Black Patients Are More Likely Than White Patients to Be in Hospitals with Worse Patient Safety Conditions

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Black and white patients receive different standards of care in the United States. This was true when the Institute of Medicine published *Unequal Treatment* in 2003, identifying differences in care by patient race and laying out policy proposals and guidelines aimed at narrowing these differences (Institute of Medicine 2003),[1] and this remains true today. In the 2019 Agency for Healthcare Research and Quality (AHRQ) disparities report, an annual assessment on disparities in medical care quality and access, Black patients received significantly worse quality of care relative to white patients in 82 out of 202 (or 40 percent of) quality measures (Agency for Healthcare Research and Quality 2020).

Identifying and reducing racial disparities in the quality of health care is a necessary (if insufficient) step toward reversing the effects of systemic racism on racial health inequities in America. This brief assesses the state of racial disparities in the quality of inpatient care using 11 AHRQ-developed patient safety quality indicators that measure rates of adverse patient safety events or hospital-acquired illnesses or injuries. Four of these measures center on general patient safety, and seven are related to risk of adverse events surrounding surgical procedures. This study investigates differences in Black and white patient safety measures using complete hospital discharge records from 26 states in 2017 and further examines whether some of these differences in patient safety quality between Black and white patients can be attributed to the hospitals into which they are admitted.

Key Findings

- For 6 out of 11 patient safety indicators, including 5 out of 7 surgery-related patient safety indicators, Black patients experienced significantly worse quality of care relative to white patients in 2017 across the 26 states in this analysis. White patients experienced significantly

worse quality of care on 2 patient safety indicators. Black and white patients experienced statistically similar quality of care on 3 of 11 patient safety indicators.

- Differences in patient safety measures among Black and white patients remained unchanged when limiting analyses to patients with coverage through Medicare, which accounts for the largest share of hospital admissions by payer.
- For 9 of 11 patient safety indicators, including 6 of 7 surgery-related patient safety indicators, Black patients were significantly less likely to be admitted into hospitals classified as "high quality" (i.e., hospitals best at minimizing patient safety risks based on the median value of each patient safety indicator). The differences in admissions into quality hospitals was large, with white patients being more than 9 percentage points more likely to be admitted into high-quality hospitals on four indicators and more than 7 percentage points more likely to be admitted into high-quality hospitals on six indicators.
- Relative to white patients, Black patients were significantly less likely to be admitted into hospitals classified as high quality for two or more of the four general patient safety indicator measures. Moreover, Black patients were 7.9 percentage points more likely than white patients to be admitted into hospitals considered low quality across all seven surgery-related patient safety measures and 4.9 percentage points less likely than white patients to be admitted into hospitals achieving high patient safety on all seven surgery-related measures.

Findings from this brief indicate that Black-white disparities in rates of adverse patient safety events remain prevalent in 2017 and that differences in the quality of hospitals into which Black and white patients are admitted continue to be a driver of overall disparities. Moreover, when using the median patient safety value to classify hospitals as high and low quality, the difference in patient safety rates between high- and low-quality hospitals exceeded the differences in the average patient safety rates between Black and white patients. Narrowing differences in the quality of hospitals that Black and white patients access will require either widening the racial mix of patients that high-quality hospitals serve to include more Black patients or reallocating or concentrating hospital resources to ensure that hospitals serving communities of color can improve patient safety conditions. This analysis finds that policies that help level differences in patient safety risks across hospitals could reduce disparities in hospital patient safety by race.

Background

Patient safety is a major dimension of hospital care quality. The Institute of Medicine defines patient safety as a metric inseparable from any discussion of the quality of care (Institute of Medicine 2000). Beginning in 2003, AHRQ and researchers at the UCSF-Stanford Evidence-Based Practice Center developed a set of patient safety measures aimed at maintaining face-validity in light of clinical and empirical literature as well as exhibiting minimum bias to differences in patient case mix (Farquhar 2008). Unlike other quality indicators, patient safety indicators do not depend on underlying patient health or the severity of conditions at admission and thus cannot be readily attributed to racial differences in

health, health behaviors, preventive care, or other components of health and health care determined before a hospital visit.[2] Thus, patient safety measures are powerful measures of hospital quality.

Black-white disparities in the quality of hospital care, specifically among patient safety indicators, have been well documented over the past decade and a half (Coffey, Andrews, and Moy 2005; Flores and Ngui 2006; Gaskin et al. 2011; Metersky et al. 2011; Okoroh, Uribe, and Weingart 2017; Romano et al. 2003; Shen et al. 2016). The underlying determinants of Black-white disparities in patient safety rates can be grouped into two categories. The first is differences in the overall quality of hospitals used by white patients versus Black patients and is the central focus of this study.[3] The second is differences in quality of care received by patients of different racial backgrounds *within* hospitals, which could be caused by implicit or unconscious biases, discrimination from health care providers, or other sources (van Ryn and Fu 2017). This second driver is not examined in this brief but will be addressed in a subsequent analysis.

Previous attempts to improve hospital-level patient safety quality through policy have fallen short. In 2008, Medicare stopped reimbursing hospitals for specific hospital-acquired conditions. This reduced payments negligibly and induced little motivation for improving quality of care (McNair, Luft, and Bindman 2009). Starting in 2015, the Affordable Care Act (ACA) penalized hospitals with a 1 percent reduction in Medicare payments if they were in the highest quartile for national risk-adjusted hospital-acquired conditions for the year. Although this penalty was much more financially burdensome for hospital systems, the policy has been found largely ineffective in reducing rates of hospital-acquired conditions, and researchers have argued that further penalizing hospitals unable to improve quality standards could actually exacerbate differences in care quality across hospitals (Sankaran et al. 2019; Sheetz et al. 2019).

Pre-ACA research found that rates of adverse patient safety events were generally greater in hospitals that had larger shares of Black patients, even after controlling for hospital characteristics (Hasnain-Wynia et al. 2007; Gaskin et al. 2011),[4] but found more modest differences in the quality of care among patients of different racial backgrounds receiving care in the same hospital (Gaskin et al. 2008). Surprisingly, despite many studies examining the effects of the ACA's coverage provisions on racial disparities in health insurance coverage and health care access and use (Buchmueller et al. 2016; Chen et al. 2016; Wehby and Lyu 2017), little research has examined racial disparities in hospital care quality since the ACA's passage. Findings in this analysis contribute to the literature by investigating patient safety disparities by race in 2017, three years after the implementation of the ACA's main coverage provisions and two years after the enforcement of major financial penalties for hospitals with the highest rates of hospital-acquired illnesses or injuries.

Data and Methods

This study uses discharge records from AHRQ's Healthcare Cost and Utilization Project state inpatient databases for 26 states in 2017.[5] Healthcare Cost and Utilization Project state inpatient databases contain a nearly full accounting of discharge records for all hospitals in the state. These databases include

patient information including age, hospital-coded race or ethnicity, the primary expected payer, total hospital charges, patient diagnostic and procedure codes, and length of stay. We acquired data from 26 states (AK, AR, AZ, CO, DC, DE, FL, GA, KS, KY, MA, MD, MI, MN, MS, NC, NJ, NE, NM, NV, OR, RI, SC, SD, UT, VT, WA, WI, and WV), with complete hospital discharge records for 2,347 hospitals.[6]

To assess quality of care, this study uses software developed by AHRQ to construct patient safety indicators.[7] AHRQ's patient safety indicators identify avoidable inpatient safety events. These measures are rates identifying counts of an adverse outcome per population at risk. We exclude measures related to mortality rates or obstetric care because these patient safety indicators apply to a significantly smaller subset of inpatient discharges. We also exclude a patient safety indicator assessing rates of retained surgical items or unretrieved device fragments because substantially fewer hospitals had the requisite number of at-risk discharges to construct these rates. Altogether, this study examines 11 patient safety indicators. Four of these measures are referred to as general patient safety indicators because they represent a broader set of illnesses or injuries that apply to a large share of inpatient discharges (pressure ulcer rate; iatrogenic pneumothorax rates; central venous catheter-related blood stream infection rates; and rates of in-hospital falls with hip fracture). The remaining seven measures are referred to as surgery-related patient safety indicators because they are related to inpatient illnesses or injuries acquired during or shortly after a surgical procedure.

AHRQ software identifies patients who experienced adverse safety events as well as all patients who were at risk of experiencing the adverse events, depending on the measure in question. Using this information, the rate of adverse patient safety events as a share of total at-risk discharges is calculated for each hospital, with hospitals with higher rates of adverse events classified as being lower quality. We exclude hospitals with fewer than 30 at-risk discharges (denominators for each patient safety indicator). Although most hospitals have enough discharges to construct rates for general patient safety indicators, fewer have enough requisite discharges for evaluating surgery-related patient safety indicators. Patient populations are restricted to patients age 19 or older who are classified as either non-Hispanic white or non-Hispanic Black.

Each patient safety indicator represents a unique assessment of hospital patient safety quality. For each measure, hospitals with rates above the median are classified as low-quality hospitals, and hospitals with rates at or below the median are classified as high-quality hospitals. Thus, hospitals identified as low quality for one patient safety indicator are not necessarily low quality for other indicators.

For each measure, we assess the share of Black patients and the share of white patients who are admitted into high-quality hospitals (i.e., hospitals demonstrated to have a lower share of patients experiencing adverse safety events). For each measure, Black and white patients are limited to those identified at risk of experiencing the adverse patient safety event (based on AHRQ definitions). For example, when assessing postoperative sepsis infection rates, at-risk patients are those with an elective surgical procedure on their discharge record, but this definition excludes patients with sepsis or related infections reported as the principle diagnosis or diagnosed as present at the time of admission and obstetric discharges.[8] Adjusted differences in Black-white admission rates into high-quality hospitals are estimated using a patient-level multivariate regression model that includes

indicators for the patient's race, age group (19–44; 45–64; 65–84; or 85 or older), and gender. Standard errors are clustered at the hospital level, the level of variation in patient safety quality assessed in this analysis.

The study examines two sensitivity tests to this main analysis. First, we restrict discharges to Medicare-covered patients to assess whether Black-white differences in access to high-quality hospitals are unchanged among those with this similar coverage type.[9] Second, we augment the main model to control for patient state of residence, which helps us assess to what degree Black-white disparities in hospital access are relevant at the local (substate) level.

To assess whether Black and white patients are admitted into hospitals that are classified as high-quality across several measures, we assess separate measures that identify hospitals that achieved patient safety rates below the median rate on multiple patient safety indicators. For the four general patient safety indicators, we construct four separate quality thresholds: hospitals that are high-quality in at least one, two, three, or all four general patient safety indicators. This measure excludes hospitals that have fewer than 30 at-risk admissions for any of the four general patient safety indicators, resulting in 2,262 total hospitals remaining in this analysis. Using a similar approach, seven quality thresholds are constructed from the surgery-related patient safety indicators, resulting in 1,196 hospitals remaining for this analysis. Black-white differences in admission rates to hospitals satisfying each of these measures are evaluated using an identical regression specification as those assessing differences in admission rates for individual patient safety indicators. This assessment across several measures uses *all* adult Black and white discharges (i.e., rather than excluding to at-risk populations for each individual patient safety indicator). Given markedly fewer hospitals have at least 30 at-risk discharges for all seven surgery-related patient safety indicators relative to those with at least 30 at-risk discharges for all four general patient safety indicators, one concern may be that the two sets of hospitals represent distinct patient populations or geographic locations. Appendix table A.1 examines this possibility by presenting means of hospital patient characteristics and state locations for these two groups of hospitals. Table A.1 indicates that the patient populations and geographic locations represented by these two groups of hospitals are nearly identical.

This analysis has several limitations. First, patient racial backgrounds are collected from hospital classification systems and are coded into broad categories on discharge records. Hospital-designated racial records may not match with self-identified patient racial or ethnic backgrounds, so important exceptions or exclusions to Black or white race designations may be unobserved in the data. Second, the analysis is limited to 26 states in 2017, and some of the largest states in the nation are not included here (e.g., CA, NY, TX, and IL). Moreover, this analysis uses data from three years before the COVID-19 pandemic, so many hospital protocols, including patient safety protocols, may have been significantly updated since this analysis. Thus, findings in this analysis may not generalize to other states or to more recent periods. Third, although analyses limited to Black and white patients with Medicare coverage are intended to assess differences in patient safety quality among older patients with similar insurance coverage, important differences in access remain among those with Medicare coverage. For example, there are critical differences in network size and payment rates among those

with Medicare Advantage and those with traditional Medicare, and these differences could be correlated with patient race. Fourth, this analysis provides evidence only of differences in hospital patient safety quality that arise because of differences *between* hospitals individuals are admitted into. Differences in hospital patient safety quality driven by differences occurring *within* hospitals is not addressed but remains an important potential driver in racial disparities in quality of care. Finally, although patient safety indicators represent standard measures of quality of patient safety care in hospitals, these measures are routinely being updated and refined to reflect new findings in clinical data (e.g., Romano et al. 2009). In recognition of this iterative process, patient safety indicators may imperfectly represent hospital patient safety quality in any given year.

Results

Differences in Patient Safety Rates between Black and White Patients

Table 1 shows Black and white patients experience two different levels of patient safety. The first column of table 1 presents rates of adverse patient safety outcomes for Black patients, reported as cases per 1,000 at-risk discharges. The second column presents regression-adjusted differences in patient safety indicators between Black and white patients, controlling for patient age and sex. Positive differences indicate a higher (worse) adverse patient safety rate for Black patients relative to white patients.

The top half of table 1 examines rates of patient safety indicators among Black patients and the adjusted Black-white differences in these rates among all adult patients. For 6 of the 11 measures, Black patients had significantly higher rates of adverse patient safety events relative to white patients. Five of these measures were surgery-related patient safety indicators. Some of these differences are meaningfully large. For example, per 1,000 at-risk Black inpatient discharges, 4.9 Black patients contracted postoperative sepsis. This rate is 2.2 cases per 1,000 at-risk discharges higher than the rate for white patients in the same age group and gender. For 3 of the 11 measures, Black patients and white patients experienced similar rates of adverse patient safety events. Finally, white patients had significantly higher rates of adverse patient safety events for two general patient safety indicators (iatrogenic pneumothorax and in-hospital falls with hip fracture). Table 1 indicates that Black patients experience systematically worse patient safety conditions relative to white patients, especially when undergoing inpatient surgical procedures. Notably, regression adjustments for patient age and gender yield nearly identical findings in direction and significance in Black and white differences in patient safety rates as the 2019 AHRQ disparities report, despite using fewer years of data (2017 versus 2016 and 2017), using fewer states, and not using AHRQ's risk-adjustment procedures.[10]

TABLE 1

Differences in Rates of Adverse Patient Safety Events between Black and White Adult Admissions, 2017

	Average rate among Black Patients (per 1,000 at-risk discharges)	Adjusted difference between Black and white patients (per 1,000 at-risk discharges)
All adult patients		
General patient safety indicators		
Pressure ulcer rate	1.22	0.05
Iatrogenic pneumothorax rate	0.14	-0.02**
Central venous catheter-related blood stream infection rate	0.18	0.06**
In-hospital fall with hip fracture rate	0.03	-0.04**
Surgery-related patient safety indicators		
Perioperative hemorrhage or hematoma rate	2.74	0.76**
Postoperative acute kidney injury requiring dialysis	1.03	0.37**
Postoperative respiratory failure rate	5.68	1.87**
Perioperative pulmonary embolism or deep vein thrombosis rate	5.08	2.30**
Postoperative sepsis rate	4.94	2.20**
Postoperative wound dehiscence rate	0.70	0.10
Abdominopelvic accidental puncture or laceration rate	1.02	0.11
Medicare patients		
General patient safety indicators		
Pressure ulcer rate	1.60	0.16
Iatrogenic pneumothorax rate	0.19	0.00
Central venous catheter-related blood stream infection rate	0.26	0.12**
In hospital fall with Hip Fracture Rate	0.05	-0.06**
Surgery-related patient safety indicators		
Perioperative hemorrhage or hematoma rate	3.07	0.91**
Postoperative acute kidney injury requiring dialysis	1.68	0.62**
Postoperative respiratory failure rate	8.60	2.74**
Perioperative pulmonary embolism or deep vein thrombosis rate	5.58	2.39**
Postoperative sepsis rate	7.28	3.14**
Postoperative wound dehiscence rate	1.06	0.17
Abdominopelvic accidental puncture or laceration rate	1.17	0.14

Source: 2017 SID discharges from AK, AR, AZ, CO, DC, DE, FL, GA, KS, KY, MA, MD, MI, MS, NC, NJ, NM, NV, OR, RI, SD, UT, VT, WA, WI, WV. Quality measures calculated using AHRQ SAS QI software version 2020.

Notes: Adjusted Black-white differences for patient safety control for patient age group and gender. A positive adjusted difference indicates worse patient safety rates for Black patients relative to white patients. Sample limited to adult patients. Standard errors are clustered at the hospital-level.

** Differences are statistically significant at the $p < 0.05$ level.

Table 1 also finds that, among Medicare-covered patients, just 1 of the 11 patient safety indicators is significantly worse for white patients relative to Black patients (in-hospital falls with hip fracture); all other differences are qualitatively unchanged.

Variation in Patient Safety Rates across Hospitals

Hospital-specific rates are constructed for each patient safety indicator. For each measure, hospitals are classified into high and low quality based on the median rate of the measure. Table 2 describes differences in patient safety rates between high- and low-quality hospitals. The first and second columns of table 2 present average rates of patient safety indicators for high- and low-quality hospitals, and the third column presents the difference in these rates. There are three major highlights. First, by construction, differences in patient safety rates between high- and low-quality hospitals are wide, demonstrating that patients who are admitted into high-quality hospitals can greatly minimize their risk of experiencing adverse patient safety events. Second, patient safety rates in high-quality hospitals for all four of the general patient safety indicators and for three of the surgery-related patient safety indicators are *zero*. Thus, hospital protocols and guidelines clearly exist that, when adhered to, can eliminate the patient risk for these adverse events. Third, for all patient safety indicators, the difference in quality measures between high- and low-quality hospitals exceeds the Black-white differences reported in table 1. That is, the disparity in patient safety indicators between hospitals is wider than disparities in patient safety by patient race.

Are Black and White Patients Admitted into Hospitals of Different Patient Safety Conditions?

The primary focus of this study is to assess whether Black and white patients are systematically admitted into hospitals with different overall patient safety conditions. Figure 1 presents the share of Black and white patients admitted into hospitals identified as high quality for each patient safety indicator. We further evaluate the adjusted difference between Black and white admission rates into high-quality hospitals using a regression analysis that includes controls for patient age and gender (table 3). The underlying estimates for figure 1 are presented in the first two columns of table 3. The third column presents the differences in admission rates between Black and white patients, and the fourth column presents the adjusted difference. The final column presents adjusted differences as a percentage of the share of white patients able to access high-quality hospitals.

TABLE 2

Differences in Hospital Rates of Adverse Patient Safety Events in High- and Low-Quality Hospitals, 2017

	Rates (per 1,000 at-risk discharges) in high-quality hospitals	Rates (per 1,000 at-risk discharges) in low-quality hospitals	Difference between high- and low- quality hospitals	Number of hospitals
General patient safety indicators				
Pressure ulcer rate	0.00	6.12	-6.12	2,274
Iatrogenic pneumothorax rate	0.00	0.38	-0.38	2,300
Central venous catheter-related blood stream infection rate	0.00	2.64	-2.64	2,281
In hospital fall with hip fracture rate	0.00	0.56	-0.56	2,293
Surgery-related patient safety indicators				
Perioperative hemorrhage or hematoma rate	0.09	3.18	-3.09	1,498
Postoperative acute kidney injury requiring dialysis	0.00	2.33	-2.33	1,373
Postoperative respiratory failure rate	0.66	9.92	-9.26	1,333
Perioperative pulmonary embolism or deep vein thrombosis rate	0.40	5.58	-5.17	1,502
Postoperative sepsis rate	0.22	8.19	-7.98	1,329
Postoperative wound dehiscence rate	0.00	2.84	-2.84	1,278
Abdominopelvic accidental puncture or laceration rate	0.00	2.02	-2.02	1,497

Source: 2017 SID discharges from AK, AR, AZ, CO, DC, DE, FL, GA, KS, KY, MA, MD, MI, MS, NC, NJ, NM, NV, OR, RI, SD, UT, VT, WA, WI, WV. Quality measures calculated using AHRQ SAS QI software version 2020.

Notes: High-quality hospitals have patient safety indicator rates below the median hospital rate across all hospitals for each measure. Low-quality hospitals have patient safety indicator rates above the median rate across all hospitals. Discharges for calculation of adverse patient safety rates restricted to age 19 or older. Sample excludes hospitals with fewer than 30 discharges at risk of an adverse event for any individual patient safety measure.

TABLE 3

Differences in Black and White Admission Rates into High-Quality Hospitals

	Share of Black patients (%)	Share of white patients (%)	Difference (percentage points)	Adjusted difference (percentage points)	Adjusted difference (% change relative to white patients)
General patient safety indicators					
Pressure ulcer rate	15.3	21.2	-5.9	-6.8**	-31.9%**
Iatrogenic pneumothorax rate	25.2	32.1	-6.9	-7.3**	-22.8%**
Central venous catheter-related blood stream infection rate	44.8	54.4	-9.6	-9.5**	-17.5%**
In hospital fall with hip fracture rate	54.0	52.4	1.6	1.2	2.3%
Surgery-related patient safety indicators					
Perioperative hemorrhage or hematoma rate	17.7	23.7	-6.0	-5.9**	-25.0%**
Postoperative acute kidney injury requiring dialysis	31.0	37.7	-6.7	-7.0**	-18.5%**
Postoperative respiratory failure rate	31.0	42.5	-11.5	-10.8**	-25.5%**
Perioperative pulmonary embolism or deep vein thrombosis rate	17.4	30.1	-12.7	-12.6**	-41.7%**
Postoperative sepsis rate	21.3	30.9	-9.7	-9.6**	-30.9%**
Postoperative wound dehiscence rate	46.8	50.3	-3.5	-3.7	-7.3%
Abdominopelvic accidental puncture or laceration rate	27.4	33.0	-5.6	-5.8**	-17.4%**

Source: 2017 SID discharges from AK, AR, AZ, CO, DC, DE, FL, GA, KS, KY, MA, MD, MI, MS, NC, NJ, NM, NV, OR, RI, SD, UT, VT, WA, WI, WV. Quality measures calculated using AHRQ SAS QI software version 2020.

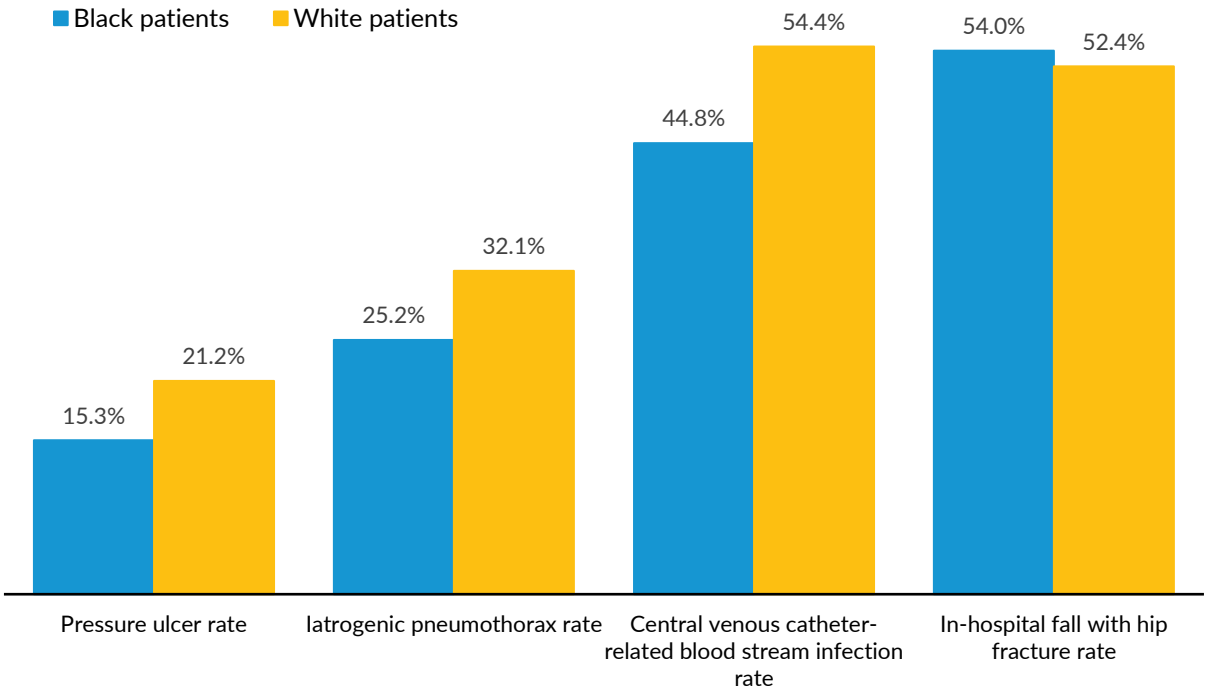
Notes: High-quality hospitals have patient safety indicator rates below the median hospital rate across all hospitals for each measure. Discharges restricted to patients ages 19 or older. Adjusted differences include controls for patient age-group and gender. Standard errors are clustered at the hospital-level.

** Differences are statistically significant at the $p < 0.05$ level.

Figure 1 describes the likelihood of being admitted into high-quality hospitals by race among the four general patient safety indicators. For three of the four measures, white patients (yellow bars) are more likely to be admitted into high-quality hospitals relative to Black patients (blue bars). Table 3 shows that Black patients are 5.9, 6.9, and 9.6 percentage points less likely to be admitted into hospitals that are best at preventing pressure ulcers, iatrogenic pneumothorax, and catheter-related blood stream infections, respectively. Accounting for differences in patient age and gender has almost no impact on these differences, and each of these differences is statistically significant. Moreover, these differences are large, with Black patients 31.9 and 22.8 percent less likely to be admitted into hospitals that are considered high quality in terms of preventing pressure ulcers and iatrogenic pneumothorax, respectively, relative to white patients. Although Black patients are slightly more likely to be admitted to hospitals that are better at preventing in-hospital falls with hip fracture relative to white patients, the estimated difference is not statistically significant.

FIGURE 1

Share of Black and White Patients Admitted into High-Quality Hospitals among General Patient Safety Indicators



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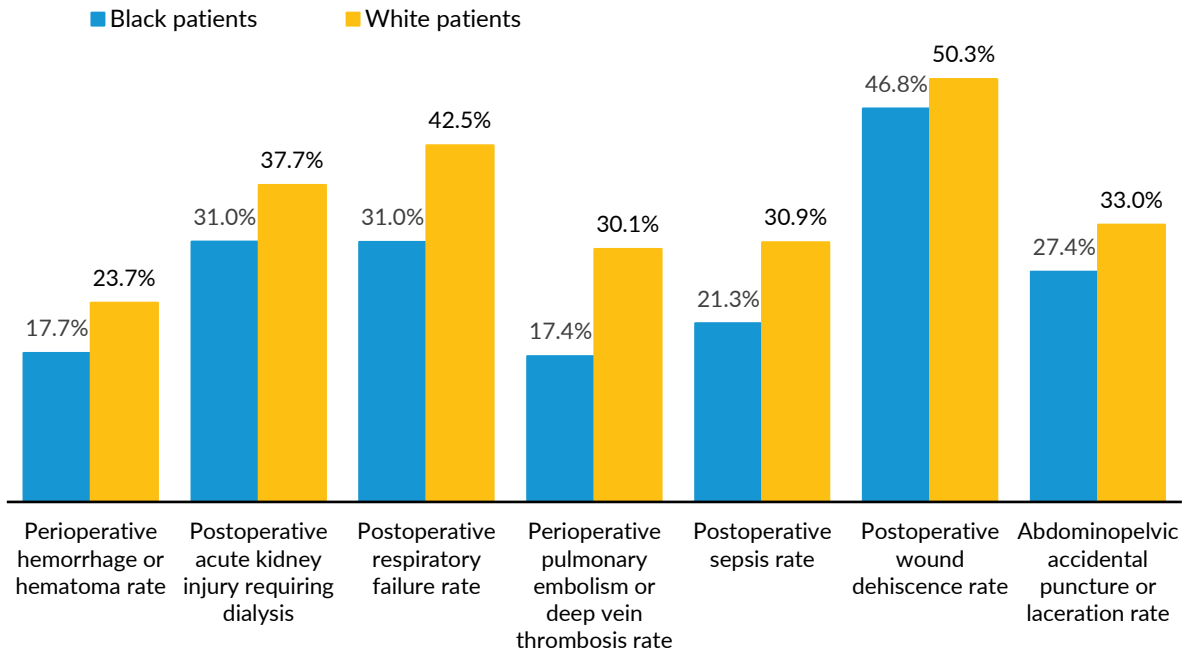
Source: 2017 SID discharges from AK, AR, AZ, CO, DC, DE, FL, GA, KS, KY, MA, MD, MI, MS, NC, NJ, NM, NV, OR, RI, SD, UT, VT, WA, WI, WV. Quality measures calculated using AHRQ SAS QI software version 2020.
Notes: High-quality hospitals have patient safety indicator rates at or below the median hospital rate across all hospitals for each measure. Discharges restricted to patients ages 19 or older. Bars represent share of patient population admitted into high-quality hospitals for each measure.

FIGURE 2

Share of Black and White Patients Admitted into High-Quality Hospitals Among Surgery-Related Patient Safety Indicators



URBAN INSTITUTE

Source: 2017 SID discharges from AK, AR, AZ, CO, DC, DE, FL, GA, KS, KY, MA, MD, MI, MS, NC, NJ, NM, NV, OR, RI, SD, UT, VT, WA, WI, WV. Quality measures calculated using AHRQ SAS QI software version 2020.

Notes: High-quality hospitals have patient safety indicator rates at or below the median hospital rate across all hospitals for each measure. Discharges restricted to patients ages 19 or older. Bars represent share of patient population admitted into high-quality hospitals for each measure.

Figure 2 presents differences in the likelihood of being admitted into high-quality hospitals by race among the seven surgery-related patient safety indicators. Patterns across all measures present essentially the same result: relative to white patients, Black patients are less able to access hospitals that are best at minimizing avoidable illness and injuries acquired during or after surgery.

Table 3 shows that six out of seven of the adjusted differences in admission rates to high-quality hospitals for surgery-related measures are statistically significant, with only the likelihood of admission into hospitals best at preventing postoperative wound dehiscence being statistically similar between Black and white patients. Several of these differences are very large. Black patients are 25.5 percent and 41.7 percent less likely to be admitted into hospitals effective at preventing postoperative respiratory failure and perioperative pulmonary embolism relative to white patients. They are 30.9 percent less likely than white patients to be admitted into hospitals that are effective at preventing postoperative sepsis infections. Black patients are 7.0 and 5.8 percentage points (18.5 and 17.4 percent) less likely to be admitted into hospitals effective at preventing postoperative kidney injuries requiring dialysis and abdominopelvic accidental punctures, which is noteworthy because high-quality hospitals can virtually eliminate patient risks for these measures, as seen in table 2.

TABLE 4

Sensitivity Analysis for Differences in Black and White Admission Rates into High-Quality Hospitals

Black-white adjusted difference in admission rates into high-quality hospitals (percentage points)	Main estimates from table 3	Among Medicare patients only	Adjusting for state of residence
General patient safety indicators			
Pressure ulcer rate	-6.8**	-7.0**	-5.4**
Iatrogenic pneumothorax rate	-7.3**	-7.1**	-3.5**
Central venous catheter-related blood stream infection rate	-9.5**	-9.1**	-5.0**
In hospital fall with hip fracture rate	1.2	1.3	2.6
Surgery-related patient safety indicators			
Perioperative hemorrhage or hematoma rate	-5.9**	-5.8**	-1.4
Postoperative acute kidney injury requiring dialysis	-7.0**	-7.8**	-1.1
Postoperative respiratory failure rate	-10.8**	-9.9**	-3.7**
Perioperative pulmonary embolism or deep vein thrombosis rate	-12.6**	-12.7**	-4.8**
Postoperative sepsis rate	-9.6**	-9.9**	-4.4**
Postoperative wound dehiscence rate	-3.7	-3.9	-1.6
Abdominopelvic accidental puncture or laceration rate	-5.8**	-5.6**	-0.5

Source: 2017 SID discharges from AK, AR, AZ, CO, DC, DE, FL, GA, KS, KY, MA, MD, MI, MS, NC, NJ, NM, NV, OR, RI, SD, UT, VT, WA, WI, WV. Quality measures calculated using AHRQ SAS QI software version 2020.

Notes: High-quality hospitals have patient safety indicator rates below the median hospital rate across all hospitals for each measure. Discharges restricted to patients ages 19 or older with Medicare coverage. Shares and difference estimates in the main specification (first column) are adjusted for patient age-group and gender. Adjusted differences in the second column use the same specification of the main model but restrict analysis to patients with Medicare coverage. Adjusted differences in the third column use all patients and adjusts for patient age-group, gender, and state of residence. Standard errors are clustered at the hospital-level.

** Differences are statistically significant at the $p < 0.05$ level.

Table 4 assesses whether the main results in table 3 are sensitive to two separate changes. First, discharges are restricted to Black and white patients with Medicare coverage. Differences in admission rates between Black and white patients may be driven in part by systematic differences in payer type and or differences in network sizes. Thus, restricting the sample to those with Medicare coverage helps narrow (but does not eliminate) differences in these potential drivers. Second, the main model is augmented to adjust for patient state of residence, restricting comparisons to differences in Black and white admission rates among those living in the same state. Black-white differences in admission rates to high- and low-quality hospitals may be smaller in local areas. Specifically, high- or low-quality hospitals may be concentrated in certain states, and therefore Black and white differences in admission rates to high-quality hospitals among patients living in the same state could be more muted (e.g., if all hospitals in a state have similar rates of adverse events, and if Black and white patients received inpatient care within state borders, we would observe no differences in Black-white admission rates to high- or low-quality hospitals in that state).

Table 4 demonstrates that even after limiting to Medicare-covered patients, major differences remain in the types of hospitals Black and white patients access, and Black-white differences in admission to high-quality hospitals are largely unaffected by restricting the analysis to patients with this coverage type. For example, where Black patients were estimated to be 6.8 percentage points less likely than white patients to be admitted into a high-quality hospital that prevents pressure ulcers, Black patients with Medicare are 7.0 percentage points less likely than white patients with Medicare to be admitted into these hospitals.

Important differences emerge when adjusting differences for patient state of residence. Relative to the main estimates in the first column of table 4, the inclusion of state controls (column three) leads to no change in the direction of these estimates. However, most estimates are smaller in magnitude, and six of these estimates are statistically significant (relative to nine statistically significant estimates in the main analysis). When comparing among patients residing in the same state, Black-white differences in admission rates to hospitals classified as high quality in preventing perioperative hemorrhage and postoperative acute kidney injury are statistically insignificant. Still, Black-white differences in admission rates to high-quality hospitals persist on many measures even when making comparisons among patients in the same state. Altogether, this suggests that some of the Black-white differences in admissions to high-quality hospitals stem from the lack of availability of high-quality hospitals in states where greater shares of Black patients live.

Hospitals classified as high quality for one patient safety indicator may be low quality for other measures, so these findings on differences in admissions into high-quality versus low-quality hospitals for individual patient safety measures may not generalize to differences in admissions into hospitals that are generally considered unsafe across several indicators. This issue may be particularly true of patient safety measures with low numbers of total adverse events, because a single adverse event for one measure could drive a hospital from a high-quality to a low-quality classification. To address this, table 5 assesses differences in the Black-white admission rates to hospitals that are classified as high-

quality hospitals across several patient safety indicators (i.e., those that achieved rates of adverse patient safety events below the median rate on multiple measures).

TABLE 5

Differences in Black and White Admission Rates into Hospitals Designated as High Quality Across Multiple Patient Safety Indicators

	Number of hospitals	Share of hospitals (%)	Adjusted Black-white difference in admission rates (percentage points)
General patient safety indicators			
High-quality hospital in at least 1 general patient safety indicator	2,097	93	-0.4
High-quality hospital in at least 2 general patient safety indicators	1,849	82	-9.1**
High-quality hospital in at least 3 general patient safety indicators	1,521	67	-8.9**
High-quality hospital for all 4 general patient safety indicators	968	43	-3.5**
Surgery-related patient safety indicators			
High-quality hospital in at least 1 surgery patient safety indicator	1,106	93	-7.9**
High-quality hospital in at least 2 surgery patient safety indicators	949	79	-9.1**
High-quality hospital in at least 3 surgery patient safety indicators	803	67	-8.5**
High-quality hospital in at least 4 surgery patient safety indicators	633	53	-7.8**
High-quality hospital in at least 5 surgery patient safety indicators	451	38	-6.1**
High-quality hospital in at least 6 surgery patient safety indicators	292	24	-5.5**
High-quality hospital for all 7 surgery patient safety indicators	166	14	-4.9**

Source: 2017 SID discharges from AK, AR, AZ, CO, DC, DE, FL, GA, KS, KY, MA, MD, MI, MS, NC, NJ, NM, NV, OR, RI, SD, UT, VT, WA, WI, WV. Quality measures calculated using AHRQ SAS QI software version 2020.

Notes: High-quality hospitals have rates of adverse patient safety events below the median hospital rate. Hospitals restricted to those that have at least 30 admissions at risk for each individual measure across all four general patient safety indicators (2,262 hospitals) or across all seven surgery-related patient safety indicators (1,196 hospitals). Black and white patients from all available discharges in these hospitals are used to assess adjusted difference in admission rates. Adjusted differences control for patient age-group and gender. Standard errors are clustered at the hospital level.

** Differences are statistically significant at the $p < 0.05$ level.

The top half of the table groups the four general patient safety indicators and creates four thresholds of quality: hospitals that are considered high-quality in at least one, two, three, or all four general patient safety indicators. The bottom half similarly constructs seven quality thresholds across the seven surgery-related patient safety indicators. As with analyses in table 3 and 4, differences in Black-white admission rates are adjusted for patient age group and gender.

About 93 percent of hospitals (2,097 hospitals) in this analysis were classified as high-quality hospitals in at least one of the four general patient safety indicators. There is no significant difference in Black and white admission rates to these hospitals. However, relative to white patients, Black patients are significantly less likely to be admitted into hospitals meeting greater quality standards. Black patients are 9.1 and 8.9 percentage points less likely to be admitted into hospitals classified as high quality on at least two and at least three measures, respectively. About 43 percent of hospitals were classified as high quality across all four patient safety indicators. Black patients are 3.5 percentage points less likely to be admitted into these hospitals relative to white patients.

An estimated 1,106 hospitals were classified as high quality for at least one of seven of patient safety indicators related to surgical procedures. Black patients were 7.9 percentage points less likely to be admitted into these hospitals. Put similarly, just 7 percent of hospitals (90 hospitals) had adverse patient safety rates above the median hospital rate across *all* seven surgery-related patient safety indicators, and Black patients were much more likely to be admitted into those hospitals than white patients. Relative to white patients, Black patients are significantly less likely to be admitted into hospitals achieving high-quality patient safety measures across several surgery-related patient safety indicators. Nearly 4 in 10 hospitals (38 percent of hospitals) were classified as high quality on at least five of seven surgery-related patient safety indicators, and Black patients were 6.1 percentage points less likely to be admitted into these hospitals. This evidence suggests that relative to white patients, Black patients are simultaneously *less* likely to access hospitals that are best in minimizing adverse surgery-related patient safety events across all or most criteria and *more* likely to be admitted into hospitals classified as low quality across several surgery-related patient safety measures.

Discussion

This study finds that Black and white patients face different standards of patient safety and that some of this disparity can be attributed to differences in the quality of hospitals patients access. Black-white disparities in patient safety are larger for quality measures surrounding surgical procedures, and Black patients are significantly less likely than white patients to access the hospitals best able to minimize these adverse surgery-related patient safety risks. For several of these measures, Black patients are more than 25 percent less likely to be admitted into high-quality hospitals relative to white patients. Differences in patient age, gender, and Medicare coverage rates by race fail to account for these disparities in patient safety as well as differences in the quality of hospitals Black and white patients access. When comparing Black-white differences in admission rates to high-quality hospitals among patients living in the same state, these differences are smaller but persist. These findings are consistent with several pre-ACA studies concluding that a significant component of racial disparities in

the quality of care is attributable to differences in where patients of color receive care (Baicker, Chandra, and Skinner 2005; Barnato et al. 2005; Hasnain-Wynia et al. 2007). That these differences continue to exist by patient race more than a decade later, and that they continue to be correlated with differences in the institutions where patients receive medical care, suggests that policy has either been ineffective or sluggish in addressing these inequities.

Disparities in patient safety by race are unacceptable symptoms of unequal health care in America. Moreover, these differences are addressable, as this analysis shows that many hospitals have been successful in eliminating adverse events across many measures of patient safety. Thus, factors that expand patient access to high-quality hospitals could contribute to reducing patient safety disparities. We observe little change in disparities in patient safety even when restricting our focus to Medicare-covered patients, indicating that even that program, which is the largest payer of inpatient admissions and for many enrollees pays approximately equal prices for inpatient services, exhibits unequal patient safety conditions among its Black and white enrollees.[11]

Patients often use the nearest hospital facilities for care, particularly for urgent conditions, and thus may not be able to choose high-quality hospitals even if they are available. Thus, improving access to high-quality hospital care may require bolder policies beyond health care–specific policies to enable patients to reside closer to high-quality hospital facilities than they otherwise would. Housing policies such as inclusionary zoning, low-income housing tax credits, and rental assistance would help make access to better neighborhoods affordable to vulnerable populations and disadvantaged minorities, which, in turn, could reduce the differences in travel distances to high-quality hospitals by race and ethnicity. Still, recent analysis of heart attack patients finds that Black patients receive care at lower-performing hospitals relative to white patients, even when living in the same zip code or hospital market as white patients (Chandra, Kakani, and Sacarny 2020), suggesting a limit to the effectiveness of leveling neighborhood quality on reducing racial disparities in care through this mechanism alone. Moreover, our analysis finds that disparities in Black-white access to high-quality hospitals narrows when comparing Black and white patients in the same state, suggesting that the availability of high-quality hospitals differs greatly across states and that such hospitals have more limited availability in states with larger shares of Black patients. Thus, addressing local inequities in access to quality hospitals is unlikely to reduce racial differences exhibited across large geographic regions.

Finally, absent improving access to high-quality hospitals, policy changes are needed that improve the quality of care in hospitals serving communities of color. Several studies have found that penalizing hospitals for having worse relative measures of hospital-acquired conditions is ineffective in improving these outcomes (Sheetz et al. 2019). An alternative strategy for improving patient safety standards in low-quality hospitals could be to dedicate resources to such hospitals to help them adopt and implement protocols that prevent adverse patient safety events from occurring.

Although this study provides evidence that differences in quality between hospitals are contributing toward racial disparities in the quality of care, it does not address potential drivers of disparities stemming from differences in the quality of care within hospitals. Discriminatory practices within institutions have been associated with lower quality of care by patient race for some outcomes, such as inpatient mortality rates for common urgent conditions such as acute myocardial infarction,

congestive heart failure, and pneumonia (Hasnain-Wynia et al. 2007). Differences in patient safety rates that Black and white patients experience within the *same* hospital will be investigated in a subsequent analysis, because policies aimed at reducing within-hospital disparities in care, such as physician bias training, are distinct from proposed policies that would be effective in reducing differences in the quality of care between hospitals.

Appendix

TABLE A.1

Summary of Hospital Patient Characteristics and Hospital Location, among Hospitals with at Least 30 At-Risk Discharges for All Four General Patient Safety Indicators or at Least 30 At-Risk Discharges for All Seven Surgery-Related Patient Safety Indicators

	Hospitals with at least 30 at-risk discharges for all four general patient safety indicators	Hospitals with at least 30 at-risk discharges for all seven surgery patient safety indicators
Number of hospitals	2,262	1,196
Characteristics of patients		
Male	0.440	0.440
Non-Hispanic white	0.662	0.662
Non-Hispanic Black	0.160	0.160
Hispanic	0.096	0.096
Age 0–18	0.148	0.149
Age 19–44	0.235	0.235
Age 45–64	0.245	0.245
Age 65–84	0.291	0.290
Age 85 or older	0.081	0.081
Medicare coverage	0.412	0.412
Medicaid coverage	0.220	0.220
Private coverage	0.290	0.290
Self-pay/uninsured	0.076	0.076
State		
Alaska	0.004	0.004
Arkansas	0.026	0.027
Arizona	0.048	0.048
Colorado	0.032	0.032
Washington DC	0.009	0.009
Delaware	0.008	0.008
Florida	0.191	0.191
Georgia	0.073	0.073
Kansas	0.021	0.021
Kentucky	0.040	0.040
Massachusetts	0.054	0.054
Maryland	0.041	0.041
Michigan	0.083	0.083
Mississippi	0.026	0.026
North Carolina	0.075	0.075
New Jersey	0.064	0.064
New Mexico	0.014	0.014
Nevada	0.024	0.024
Oregon	0.025	0.025

	Hospitals with at least 30 at-risk discharges for all four general patient safety indicators	Hospitals with at least 30 at-risk discharges for all seven surgery patient safety indicators
Rhode Island	0.009	0.009
South Dakota	0.007	0.007
Utah	0.019	0.020
Vermont	0.004	0.004
Washington	0.044	0.044
Wisconsin	0.040	0.040
West Virginia	0.017	0.017

Source: 2017 SID discharges from AK, AR, AZ, CO, DC, DE, FL, GA, KS, KY, MA, MD, MI, MS, NC, NJ, NM, NV, OR, RI, SD, UT, VT, WA, WI, WV. Discharges at risk for patient safety indicators calculated using AHRQ SAS QI software version 2020.
Notes: Hospital-level estimates are weighted by the number of inpatient discharges.

Notes

[1] Throughout this study, "Black patients" refers to non-Hispanic Black patients, and "white patients" refers to non-Hispanic white patients.

[2] AHRQ quality-assessment software includes risk-adjustment procedures that adjust patient safety quality indicators for various patient factors that could be correlated with a heightened risk for experiencing an adverse safety event (e.g., age, gender, AHRQ-classified patient illness or injury severity and mortality risk). For transparency, this study does not use risk-adjustment procedures directly but rather uses unadjusted rates of adverse patient safety events and uses multivariate regression approach to explicitly control for factors that predicted to result in differential exposure to adverse events (i.e., age and gender) by patient race.

[3] This study focuses on gap in patient safety quality between Black patients and white patients; we aim to assess such disparities between Hispanic and white patients and Native American or Alaska Native and white patients in future analysis. Black-white disparities are prevalent over a larger share of quality measures relative to all other racial and ethnic differences, although sizeable differences remain in quality measures between Hispanic and white patients as well between Native American or Alaska Native and white patients (AHRQ 2020).

[4] Gaskin et al. (2011) found little association between patient safety rates and hospitals with larger patient shares of Hispanic ethnicity or Asian descent.

[5] "HCUP State Inpatient Databases (SID)," Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality, 2017, https://www.hcup-us.ahrq.gov/db/state/siddbdocumentation.jsp.

[6] This analysis is limited to states that had inpatient databases available for purchase through AHRQ on August 2020 and had requisite data elements for calculating AHRQ patient safety indicators. We exclude Iowa, Minnesota, and Nebraska from the analysis because these state inpatient databases do not separate discharge data by hospital. Discharge data from Maine do not identify patient racial or ethnic background and are therefore excluded from the analysis. Discharge data from South Carolina do not identify patient age and are therefore excluded from the analysis. New York currently has 2017 inpatient data available through AHRQ, but this database was not available when the data were acquired.

[7] See https://www.qualityindicators.ahrq.gov/.

[8] See "Patient Safety Indicator 13 (PSI 13) Postoperative Sepsis Rate," Agency for Healthcare Research and Quality, June 2017, https://www.qualityindicators.ahrq.gov/Downloads/Modules/PSI/V60-ICD09/TechSpecs/PSI_13_Postoperative_Sepsis_Rate.pdf.

[9] Healthcare Cost and Utilization Project data provide information on the primary payer for each discharge. Therefore, limiting analyses to patients with Medicare as their listed primary payer may include disabled patients that have both Medicare and Medicaid coverage.

[10] Findings in table 1 are consistent with the 2019 AHRQ Disparities Report (AHRQ 2020, table 1), which used data from 2016 and 2017 in all Healthcare Cost and Utilization Project participating states and incorporated a risk-adjustment methodology for its rate. As with this analysis, the 2019 AHRQ Disparities report found that Black patients had significantly better (lower) rates of iatrogenic pneumothorax and in-hospital falls with hip fracture; Black-white differences for postoperative wound dehiscence and abdominopelvic accidental puncture or lacerate rates were statistically insignificant; and the Black patients had significantly worse (higher) rates of all remaining Patient Safety Indicators. However, the AHRQ report finds that Black patients experienced significantly higher rates of pressure ulcers relative to white patients. This study finds that although Black patients have higher rates of pressure ulcers relative to white patients, the difference is not statistically significant.

[11] Although no differences in Black-white disparities are observed when limiting patients to those with Medicare coverage, this finding does not rule out racial differences in insurance coverage and type as potential drivers of patient safety disparities. Spencer, Gaskin, and Roberts (2013) concluded that patients with different insurers experienced different rates of quality of care *within* the same hospital. Risk-adjusted mortality rates for surgical procedures for Medicare, Medicaid, and other payer or uninsured payments were greater relative to patients with private insurers in the same hospitals. Differences were particularly large for low payment coverage or uninsured patients, suggesting that ACA provisions aimed at improving coverage rates may serve to reduce *within*-hospital differences in the quality of care.

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