%) children. Similarly, among children with severe pain (≥7 of 10 points), non-Hispanic white children were more likely to receive analgesics (27.1%) than non-Hispanic black (15.8%), Hispanic (18.9%), and other race (7.1%) children. Narcotic analgesics were also administered more frequently to non-Hispanic white patients (12.3%) than non-Hispanic black (5%), Hispanic (8.1%), or other race (4.3%) children.

Findings from multivariate logistic regression models that adjusted for age, gender, pain level, triage level, hospital ownership, geographic region, income, and insurance status, and used non-Hispanic white patients as the referent group, are shown in Figs 1–3.

Results for pain management variables (Fig 1) showed that non-Hispanic black patients were less likely than non-Hispanic white patients to receive any analgesic (OR: 0.61; 95% CI: 0.43–0.87) or a narcotic analgesic (OR: 0.38; 95% CI: 0.18–0.81). Among patients with severe pain (≥7 of 10 points), non-Hispanic black patients and patients from other racial/ethnic categories

TABLE 1 Characteristics of Pediatric Patients Who Presented With Abdominal Pain to EDs, Stratified by Race/Ethnicity

Characteristic	Total (N = 8 137 774)	Non-Hispanic White Children (n = 4 283 045)	Non-Hispanic Black Children (n = 1 908 755)	Hispanic Children (n = 1 676 632)	Other Children (n = 269 342)
Race/ethnicity, %	100	52.6 (48.9–56.3)	23.5 (19.7–27.7)	20.6 (16.7–25.1)	3.3 (2.4–4.6)
Mean age, y	14.5 (14.2–14.9)	14.8 (14.3–15.2)	15.7 (15.1–16.3)	13.0 (12.3–13.7)	12.1 (10.5–13.6)
Age category, %					
<2 years	1.4 (0.8–1.9)	1.5 (0.8–2.7)	0.8 (0.3–2.2)	1.3 (0.6–2.9)	4.5 (1.5–12.4)
2–5 years	8.6 (6.9–10.4)	6.6 (5.0–8.6)	7.7 (5.4–10.8)	13.4 (9.4–18.7)	19.3 (11.3–31.1)
6–11 years	20.0 (17.2–22.8)	19.3 (16.2–22.8)	13.3 (9.5–18.3)	29.0 (22.5–36.4)	23.6 (15.3–34.7)
12–14 years	8.5 (7.2–9.9)	10.6 (8.7–12.8)	6.1 (3.8–9.7)	6.6 (4.1–10.6)	5.8 (2.4–13.5)
15–18 years	27.8 (25.2–30.1)	29.4 (25.8–33.3)	28.2 (23.5–33.3)	23.2 (18.8–28.2)	24.1 (14.9–36.6)
19–21 years	33.8 (30.9–36.6)	32.8 (29.2–36.6)	44.0 (38.7–49.3)	26.6 (21.4–32.5)	22.7 (12.8–37.0)
Female gender, %	70.1 (67.8–72.3)	69.2 (66.3–72.1)	76.8 (72.5–81.0)	66.4 (61.6–71.2)	58.6 (46.3–70.9)
Presenting level of pain, %					
None	5.3 (4.0–6.6)	4.4 (2.9–6.7)	7.5 (4.9–11.4)	5.6 (3.2–9.6)	2.5 (0.9–6.7)
Mild	10.8 (9.2–12.4)	10.4 (8.6–12.5)	10.2 (7.3–14.2)	11.9 (8.2–16.8)	15.3 (8.4–26.3)
Moderate	32.5 (29.9–35.2)	32.7 (29.2–36.5)	28.2 (23.1–33.9)	35.3 (29.3–41.8)	43.6 (33.1–54.7)
Severe	33.4 (30.1–36.7)	36.5 (32.0–41.0)	34.1 (29.2–39.3)	27.3 (20.7–35.1)	18.1 (10.4–29.5)
Unknown	17.9 (15.0–20.9)	16.1 (12.9–19.9)	19.9 (15.7–25.0)	20.0 (14.9–26.3)	20.5 (10.9–35.3)
Triage level, %					
Immediate or emergent	7.9 (6.1–9.7)	7.6 (5.7–10.1)	8.3 (5.6–12.3)	8.4 (5.3–13.0)	6.3 (2.8–13.5)
Urgent	54.0 (50.2–57.7)	55.8 (50.6–60.8)	53.3 (46.6–59.9)	50.0 (43.5–56.5)	55.4 (39.5–70.2)
Semiurgent, nonurgent, or no triage performed	38.1 (34.3–42.0)	36.6 (31.6–41.9)	38.4 (32.5–44.5)	41.7 (34.9–48.7)	38.3 (24.5–54.2)
Hospital ownership, %					
Voluntary/nonprofit	74.9 (69.8–79.9)	78.2 (72.3–84.1)	78.5 (71.1–85.9)	62.3 (54.3–70.3)	74.7 (62.0–87.4)
Government/nonfederal	13.1 (9.8–16.4)	10.9 (7.4–14.5)	13.4 (7.6–19.3)	17.2 (9.9–24.4)	18.6 (7.3–29.8)
Proprietary	12.1 (8.1–16.0)	10.8 (6.0–15.6)	8.1 (3.9–12.3)	20.5 (12.7–28.3)	6.7 (0.0–13.3)
Region, %					
Northeast	17.3 (14.3–20.4)	19.0 (14.9–23.2)	13.0 (8.3–17.8)	17.4 (11.3–23.5)	20.7 (8.8–32.6)
Midwest	22.5 (17.0–28.0)	25.3 (19.1–31.6)	23.8 (15.0–32.6)	14.1 (6.5–21.8)	20.4 (6.2–34.6)
South	41.0 (34.8–47.2)	38.8 (31.9–45.7)	56.0 (45.7–66.3)	33.6 (20.8–46.5)	14.5 (5.0–24.0)
West	19.2 (12.7–25.7)	16.8 (9.6–24.1)	7.2 (3.5–10.9)	34.8 (23.4–46.2)	44.4 (25.9–62.9)
Area population living below the federal poverty line, %					
<5% of population	13.3 (10.7–15.8)	19.1 (15.7–23.1)	5.6 (3.5–8.8)	8.2 (5.3–12.3)	6.6 (2.7–15.2)
5%–9.99% of population	25.9 (22.9–29.0)	31.0 (27.0–35.2)	14.4 (10.3–19.9)	25.1 (20.2–30.8)	32.6 (22.8–44.3)
10%–19.99% of population	32.9 (29.4–36.3)	33.6 (29.4–38.0)	31.7 (26.6–37.2)	34.2 (26.9–42.3)	22.0 (13.0–34.7)
≥20% of population	21.7 (18.5–24.9)	9.8 (7.4–13.0)	42.6 (35.4–50.1)	27.5 (20.8–35.4)	27.5 (15.7–43.4)
Unknown	6.2 (4.1–8.2)	6.5 (4.3–9.8)	5.8 (3.4–9.8)	5.0 (2.9–8.6)	11.3 (5.2–22.8)
Insurance status, %					
Private insurance	38.8 (35.7–42.0)	51.0 (46.7–55.3)	22.6 (18.0–27.2)	25.7 (19.1–32.2)	42.8 (30.8–54.7)
Medicaid or CHIP	32.5 (29.5–35.4)	23.4 (20.0–26.9)	44.5 (38.9–50.1)	41.7 (34.9–48.5)	32.5 (21.4–43.7)
Self-pay	17.4 (14.7–20.0)	15.6 (11.6–19.5)	21.6 (16.6–26.6)	18.1 (13.2–23.0)	11.5 (3.9–19.0)
Other	4.5 (3.2–5.8)	3.6 (2.3–5.0)	5.0 (2.3–7.6)	6.8 (3.0–10.6)	1.9 (0.0–4.1)
Unknown	6.8 (4.0–9.7)	6.3 (2.9–9.8)	6.3 (3.4–9.2)	7.8 (2.7–12.8)	11.4 (0.0–23.5)

Data are national estimates based on information reported in the 2006–2009 NHAMCS and represent means or percentages (95% CI), as indicated. Unless it was the individual hospital's policy to obtain self-reported race/ethnicity, the hospital staff reported a patient's race/ethnicity on the basis of observation. Because of rounding, percentages may not total 100%. CHIP, Children's Health Insurance Program.

were less likely to receive analgesia than non-Hispanic white patients (ORs [95% CI]: 0.43 [0.22–0.87] and 0.02 [0.00–0.19], respectively). Among patients in the 2 most severe triage categories, non-Hispanic black patients and patients from other racial/ethnic categories were less likely to receive analgesia than non-Hispanic white patients (ORs [95% CI]: 0.60 [0.38–0.92] and 0.41 [0.18–0.90], respectively).

Results for any diagnostic test, blood tests, urinalyses, pregnancy tests, and imaging (Fig 2) revealed no significant differences associated with race/ethnicity.

Results for other process of care measures (Fig 3) revealed that non-Hispanic black and Hispanic patients were more likely to have a prolonged ED LOS (>6 hours) than non-Hispanic white patients (ORs [95% CI]: 1.68

[1.13–2.51] and 1.64 [1.09–2.47], respectively). There were no significant differences in 72-hour return visit or admission rates.

DISCUSSION

In our analyses of nationally representative data for children ≤21 years who presented to EDs with abdominal pain, we found that non-Hispanic black patients were less likely than non-
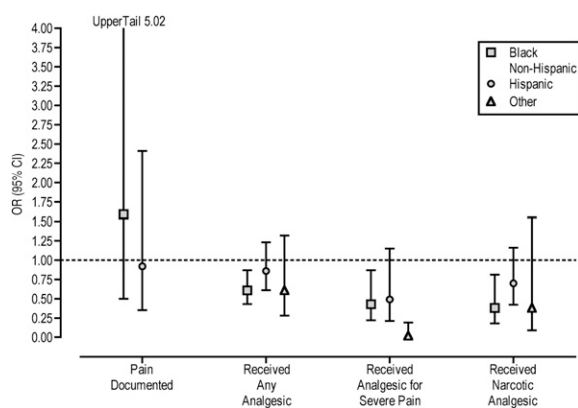
FIGURE 1
Management of pain in children who presented with abdominal pain to EDs. Findings are from multivariate logistic regression models that adjusted for confounders (age, gender, pain level, triage level, type of hospital ownership, geographic region, income, and insurance status) and used non-Hispanic white patients as the referent group. Severe pain was defined as a score of ≥7 on a 10-point scale. Values that do not cross 1 (dotted line) were considered statistically significant.
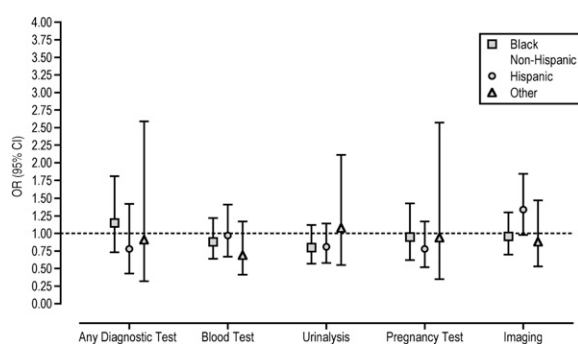
FIGURE 2
Diagnostic tests ordered for children who presented with abdominal pain to EDs. Findings are from multivariate logistic regression models that adjusted for confounders (age, gender, pain level, triage level, type of hospital ownership, geographic region, income, and insurance status) and used non-Hispanic white patients as the referent group. Values that do not cross 1 (dotted line) were considered statistically significant.
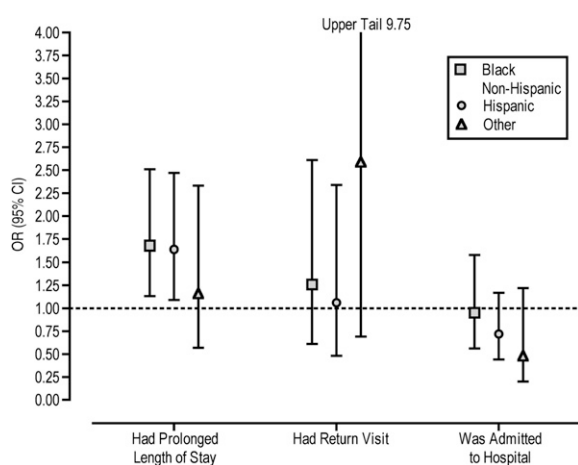
FIGURE 3
Hospital-related processes for children who presented with abdominal pain to EDs. Findings are from multivariate logistic regression models that adjusted for confounders (age, gender, pain level, triage level, type of hospital ownership, geographic region, income, and insurance status) and used non-Hispanic white patients as the referent group. Prolonged LOS was defined as >6 hours, and return visit defined as return within 72 hours. Values that do not cross 1 (dotted line) were considered statistically significant.

Hispanic white patients to receive any analgesics or narcotic analgesics for pain, even when pain was reported as severe. We also found that non-Hispanic black and Hispanic patients were more likely than non-Hispanic white patients to have a prolonged LOS. We identified no significant race/ethnicity-based differences in diagnostic testing, return visits, or admission rates.

Our findings are consistent with studies in adult ED patients. For example, in a 4-year retrospective review of 20 125 adults with abdominal or back pain in 2 urban EDs, Mills et al[24] found that white patients were more likely than nonwhite patients to receive any analgesics and opiates. In a study in 139 ED patients in Los Angeles over a 2-year period with isolated bone fractures, Todd et al[25] found that non-Hispanic white patients were more likely than Hispanic patients to receive analgesics. Similarly, Todd et al[26] also found that among 217 Atlanta, Georgia, ED patients with long-bone fractures, white patients were more likely than black patients to receive analgesics. In an analysis of 1997–1999 NHAMCS data that examined analgesic administration to adults, Tamayo-Sarver et al[27] found that physicians were more likely to prescribe opioids to white patients than black patients with migraines and back pain. Finally, an analysis of NHAMCS data for pain-related visits to US EDs from 1993 to 2005 found that white patients were more likely to be prescribed opioids than black, Hispanic, or other race patients. These findings held for all types of pain visits (including nephrolithiasis and long-bone fractures) and were detected among adults and children.[28]

Our results differ from a study that used 1992–1998 NHAMCS data and found no race/ethnicity-based differences in analgesic administration to children under 19 years old with long-bone fractures.[21] One possible explanation

for the differences in results is that abdominal pain has more heterogeneous causes and fewer clinical and diagnostic findings than do long-bone fractures. Another possible explanation is health care providers' concern about masking a surgical abdominal condition despite several studies showing that analgesics do not interfere with diagnosis.[29–32] Furthermore, this concern would not explain findings of race/ethnicity-based disparities in analgesic administration.

Compared with non-Hispanic white patients, non-Hispanic black and Hispanic patients were more likely to have a prolonged ED LOS. Our findings are consistent with NHAMCS data from 1997–2000 suggesting that ED wait times vary according to race/ethnicity.[6] In our study, prolonged LOS does not seem to be related to diagnostic evaluation because no racial/ethnic differences in testing were identified. For Hispanic patients, LOS may be related to language barriers and use of interpreter services, although we could not examine the effect of language in our study. For non-Hispanic black patients, LOS may be partially explained by longer median wait times to see a physician for those triaged as semiurgent or nonurgent or with no documented triage score.

Racial/ethnic differences in diagnostic testing were found in our unadjusted analysis, but not after controlling for confounders. Differences in adjusted and unadjusted analyses suggest that factors other than patient race/ethnicity may explain differences in testing. In some scenarios, receiving less testing may result in delayed or misdiagnosis, reflecting poor-quality care. In other cases, receiving more testing may be harmful, such as exposing a child to radiation by performing a potentially unnecessary CT scan. To improve the quality and equity of care for all children, it is important

for physicians to be mindful of and address differences in both directions. Several study limitations deserve mention. First, the sample size was limited for certain variables. There were few cases in which patients from minority groups had severe pain and were given any analgesic or a narcotic analgesic, few cases in which Hispanic patients were given any analgesic, few cases in which patients from minority groups had 72-hour return visits, and few cases in which patients from the "other" category of race/ethnicity had a prolonged LOS or were admitted to the hospital. These small cell sizes result in unstable national estimates, limiting the accuracy of our results. However, when we grouped the patients into white and nonwhite categories to create larger cell sizes, we observed patterns similar to the ones reported in our results.

Second, whereas some hospitals obtained self-reported data on race/ethnicity, often considered the gold standard,[33–35] others relied on hospital staff to assign race/ethnicity. Because our study is concerned with management on the basis of health care providers' perceptions of race/ethnicity, hospital staff designations may more accurately reflect these perceptions. However, lack of consistent self-report for patient race/ethnicity may have contributed to misclassification bias.

Third, the majority of diagnoses codes were generic, with "other symptoms involving abdomen and pelvis" the most commonly listed discharge diagnosis for all children in the sample. Given the lack of specificity, we were unable to determine how specific diagnoses contributed to our findings. However, when we adjusted for age, gender, presenting pain level, and triage level, and looked specifically at analgesia administration in the 2 most severe triage categories, our findings persisted. Our adjusted results suggests

that race/ethnicity-based differences in analgesic administration and LOS were independent of severity of illnesses and the clinical factors controlled for. However, other factors, such as diagnosis and comorbid illnesses, can influence management, which we were unable to control for.

Finally, we adjusted for triage category in our model; however, there may have been race/ethnicity-related bias among triage staff. A 10-year analysis of 78 million adult ED visits using NHAMCS found that black and Hispanic patients with chest pain were less likely than whites to be triaged emergently.[36] Therefore, it is possible that in our study, white patients who were less ill may have been assigned a more urgent score and minority patients who were more ill could have been assigned a less urgent score. If this situation occurred, we would expect our results to underestimate the association between race/ethnicity and abdominal pain management.

The Institute of Medicine defines health care disparities as "observed differences in quality of healthcare by race/ethnicity that are not due to access to care, clinical needs, patient preferences, or appropriateness of the intervention."[18] We adjusted for confounders in our analysis, including biological, clinical, system-level, and socioeconomic factors, and found that race/ethnicity-based differences persisted for analgesic use and LOS. Additional research is needed to better understand other patient-, parent-, provider-, and system-level factors that may contribute to these differences. Future studies should explore factors that influence when (early or delayed), where (ED or primary medical provider's office), and how (ambulance or private vehicle) parents access care for abdominal pain and other common conditions. Parental preference influences race/ethnicity-based differences

in performing CT scans in children with head trauma.[2] The role of parents' treatment preferences, medical mistrust, and health beliefs warrants further analyses involving mixed qualitative and quantitative research methods.

EDs are settings conducive to stress and fatigue among health care providers. The stressful ED setting may foster providers' use of mental shortcuts or heuristics,[37] including racial/ethnic profiling and stereotyping. Studies in adult populations suggest that providers are more likely to be influenced by stereotypes and bias when making decisions in the setting of time pressure and limited available information.[38] The subjective nature of abdominal pain, combined with lack

of an established patient-provider relationship in EDs, may enhance the use of heuristic methods for evaluating and managing children. Additional research is needed to explore the role of bias and other provider-level factors that may contribute to pediatric health care disparities. System-level factors should also be explored, including the availability of primary care providers, interpreter services, consulting subspecialists, and pediatric formulations of analgesics.

CONCLUSIONS

Equity is an important component of health care quality, and efforts to identify and address race/ethnicity-based

inequities are critical. By documenting inequities in analgesia and LOS for abdominal pain in a nationally representative sample of ED visits, our study contributes to the growing body of evidence showing disparities in pediatric health care. These data can be used to develop and test interventions that seek to eliminate race/ethnicity-based differences in the management of abdominal pain and other common pediatric complaints in EDs. Until such interventions are developed, clinicians caring for children in EDs should be aware of inequities in analgesic administration and make efforts to address pain control that may be suboptimal among minority children.

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