HHS Public Access

Author manuscript

*Hosp Pediatr*. Author manuscript; available in PMC 2020 January 01.

Published in final edited form as:

*Hosp Pediatr*. 2019 January ; 9(1): 1–5. doi:10.1542/hpeds.2018-0131.

# Racial, Ethnic, and Socioeconomic Disparities in Patient Safety Events for Hospitalized Children

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## Abstract

**OBJECTIVES:** Previous studies have revealed racial/ethnic and socioeconomic disparities in quality of care and patient safety. However, these disparities have not been examined in a pediatric inpatient environment by using a measure of clinically confirmed adverse events (AEs). In this study, we do so using the Global Assessment of Pediatric Patient Safety (GAPPS) Trigger Tool.

**METHODS:** GAPPS was applied to medical records of randomly selected pediatric patients discharged from 16 hospitals in the Pediatric Research in Inpatient Settings Network across 4 US

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**FINANCIAL DISCLOSURE:** The authors have indicated they have no financial relationships relevant to this article to disclose.

**POTENTIAL CONFLICT OF INTEREST:** Dr Stockwell discloses that heis an employee of Pascal Metrics, a patient safety organization, but does not perceive a conflict of interest; Dr Landrigan discloses that he holds equity in and has consulted for the I-PASS Institute, which seeks to aid hospitals in implementing safer handoffs of care, but does not perceive a conflict of interest; the other authors have indicated they have no potential conflicts of interest to disclose.

Drs Stockwell and Landrigan conceptualized and designed the study, coordinated and supervised the data collection, conducted initial analyses, drafted the initial manuscript, and reviewed and revised the manuscript; Drs Toomeyand Schuster conceptualized and designed the study, obtained funding, coordinated and supervised the data collection, conducted initial analyses, drafted the initial manuscript, and reviewed and revised the manuscript; Mr Westfall collected the data, conducted initial analyses, and reviewed and revised the manuscript; Ms Liu collected the data, conducted initial analyses, drafted the initial manuscript, and reviewed and revised the manuscript; Dr Parry coordinated and supervised the data collection, conducted initial analyses, and critically reviewed the manuscript; Mr Coopersmith interpreted data, drafted portions of the manuscript, and critically reviewed and revised the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

regions from January 2007 to December 2012. Disparities in AEs for hospitalized children were identified on the basis of patient race/ethnicity (black, Latino, white, or other; $N = 17336$ patient days) and insurance status (public, private, or self-pay/no insurance; $N = 19\,030$ patient days).

**RESULTS:** Compared with hospitalized non-Latino white children, hospitalized Latino children experienced higher rates of all AEs (Latino: 30.1 AEs per 1000 patient days versus white: 16.9 AEs per 1000 patient days; $P \leq .001$), preventable AEs (Latino: 15.9 AEs per 1000 patient days versus white: 8.9 AEs per 1000 patient days; $P = .002$), and high-severity AEs (Latino: 12.6 AEs per 1000 patient days versus white: 7.7 AEs per 1000 patient days; $P = .02$). Compared with privately insured children, publicly insured children experienced higher rates of preventable AEs (public: 12.1 AEs per 1000 patient days versus private: 8.5 AEs per 1000 patient days; $P = .02$). No significant differences were observed among other groups.

**CONCLUSIONS:** The GAPPS analysis revealed racial and/or ethnic and socioeconomic disparities in rates of AEs experienced by hospitalized children across a broad range of geographic and hospital settings. Further investigation may reveal underlying mechanisms of these disparities and could help hospitals reduce harm.

Disparities in care processes and outcomes related to race, ethnicity, primary language, and insurance status have been identified throughout the health care system. In 2003, the Institute of Medicine summarized many of these findings and offered possible solutions.[1] In pediatrics in particular, disparities have been found in health status,[2] insurance coverage,[3] access to care, use of services,[4–6] level of pain experienced, and treatment of pain.[7] Studies have revealed that families and patients who do not speak English as a primary language at home,[8] as well as patients with public insurance,[9] are especially vulnerable to poor-quality care.

Patient safety is an ongoing area of concern for pediatric disparities.[10] Previous research has suggested that disparities in patient safety exist for black and Latino children, for children whose families do not primarily speak English,[11] and for children on Medicaid insurance.[12] Inpatient adverse events (AEs) have been identified via a variety of methods, including voluntary provider reporting,[13] manual chart review,[14] and discharge record analysis.[15] Trigger tools are used to identify elements of medical records that potentially represent AEs, which are then investigated by clinicians to determine the presence of AEs. Trigger tools are more efficient than an exhaustive manual chart review and are more likely to detect AEs than voluntary incident reporting or an examination of billing codes.[16] The Global Assessment of Pediatric Patient Safety (GAPPS) Trigger Tool builds on previous pediatric trigger tools because it can be used to rigorously evaluate the accuracy of each trigger, measure interrater reliability, and ensure consistency across hospital contexts.[17] To our knowledge, patient safety disparities have not been previously identified in the pediatric inpatient environment by measuring rates of clinically confirmed AEs in a multisite investigation.

## METHODS

We used GAPPS to examine the prevalence of disparities in AE rates in different patient populations across a range of hospitals with varying characteristics. GAPPS was applied to medical records of randomly selected patients discharged between January 2007 and

December 2012 from 16 hospitals selected through the Pediatric Research in Inpatient Settings Network. This process has been described previously.[17] Briefly, nurse reviewers at each hospital investigated selected records, identifying AEs on the basis of GAPPS triggers. Once identified, 2 secondary physician reviewers independently adjudicated on AEs. Once confirmed, severity of AEs was rated by using National Coordinating Council for Medication Error Reporting and Prevention standards, and preventability was rated by using a 4-point Likert scale. The institutional review boards at each hospital approved all study procedures.

## Hospital Characteristics

We selected 4 hospitals from each of 4 US regions: Northeast, Midwest, West, and South. Academic or nonacademic community status was determined by categorizations set by the American Hospital Association,[18] and a balance of academic and nonacademic hospitals was selected from each region.

## Patient Characteristics

Race/ethnicity and insurance status were abstracted from selected medical records. Race/ethnicity was recorded by using the categories Alaskan native, American Indian, Asian, black, non-Latino white, Latino, native Hawaiian or other Pacific Islander, and other. We combined patients in the categories Alaskan native; American Indian; Asian; native Hawaiian or other Pacific Islander; and non-white, non-Latino other into a single “Other” category because each of the categories represented a small number of hospitalizations.

Insurance status was recorded by using 6 nonmutually exclusive categories: Medicaid, Medicare, private insurance, self-pay, no insurance, and not recorded. We excluded hospitalizations for patients covered by Medicare because pediatric eligibility for Medicare is based on having specific medical conditions.[19] We combined self-pay and no insurance into a single category and excluded records with no recorded insurance status. Therefore, we categorized patients into public insurance (Medicaid), private insurance, and selfpay/no insurance groups. Patients who were recorded as having both private and public insurance were included in the private insurance group.

## Statistical Analysis

We examined the distribution of overall, preventable, and high-severity AEs. AEs with National Coordinating Council for Medication Error Reporting Prevention severity categories of F to I were considered high severity.[20] AEs were compared by racial and/or ethnic group (black, white, Latino, and other) and insurance status (public insurance, private insurance, and self-pay/no insurance). To assess the number of AEs per 1000 patient days for the aforementioned characteristics, we performed Poisson regression models with race/ethnicity and insurance status as predictors (included in the model independently). All between-group differences were tested at a 2-sided 0.05 significance level.

## RESULTS

Of 3790 medical records reviewed, race/ ethnicity was documented in 3231; there were 17336 patient days for this group. Insurance status was documented in 3468 records with 19030 patient days. As previously reported,[21] reviewers identified a total of 413 AEs (19.5 AEs per 1000 patient days; 95% confidence interval [CI]: 17.6–21.4) and 209 preventable AEs (9.9 AEs per 1000 patient days; 95% CI: 8.5–11.2) across the entire cohort of patients.

In an examination of potential disparities by race/ethnicity, only the Latino subset showed a difference from the white (reference) group (Table 1). This difference persisted across all AEs (Latino: 30.1 AEs per 1000 patient days versus white: 16.9 AEs per 1000 patient days; $P \leq .001$), preventable AEs (Latino: 15.9 AEs per 1000 patient days versus white 8.9 AEs per 1000 patient days; $P = .002$), and high-severity AEs (Latino: 12.6 AEs per 1000 patient days versus white 7.7 AEs per 1000 patient days; $P = .02$).

When examining the insurance status groups, there were fewer AEs in the self-pay/insurance category for all AEs compared with those in the private insurance category, although this disparity did not reach significance (self-pay/no insurance: 7.7 AEs per 1000 patient days versus private: 18.7 AEs per 1000 patient days; $P = .08$; Table 2). The public insurance group had a higher AE rate compared with the private insurance group, but the difference did not reach significance (public: 22.3 AEs per 1000 patient days versus private: 18.7 AEs per 1000 patient days; $P = .09$). However, the public group had a significantly higher preventable AE rate than the private group (public: 12.1 AEs per 1000 patient days versus private: 8.5 AEs per 1000 patient days; $P = .02$).

## DISCUSSION

In a 16-hospital study, we found higher rates of AEs, including preventable and high-severity AEs, among hospitalized Latino versus white children. We also found higher rates of preventable AEs for hospitalized children with public versus private insurance.

The AE disparity between Latino and white patients persisted across AE type. Although we cannot be certain from this investigation, we hypothesize that language barriers may contribute to this disparity and should be further explored. Compared with white children, Latino children are less likely to speak English at home.[6] Disparities in health, use of health services, and access to care have been found for this population.[8] Adverse patient safety events due to language barriers have been documented, sometimes resulting from misinterpretation among practitioners, patients, and families.[11,22] However, to our knowledge, linguistic disparities in pediatric inpatient safety events have not been measured on a large scale.

Despite previously reported health and patient safety disparities for black children on a national level,[10] particularly in birth trauma,[23] we did not find statistically significant differences in AE rates between hospitalized black and white children. Further examination of the relationship among AE rates, race/ethnicity, and health disparities is required to understand this discrepancy. With this study, we may not have had sufficient statistical power to identify the potential disparity. Health disparities among black and white children

on a national level are primarily driven by a wider range of factors other than inpatient safety.[24]

The insurance status disparity in the frequency of preventable AEs should also be investigated. Because children must fall below a family income threshold to be eligible for Medicaid, insurance status disparities indicate socioeconomic inequalities in patient safety. The potentially lower AE rates for the self-pay/no insurance category call for further study as well. This category likely includes children with both families with limited resources and families with relatively high socioeconomic status who can afford to pay out of pocket.

The mechanisms of racial and/or ethnic and insurance status disparities necessitate further exploration. Provider bias and discrimination may play a role; providers may unconsciously or consciously perceive[25] or treat[26] patients differently depending on their insurance status, socioeconomic status, or race/ethnicity. Closer examination of patient and family experience and coordination of care could be used to determine key processes and moments in which these disparities are perpetuated.

This work has limitations. The data were collected from 2007 to 2012, and the quality of care may have changed since that time. More recent data may yield differing results. Additionally, although trigger-based safety event identification represents the most sensitive method that is currently employed widely, some events likely escaped the review process. Medical record review-based investigations have human reviewers who are central to the capture of events, and therefore may miss events. Furthermore, because of potential bias, individuals documenting events in charts or reviewing charts for AEs may be more or less likely to identify AEs or rate them as preventable depending on patient race/ ethnicity or insurance status. Other demographic variables (eg, age) or medical variables (eg, severity of illness and length of stay) may be associated with and/or confound race/ethnicity or insurance status and may also contribute to disparities.

## CONCLUSIONS

We found a higher incidence of AEs in hospitalized Latino children compared with hospitalized non-Latino white children as well as a higher incidence of preventable AEs in hospitalized children with public insurance. In addition to employing process-based improvements to address safety events, understanding the nature of these disparities may assist hospitals in reducing their rates of harm.

## Acknowledgments

We thank the following GAPPS National Field Test sites: Boston Children’s Hospital, Children’s Hospital Colorado, Children’s National Medical Center, Cincinnati Children’s Hospital Medical Center, Grand View Hospital, Hillcrest Hospital, Lucile Packard Children’s Hospital Stanford, Mary Washington Hospital, New York-Presbyterian/Weill Cornell Medical Center, Progress West Hospital, Providence St Peter Hospital, Silver Cross Hospital, South Shore Hospital, University of Florida Health Shands Children’s Hospital, Utah Valley Regional Medical Center, and Western Virginia University Hospitals. We also thank the members of the GAPPS Study Group. See Supplemental Information for a complete list of the members of the GAPPS Study Group.

**FUNDING:** Supported by the US Department of Health and Human Services Agency for Healthcare Research and Quality and Centers for Medicare and Medicaid Services and by the Children’s Health Insurance Program Reauthorization Act of 2009 Pediatric Quality Measures Program Centers of Excellence under grant U18 HS

020513 (to Principal Investigator Dr Schuster). The content is solely the responsibility of the authors and does not necessarily represent the official views of the Agency for Healthcare Research and Quality.

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**TABLE 1**

All, Preventable, and High-Severity AEs per 1000 Patient Days by Race/Ethnicity

| Race/Ethnicity | Patient Records (*N* = 17 336), *n* (%) | All AEs | | Preventable AEs | | High-Severity AEs | |
|---|---|---|---|---|---|---|---|
| | | AEs per 1000 Patient Days (95% CI) | *P* | AEs per 1000 Patient Days (95% CI) | *P* | AEs per 1000 Patient Days (95% CI) | *P* |
| White | 11 238 (64.8) | 16.9 (14.7–19.5) | Reference | 8.9 (7.3–10.8) | Reference | 7.7 (6.3–9.6) | Reference |
| Black | 2558 (14.8) | 18.4 (13.8–24.5) | .61 | 5.9 (3.5–9.7) | .13 | 10.2 (6.9–14.9) | .22 |
| Latino | 2459 (14.2) | 30.1 (24.0–37.8) | <.001 | 15.9 (11.6–21.7) | .002 | 12.6 (8.9–17.9) | .02 |
| Other | 1081 (6.2) | 20.4 (13.4–30.9) | .41 | 11.1 (6.3–19.5) | .47 | 12.0 (7.0–20.7) | .14 |

**TABLE 2**

All, Preventable, and High-Severity AEs per 1000 Patient Days by Insurance Type

| Insurance | Patient Records (*N* = 19 030), *n* (%) | All AEs | | Preventable AEs | | High-Severity AEs | |
|---|---|---|---|---|---|---|---|
| | | AEs per 1000 Patient Days (95% CI) | *P* | AEs per 1000 Patient Days (95% CI) | *P* | AEs per 1000 Patient Days (95% CI) | *P* |
| Private | 10 883 (57.2) | 18.7 (16.2–21.4) | Reference | 8.5 (6.8–10.4) | Reference | 9.1 (7.4–11.1) | Reference |
| Public | 7630 (40.1) | 22.3 (19.1–25.9) | .09 | 12.1 (9.7–14.8) | .02 | 10 (7.8–12.5) | .55 |
| Self-pay/insurance | 517 (2.7) | 7.7 (2.1–19.8) | .08 | 3.9 (0.5–14.0) | .3 | 3.9 (0.5–14.0) | .23 |