Published in final edited form as:
Ann Thorac Surg. 2012 December ; 94(6): . doi:10.1016/j.athoracsur.2012.05.124.

Effect of Sex and Race on Outcome in Patients Undergoing Congenital Heart Surgery: An Analysis of The Society of Thoracic Surgeons Congenital Heart Surgery Database

Daniel J. DiBardino, MD, **Sara K. Pasquali, MD, MHS**, **Jennifer C. Hirsch, MD, MS**, **Daniel K. Benjamin, PhD**, **Kellianne C. Kleeman, BS**, **Jorge D. Salazar, MD**, **Marshall L. Jacobs, MD**, **John E. Mayer, MD**, and **Jeffrey P. Jacobs, MD**
Division of Congenital Heart Surgery, Blair E. Batson Children's Hospital, University of Mississippi School of Medicine, Jackson, Mississippi; Department of Pediatrics, Duke University School of Medicine, Duke Clinical Research Institute, Duke University Medical Center, Durham, North Carolina; Department of Cardiac Surgery, University of Michigan Medical School, Ann Arbor, Michigan; Department of Pediatric and Congenital Heart Surgery, Cleveland Clinic, Cleveland, Ohio; Children's Hospital Boston, Harvard Medical School, Boston, Massachusetts; The Congenital Heart Institute of Florida, All Children's Hospital, University of South Florida College of Medicine, Cardiac Surgical Associates of Florida, St. Petersburg and Tampa, Florida

Abstract

Background—Previous studies on the impact of race and sex on outcome in children undergoing cardiac operations were based on analyses of administrative claims data. This study uses clinical registry data to examine potential associations of sex and race with outcomes in congenital cardiac operations, including in-hospital mortality, postoperative length of stay (LOS), and complications.

Methods—The Society of Thoracic Surgeons Congenital Heart Surgery Database (STS-CHSD) was queried for patients younger than 18 years undergoing cardiac operations from 2007 to 2009. Preoperative, operative, and outcome data were collected on 20,399 patients from 49 centers. In multivariable analysis, the association of race and sex with outcome was examined, adjusting for patient characteristics, operative risk (Society of Thoracic Surgeons–European Association for Cardiothoracic Surgery [STAT] mortality category), and operating center.

Results—Median age at operation was 0.4 years (inter-quartile range 0.1–3.4 years), and 54.4% of patients were boys. Race/ethnicity included 54.9% white, 17.1% black, 16.4% Hispanic, and 11.7% "other." In adjusted analysis, black patients had significantly higher in-hospital mortality (odds ratio [OR], 1.67; 95% confidence interval [CI], 1.37–2.04; $p < 0.001$) and complication rate (OR, 1.15; 95% CI, 1.04–1.26; $p < 0.01$) in comparison with white patients. There was no significant difference in mortality or complications by sex. Girls had a shorter LOS than boys (−0.8 days; $p < 0.001$), whereas black (+2.4 days; $p < 0.001$) and Hispanic patients (0.9 days; $p < 0.01$) had longer a LOS compared with white patients.

Conclusions—These data suggest that black children have higher mortality, a longer LOS, and an increased complication rate. Girls had outcomes similar to those of boys but with a shorter LOS

Address correspondence to Dr DiBardino, Division of Pediatric and Congenital Heart Surgery, Department of Surgery, 2500 N State St, Jackson, MS 39216; daniel.dibardino@gmail.com.

Presented at the Forty-eighth Annual Meeting of The Society of Thoracic Surgeons, Fort Lauderdale, FL, Jan 28–Feb 1, 2012. Winner of a Richard E. Clark Award.

of almost a day. Further study of potential causes underlying these race and sex differences is warranted.

Knowledge concerning the potential associations of sex and race with outcomes after congenital cardiac operations is limited. In the domain of adult cardiac operations for acquired heart disease, associations of sex and race with outcomes have been studied more extensively, and many of these studies have used data from the Society of Thoracic Surgeons (STS) Adult Cardiac Surgery Database [1–4]. For pediatric patients undergoing cardiac operations, several recent studies have examined potential associations between in-hospital mortality and patient sex and race/ethnicity [5–16]. The majority of these studies have based their inferences on analyses of statewide or nationwide administrative claims databases, which collect data from hospital billing records regarding International Classification of Diseases, 9th revision (ICD-9) diagnostic and procedural codes to identify cases of interest. Other studies have used birth defect registries, which also use the ICD-9 coding system [17]. Previous analyses have suggested important limitations of administrative databases and the ICD-9 coding system in regard to pediatric cardiac case ascertainment [18–20]. To our knowledge, the association of patient race and sex with outcome has not been previously studied in a clinical registry specific to congenital heart disease. A better understanding of potential disparities in outcomes across race and sex is a necessary first step toward further study of the mechanisms underlying these differences. Thus the purpose of the present study was to use a large national multiinstitutional clinical database to investigate the potential associations of sex and race/ethnicity with outcomes after congenital cardiac operations, including operative mortality, postoperative length of stay (LOS), and occurrence of complications.

Patients and Methods

Data Source

The STS Congenital Heart Surgery Database (STS-CHSD) was used for this study. The STS-CHSD contains preoperative, operative, and outcomes data on all children undergoing cardiac operations at participating centers and currently represents more than 80% of all US centers performing pediatric cardiac operations [21]. Diagnoses and procedures are coded by clinicians and affiliated personnel using the International Pediatric and Congenital Cardiac Code, which was developed through a collaborative effort of an international group of pediatric cardiologists and congenital heart surgeons [22]. Data quality and reliability are evaluated through intrinsic verification of data (eg, identification and correction of missing/out of range values and inconsistencies in values across fields), and a formal process of site visits and data audits conducted by a panel of independent data quality personnel and pediatric cardiac surgeons at 6 randomly chosen institutions annually [23, 24]. The Duke Clinical Research Institute serves as the data warehouse and analytic center for all of the STS National Databases. This study was approved by the Duke University Medical Center Institutional Review Board with waiver of informed consent and by the Access and Publications Committee of the STS Workforce for National Databases.

Study Population

Ninety-eight centers submitted data from January 1, 2007 to December 31, 2009 from patients less than 18 years of age undergoing any cardiovascular operation classified in the Society of Thoracic Surgeons–European Association for Cardiothoracic Surgery (STAT) mortality categories (category 1 = lowest mortality risk, category 5 = highest mortality risk) [25]. This risk stratification system was recently developed based on empirical data from nearly 80,000 patients and is able to classify greater numbers of operations compared with other risk stratification systems. We have previously described the individual operations that

compose each of the STAT mortality categories [25]. For the present study, centers with more than 15% missing data for the study variables (n = 26), and centers (n = 4) with very small sample size (<5 operations during the entire study period) were excluded. Although the STS-CHSD contains nearly complete data for the standard core data fields required to calculate in-hospital mortality, not all centers submit complete data for the other variables, such as patient preoperative factors and complications. Therefore it is standard practice to exclude centers with more than 15% missing data for key study variables to maximize data integrity and minimize missing data. From the 49 remaining centers, patients with missing data for any study variable were excluded. Of note, in-hospital mortality in patients in our study was similar to the overall cohort of patients undergoing congenital cardiac operations during the study period (4.3% versus 4.0%).

Data Collection

Data collected included patient age, sex, weight, race, presence of any noncardiac abnormality/genetic syndrome or other preoperative risk factor (including cardiovascular, respiratory, neurologic, renal, hematologic, and infectious conditions) as defined in the STS-CHSD [26]. The index cardiac operation performed during a given hospitalization was classified by the STAT mortality category [25]. Center characteristics were also collected, including average annual center surgical volume of STAT-classified cases during the study period.

Outcomes

The primary outcome was in-hospital mortality. Secondary outcomes included postoperative LOS and the occurrence of any STS-defined postoperative complication [26].

Analysis

Study variables were described overall and across race and sex groups using standard summary statistics. The STS-CHSD contains the following fields regarding race/ethnicity: white, black, Hispanic, Asian, Native American, and other. For the purposes of this analysis, race/ethnicity was categorized as white, black, Hispanic, and other (with “other” representing the aggregate of Asian, Native American, and other in the data specifications). Unadjusted outcomes were compared across race and sex groups using the χ^2 and Kruskal-Wallis tests. Multivariable analysis was then performed to evaluate the association of race and sex with outcome. For dichotomous outcome variables, conditional logistic regression stratified by center was used. Odds ratio (OR) and 95% confidence interval (CIs) are reported. For postoperative LOS, linear regression with center modeled as a main effect was used. Postoperative LOS was not normally distributed and was therefore log transformed for analysis. Results are reported as parameter estimates and 95% CIs. Importantly, these models, which condition on center, were chosen because they measure the association between the variables of interest (race and sex) and outcome within each center and then combine these results across centers, thus mitigating potential center effects. Models that instead provide averaged estimates across centers do not exclude the possibility that any difference found related to race or sex may be related to other unaccounted for differences in treatment or outcomes between centers. All models were adjusted for age, weight, any noncardiac/genetic abnormality, any other STS preoperative risk factor (as already described), and STAT mortality category. All analyses were performed using STATA, version 11.2 (StataCorp, College Station, TX). A p value less than 0.05 was considered statistically significant.

Results

Study Population

Initial query of the STS-CHSD for the 3-year time interval of 2007 through 2009, inclusive, revealed 46,490 patients at 98 centers undergoing operations classified in the STAT mortality categories. Applying the aforementioned inclusion and exclusion criteria, the final study population included 20,399 patients from 49 centers. Table 1 describes study population characteristics overall and by race and sex subgroups. Overall there were 11,100 boys (54.4%) and 9,299 girls (45.6%). Patient race/ethnicity included 11,198 (54.9%) white, 3,479 (17.1%) black, 3,345 (16.4%) Hispanic, and 2,377 (11.6%) "other" patients. Median age of the cohort was 0.4 years (interquartile range, 0.1–3.4 years). Age and weight at operation were similar across groups, with the exception that black patients tended to be slightly younger and weigh less. The proportion of patients with any noncardiac/genetic abnormality and any preoperative risk factor was similar across groups, as was the distribution of STAT mortality categories (Table 1).

Unadjusted Outcomes

Unadjusted outcomes in the race and sex categories are displayed in Table 2. In unadjusted analysis by sex, girls had a shorter postoperative LOS and fewer postoperative complications. There was no difference in mortality when comparing boys and girls. In unadjusted analysis by race/ethnicity, white patients had the lowest mortality rate, shortest postoperative LOS, and lowest postoperative complication rate (Table 2).

Adjusted Outcomes

Results from multivariable analysis are displayed in Table 3. Sex analysis showed that girls had a shorter postoperative LOS than did boys (−0.8 days; $p < 0.001$). There was no significant difference in mortality or postoperative complications in adjusted analysis by sex.

In adjusted analysis by race/ethnicity, black patients had significantly higher in-hospital mortality (OR, 1.67; 95% CI, 1.37–2.04; $p < 0.001$) in comparison with white patients. There were no other significant mortality differences. Black patients (+2.4 days; $p < 0.001$) and Hispanic (0.9 days; $p < 0.01$) patients also had a significantly longer postoperative LOS when compared with white patients. Finally, black patients had a significantly higher rate of postoperative complications (OR, 1.15; 95% CI, 1.04–1.26; $p < 0.01$) in comparison with white patients.

Comment

This study represents the first investigation of potential associations between sex and race and the outcome of pediatric cardiac operations using a national multiinstitutional disease-specific clinical registry. Our study revealed several associations between race and sex and outcome after pediatric cardiac operations, including shorter hospital stays for girls than for boys but no difference in mortality rates by sex. In-hospital mortality and the rate of postoperative complications were higher for black than for white patients, and black and Hispanic patients had a longer postoperative LOS.

These results are best considered in the context of previous studies [5–16]. Although the findings of previous studies have been somewhat inconsistent, several have suggested an association between sex and mortality rate, with girls having a greater mortality risk [6, 7]. In the present study, multivariable analysis with adjustment for patient factors, comorbidities, and STAT mortality category revealed a shorter postoperative LOS in girls

but no difference in in-hospital mortality or rate of the occurrence of postoperative complications. The reasons for the differences between the findings of our study compared with others are unclear. It is possible that the use of clinical registry data allows better adjustment for other patient risk factors and surgical risk; however we also did not find any significant difference in mortality in unadjusted analysis in our dataset. Further investigation into the longer postoperative LOS found in our study in boys is warranted. It has been shown previously that LOS, or room and board charges, is 1 of the most significant factors associated with increased hospital charges in patients undergoing congenital cardiac operations [27].

In regard to race, multiple previous studies have found significant associations between race and outcome [5–16]. The present study confirms some of these findings in a large clinical registry. Inconsistencies across geographic regions with respect to associations between race and outcome have been demonstrated in at least 1 previous study [9], whereas others have suggested that racial and ethnic disparities in outcome do not appear to be related to differences in access to care or insurance type [11, 13, 28]. In an effort to minimize confounding by location of care, we used multivariable models that condition on center and measure the association between the variables of interest and outcome within each center, thus mitigating potential center effects. Our models exclude the possibility that our results are due to differences between centers; therefore our results cannot be explained by the possibility that patients of certain races might be disproportionally treated at centers with poorer outcomes in general. Accounting for surgical risk (through adjustment for STAT mortality category) also excludes the possibility that an association of certain race/ethnicities with “riskier” operations explain the results.

The relative strengths of this analysis are related to the use of clinical data from the STS-CHSD, the inclusion of a large number of centers and patients, and evaluation of data from only centers with a high degree completeness of data. The use of the multivariable analysis conditioned on center is also important, in addition to adjustment for other patient factors and STAT mortality category. Limitations of the study include the lack of socioeconomic and insurance data in the analysis. Thus we are not able to determine the extent to which our findings may be related to differences in insurance type, socioeconomic factors, education, or access to care. Other limitations are related to the nature of the STS-CHSD. Despite the large size of the database, there is the possibility that patients and data in the STS-CHSD are not entirely representative of other populations, particularly since not all hospitals submitting data to the database submit race data on all patients. The similarity in mortality rates between the included cohort and the overall population of patients included in the STS-CHSD undergoing cardiac operations during the study period supports the generalizability of our findings. Finally, end points used for this analysis pertain only to events during the surgical hospital admission, so deaths or complications after discharge from the hospital are not included in the analysis.

In conclusion, analysis of demographic and clinical data pertaining to 20,399 patients in the STS-CHSD revealed important associations between sex, race, and outcome after pediatric cardiac operations. Evaluation of complex relationships between clinical variables and socioeconomic and other factors that may affect access to care remains a significant challenge. Since much of the pertinent socioeconomic data are not collected in the STS-CHSD, an analysis of a linked dataset that capitalizes on the strengths of both the STS-CHSD and those of administrative claims datasets may be a logical next step.

References

1. Edwards FH, Carey JS, Grover FL, Bero JW, Hartz RS. Impact of gender on coronary bypass operative mortality. Ann Thorac Surg. 1998; 66:125–31. [PubMed: 9692451]
2. Taylor NE, O'Brien S, Edwards FH, Peterson ED, Bridges CR. Relationship between race and mortality and morbidity after valve replacement surgery. Circulation. 2005; 15;111:1305–12.
3. Bridges CR, Edwards FH, Peterson ED, Coombs LP. The effect of race on coronary bypass operative mortality. J Am Coll Cardiol. 2000; 36:1870–6. [PubMed: 11092658]
4. Haywood LJ, Ell K, deGuman M, Norris S, Blumfield D, Sobel E. Chest pain admissions: characteristics of black, Latino, and white patients in low- and mid-socioeconomic strata. J Natl Med Assoc. 1993; 85:749–57. Erratum in J Natl Med Assoc 1993, 85, 950. [PubMed: 8254691]
5. Benavidez OJ, Gauvreau K, Del Nido P, Bacha E, Jenkins KJ. Complications and risk factors for mortality during congenital heart surgery admissions. Ann Thorac Surg. 2007; 84:147–55. [PubMed: 17588402]
6. Klitzner TS, Lee M, Rodriguez S, Chang RK. Sex-related disparity in surgical mortality among pediatric patients. Congenital Heart Dis. 2006; 1:77–88.
7. Chang RK, Chen AY, Klitzner TS. Female sex as a risk factor for in-hospital mortality among children undergoing cardiac surgery. Circulation. 2002; 106:1514–22. [PubMed: 12234958]
8. Jenkins KJ, Newburger JW, Lock JE, et al. In-hospital mortality repair of congenital heart defects: preliminary observations of variation by hospital caseload. Pediatrics. 1995:323–30. [PubMed: 7862467]
9. Seifert HA, Howard DL, Silber JH, Jobes DR. Female sex increases the risk of death during hospitalization for pediatric cardiac surgery. J Thorac Cardiovasc Surg. 2007; 133:668–75. [PubMed: 17320563]
10. Gonzales PC, Gauvreau K, Demone JA, Piercey GE, Jenkins KJ. Racial and ethnic differences in mortality for congenital heart surgery in children may reflect unequal access to care. Pediatr Cardiol. 2003; 24:103–8. [PubMed: 12360393]
11. Benavidez OJ, Gauvreau K, Jenkins KJ. Racial and ethnic disparities in mortality following congenital heart surgery. Pediatr Cardiol. 2006; 27:321–8. [PubMed: 16565899]
12. Chang RK, Chen AY, Klitzner TS. Factors associated with age at operation for children with congenital heart disease. Pediatrics. 2000; 105:1073–81. [PubMed: 10790465]
13. Demone JA, Gonzalez PC, Gauvreau K, Piercey GE, Jenkins KJ. Risk of death for Medicaid recipients undergoing congenital heart surgery. Pediatr Cardiol. 2003:97–102. [PubMed: 12360394]
14. Benavides OJ, Gauvreau K, del Nido P, Bacha E, Jenkins KJ. Complications and risk factors for mortality during congenital heart surgery admissions. Ann Thorac Surg. 2007; 84:147–55. [PubMed: 17588402]
15. Connor JA, Gauvreau K, Jenkins KJ. Factors associated with increased resource utilization for congenital heart disease. Pediatrics. 2005; 116:689–95. [PubMed: 16140709]
16. Ballweg JA, Wernovsky G, Gaynor JW. Neurodevelopmental outcomes following congenital heart surgery. Pediatr Cardiol. 2007; 28:126–33. Epub 2007 Jan 29. [PubMed: 17265108]
17. Nembhard WN, Salemi JL, Ethen MK, Fixler DE, DiMaggio A, Canfield MA. Racial/ethnic disparities in risk of early childhood mortality among children with congenital heart defects. Pediatrics. 2011; 127:e1128–38. [PubMed: 21502234]
18. Cronk CE, Malloy ME, Pelech AN, et al. Completeness of state administrative databases for surveillance of congenital heart disease. Birth Defects Res A Clin Mol Teratol. 2003; 67:597–603. [PubMed: 14703780]
19. Frohnert BK, Lussky RC, Alms MA, et al. Validity of hospital discharge data for identifying infants with cardiac defects. J Perinatol. 2005; 25:737–42. [PubMed: 16163368]
20. Strickland MJ, Riehle-Colarusso TJ, Jacobs JP, et al. The importance of nomenclature for congenital heart disease: implications for research and evaluation. Cardiol Young. 2008; 18(Suppl 2):92–100. [PubMed: 19063779]

21. Franklin RC, Jacobs JP, Krogmann ON, et al. Nomenclature for congenital and pediatric cardiac disease: historical perspectives and the International Pediatric and Congenital Cardiac Code. Cardiol Young. 2008; 18(Suppl 2):70– 80. [PubMed: 19063777]

22. Jacobs ML, Daniel M, Mavroudis C, et al. Report of the 2010 Society of Thoracic Surgeons Congenital Heart Surgery Practice and Manpower Survey. Ann Thorac Surg. 2011; 92:762–9. [PubMed: 21865107]

23. Clarke DR, Breen LS, Jacobs ML, et al. Verification of data in congenital cardiac surgery. Cardiol Young. 18(Suppl 2):177–87. [PubMed: 19063789]

24. Jacobs JP, O'Brien SM, Pasquali SK, Richard E, et al. Clark Paper: Variation in outcomes for benchmark operations: an analysis of the Society of Thoracic Surgeons Congenital Heart Surgery Database. Richard Clark Award recipient for best use of the STS Congenital Heart Surgery Database. Ann Thorac Surg. 201; 92:2184–92. [PubMed: 22115229]

25. O'Brien SM, Clarke DR, Jacobs JP, et al. An empirically based tool for analyzing mortality associated with congenital heart surgery. J Thorac Cardiovasc Surg. 2009; 138:1139–53. [PubMed: 19837218]

26. [Accessed: January 15, 2012.] Society of Thoracic Surgeons Congenital Heart Surgery Database Data Specifications, Version 2.50. Available at: http://www.sts.org/sites/default/files/documents/pdf/Congenital_DataSpecs_250.pdf

27. Pasquali SK, Sun JL, d'Almada P, et al. Center variation in hospital costs for patients undergoing congenital heart surgery. Circ Cardiovasc Qual Outcomes. 2011; 1:306–12. [PubMed: 21505154]

28. Oster ME, Strickland MJ, Mahle WT. Racial and ethnic disparities in post-operative mortality following congenital heart surgery. J Pediatr. 2011:222–6. [PubMed: 21414631]

Table 1

Study Population Characteristics Overall and by Sex and Race/Ethnicity Subgroups

Variable	Overall (N = 20,399)	Male (n = 11,100)	Female (n = 9,299)	White (n = 11,198)	Black (n = 3,479)	Hispanic (n = 3345)	Other (n = 2,377)
Age (y)	0.4 (0.1–3.4)	0.3 (0.1–3.6)	0.4 (0.2–3.2)	0.5 (0.1–4.1)	0.4 (0.1–2.8)	0.4 (0.1–2.6)	0.3 (0.1–2.1)
Weight (kg)	5.8 (3.3–14.3)	6.0 (3.4–15.0)	5.5 (3.2–13.5)	6.1 (3.4–15.8)	5.4 (3.0–12.9)	5.6 (3.3–13.0)	5.1 (3.1–11.0)
Sex, male	11,100 (54.4%)	…	…	6,129 (54.7%)	1,834 (52.7%)	1,854 (55.4%)	1,283 (54.0%)
Race							
White	11,198 (54.9%)	6,129 (55.2%)	5,069 (54.5%)	…	…	…	…
Black	3,479 (17.1%)	1,834 (16.5%)	1,645 (17.7%)	…	…	…	…
Hispanic	3,345 (16.4%)	1,854 (16.7%)	1,491 (16.0%)	…	…	…	…
Other	2,377 (11.7%)	1,283 (11.6%)	1,094 (11.8%)	…	…	…	…
Any non-CV/genetic abnormality	6,698 (32.8%)	3,437 (31.0%)	3,261 (35.1%)	3,586 (32.0%)	1,200 (34.5%)	1,192 (35.6%)	720 (30.3%)
Any preoperative risk factor	7,023 (34.4%)	3,848 (34.7%)	3,175 (34.1%)	3,597 (32.1%)	1,335 (38.4%)	1,184 (35.4%)	908 (38.2%)
STAT mortality category							
1–3	15,309 (75.0%)	8,245 (74.3%)	7,064 (76.0%)	8,466 (75.6%)	2,658 (76.4%	2,413 (72.1%)	1,772 (74.6%)
4–5	5,090 (25.0%)	2,855 (25.7%)	2,235 (24.0%)	2,732 (24.4%)	821 (23.6%)	932 (27.9%)	605 (25.4%)

Data are presented as median (interquartile range) or number (percent).

CV = cardiovascular; STAT = Society of Thoracic Surgeons–European Association for Cardiothoracic Surgery.

Table 2

Unadjusted Outcomes

A. By Sex

Outcome	Male	Female	*p* Value
In-hospital mortality	462 (4.2%)	404 (4.3%)	0.52
Postoperative LOS, days	6.0 (4.0–14.0)	6.0 (4.0–13.0)	<0.001
Complications	4,184 (37.7%)	3,367 (36.2%)	0.03

B. By Race/Ethnicity

Outcome	White	Black	Hispanic	Other	*p* Value
In-hospital mortality	398 (3.6%)	193 (5.6%)	159 (4.8%)	116 (4.9%)	<0.0001
Postoperative LOS, days	6.0 (4.0–12.5)	6.0 (4.0–16.0)	6.0 (4.0–15.0)	6.0 (4.0–14.0)	<0.0001
Complications	4,047 (36.1%)	1,324 (38.1%)	1,252 (37.4%)	928 (39.0%)	0.004

Data are presented as median (interquartile range) or number (percent).

LOS = length of stay.

Table 3

Adjusted Outcomes

A. In-Hospital Mortality

Variable	Odds Ratio	95% CI	*p* Value
Sex			
Female	1.07	0.92, 1.23	0.39
Male	Reference		
Race/ethnicity			
Black	1.67	1.37, 2.04	<0.001
Hispanic	1.12	0.90, 1.39	0.31
Other	1.24	0.98, 1.57	0.07
White	Reference		

B. Postoperative LOS

Variable	Estimate (log days)[a]	95% CI	*p* Value
Sex			
Female	−0.046	−0.071, −0.021	<0.001
Male	Reference		
Race/ethnicity			
Black	0.148	0.112, 0.184	<0.001
Hispanic	0.053	0.015, 0.091	<0.01
Other race	0.016	−0.025, 0.058	0.45
White	Reference		

C. Postoperative Complications

Variable	Odds Ratio	95% CI	*p* Value
Sex			
Female	0.94	0.88, 1.01	0.08
Male	Reference		
Race/ethnicity			
Black	1.15	1.04, 1.26	<0.01
Hispanic	1.07	0.97, 1.18	0.18
Other race	1.11	0.99, 1.24	0.06
White	Reference		

[a] Estimated difference in days was also calculated from the models: female versus male: (−0.8 days); race/ethnicity: black (+2.4 days), Hispanic (+0.9 days), and other (+0.3 days)—all versus white.

CI = confidence interval; LOS = length of stay.