Surgical Mortality and Race as a Risk Factor: A Compass, Not a Destination

Nia Heard-Garris, MD, MSc,[a,b] Ekene Onwuka, MD, MS,[c] Matthew M. Davis, MD, MAPP[a,b,d]

Remarkably, few national estimates of inpatient pediatric surgical mortality have been published.[1] Pediatric inpatient mortality has been reported mostly for cardiovascular and neurosurgical procedures.[2,3] In this issue of *Pediatrics*, Akbilgic et al[4] broaden and extend this literature by examining 30-day postoperative mortality for more than 260 000 surgical procedures performed on children from 2012 to 2015. By using a novel approach, network analysis, and classification trees, the authors developed race-specific models using preoperative risk factors to predict 30-day surgical mortality for African-American versus white children. Risk factors such as ventilator use, oxygen support, wound infections, transfusions, and neonatal status were more prevalent in African-American children and positively associated with death after surgery. Moreover, risk factors more prevalent in white children (eg, sepsis, malignancy, emergent case status) carried a higher risk of death when present in African-American children.[4]

Although this study lacked data about social and structural risk factors, which are often experienced differentially among racial groups and known to contribute to overall health outcomes and mortality, race-specific risk models may have implications for surgical practice. For example, surgical teams might use the models to estimate the 30-day mortality risk in children on ventilators and requiring inotropic support as 34.5% in African-American children and 15.9% in white children in nonemergent cases and may consider more aggressive preoperative weaning approaches where appropriate. These models may also enable surgeons to provide families with more accurate information about their child's risk.

On the other hand, the hazard of using race-specific risk models is that differences in outcomes may be attributed to race, an unmodifiable patient-level factor, rather than to modifiable structural or system-level differences such as the type or quality of care that different groups receive. In their research, authors often identify race as a risk factor, modifier, or predictor of health care outcomes. Yet, race is an imprecise proxy for social class, culture, and possibly shared lived experience, rather than a biological construct.[5] Race is merely a compass, indicating where clinicians and policy makers should look to address disparities. It is not the destination. In their studies, authors cite advanced stage of disease,[6,7] access to care,[8] referral to high-mortality hospitals,[9] and higher frequencies of postoperative complications as drivers of the higher postoperative morbidity and mortality observed in African-American children.[2,10,11] It is imperative that, within their research, authors rigorously examine the causes underlying the systems and structures that lead to disparate outcomes and ways to address disparities.

For example, African-American patients may be more often referred to high-mortality hospitals, with overall lower surgical volumes, surgeons with less experience, and lower resource availability (eg, condition-specific subspecialists),

[a]*Division of Academic General Pediatrics and Primary Care, Department of Pediatrics, Ann & Robert H. Lurie Children's Hospital of Chicago and Feinberg School of Medicine, Northwestern University, Chicago, Illinois;* [b]*Mary Ann & J. Milburn Smith Child Health Research, Outreach, and Advocacy Center, Stanley Manne Children's Research Institute, Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, Illinois;* [c]*Department of Surgery, The Ohio State University Wexner Medical Center, Columbus, Ohio; and* [d]*Departments of Medical Social Sciences, Medicine, and Preventive Medicine, Feinberg School of Medicine, Northwestern University, Chicago, Illinois*

DOI: https://doi.org/10.1542/peds.2017-3894

Accepted for publication Nov 21, 2017

Address correspondence to Nia Heard-Garris, MD, MSc, Division of Academic General Pediatrics and Primary Care, Ann & Robert H. Lurie Children's Hospital of Chicago, 225 Chicago Ave, Box 162, Chicago, IL 60611. E-mail: nheardgarris@luriechildrens.org

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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

FUNDING: No external funding.

To cite: Heard-Garris N, Onwuka E, Davis MM. Surgical Mortality and Race as a Risk Factor: A Compass, Not a Destination. *Pediatrics.* 2018;141(2):e20173894

leading to poorer outcomes.[9,12,13] The proportion of African-American children receiving surgical care in low-volume, high-mortality hospitals is unclear; however, research in African-American adult patients has revealed that the site of care explains much of the risk-adjusted postoperative mortality.[14] Surgical regionalization of care, which is intended to centralize the care of complex surgical diseases at high-volume centers with experience with specific conditions, has been proposed as an approach to improve postoperative mortality among adults. However, regionalization may also prolong patient travel times, which has the potential to further disenfranchise racial-minority patients who are disproportionately likely to face transportation-related barriers to care.[12,15,16] Clinical and policy efforts should be aimed at directing or transferring patients with known preoperative risk factors to facilities well-equipped in personnel and equipment to support these patients, while also providing additional resources to institutions that largely care for minority populations.[13] Medically complex patients, regardless of race, cannot be expected to have good surgical outcomes in under-resourced environments.

Additionally, although research-based models offer ways to risk-stratify patients, families also may desire ways to risk-stratify hospitals. Patients, families, and referring physicians need similar tools to provide information on pediatric postoperative mortality by hospital.[13] Researchers and health care institutions should consider partnerships to generate transparent, publicly available, risk-adjusted surgical complication and mortality data, among other metrics that are continuously tracked as an approach to improve their patient outcomes. When necessary, it would be appropriate to aggregate data over many years to have robust numbers of pediatric surgical cases on which to evaluate patterns of postoperative outcomes.

Ultimately, changes in practice and policy, rather than using race to predict risk, will offer the best opportunities to narrow the postoperative surgical mortality gap between African-American children and white children. These approaches must be considered along with the larger, pervasive context of structural racism that African-American patients face. African-American patients, children, and their families, experience oppressive forces that counteract even the best quality health care, requiring multidisciplinary, multilevel, and multisector interventions to address disparities and to move toward health equity. Although risk models illuminate the problem, clinicians and institutions must face the problem to save children's lives. As renowned essayist James Baldwin wrote in "As Much Truth as One Can Bear:" "Not everything that is faced can be changed; but nothing can be changed until it is faced."

ACKNOWLEDGMENTS

We thank Kofi Essel, MD, of Children's National Health System, for his insight and Wayne Garris, JD, for his critical edits of the manuscript.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

COMPANION PAPER: A companion to this article can be found online at www.pediatrics.org/cgi/doi/10.1542/peds.2017-2221.

REFERENCES

1. Abdullah F, Gabre-Kidan A, Zhang Y, Sharpe L, Chang DC. Report of 2, 087,915 surgical admissions in U.S. children: inpatient mortality rates by procedure and specialty. *World J Surg*. 2009;33(12):2714–2721
2. Chan T, Lion KC, Mangione-Smith R. Racial disparities in failure-to-rescue among children undergoing congenital heart surgery. *J Pediatr*. 2015;166(4):812–818.e1–e4
3. Attenello FJ, Ng A, Wen T, et al. Racial and socioeconomic disparities in outcomes following pediatric cerebrospinal fluid shunt procedures. *J Neurosurg Pediatr*. 2015;15(6):560–566
4. Akbilgic O, Langham MR Jr, Davis RL. Race, preoperative risk factors, and death after surgery. *Pediatrics*. 2018;141(2):e20172221
5. Jones CP. Invited commentary: "race," racism, and the practice of epidemiology. *Am J Epidemiol*. 2001;154(4):299–304; discussion 305–306
6. Jacobs AJ, Lindholm EB, Levy CF, Fish JD, Glick RD. Racial and ethnic disparities in treatment and survival of pediatric sarcoma. *J Surg Res*. 2017;219:43–49
7. Austin MT, Hamilton E, Zebda D, et al. Health disparities and impact on outcomes in children with primary central nervous system solid tumors. *J Neurosurg Pediatr*. 2016;18(5):585–593
8. Sistino JJ, Ellis C Jr. Effects of health disparities on survival after neonatal heart surgery: why should racial, ethnic, gender, and socioeconomic status be included in the risk analysis? *J Extra Corpor Technol*. 2011;43(4):232–235
9. Chan T, Pinto NM, Bratton SL. Racial and insurance disparities in hospital mortality for children undergoing congenital heart surgery. *Pediatr Cardiol*. 2012;33(7):1026–1039
10. Chu DI, Canning DA, Tasian GE. Race and 30-day morbidity in pediatric

urologic surgery. *Pediatrics*. 2016;138(1):e20154574

11. Stone ML, Lapar DJ, Kane BJ, Rasmussen SK, McGahren ED, Rodgers BM. The effect of race and gender on pediatric surgical outcomes within the United States. *J Pediatr Surg*. 2013;48(8):1650–1656
12. Birkmeyer JD, Stukel TA, Siewers AE, Goodney PP, Wennberg DE, Lucas FL. Surgeon volume and operative mortality in the United States. *N Engl J Med*. 2003;349(22):2117–2127
13. Dimick J, Ruhter J, Sarrazin MV, Birkmeyer JD. Black patients more likely than whites to undergo surgery at low-quality hospitals in segregated regions. *Health Aff (Millwood)*. 2013;32(6):1046–1053
14. Lucas FL, Stukel TA, Morris AM, Siewers AE, Birkmeyer JD. Race and surgical mortality in the United States. *Ann Surg*. 2006;243(2):281–286
15. Chang R-KR, Klitzner TS. Can regionalization decrease the number of deaths for children who undergo cardiac surgery? A theoretical analysis. *Pediatrics*. 2002;109(2):173–181
16. Birkmeyer JD, Siewers AE, Marth NJ, Goodman DC. Regionalization of high-risk surgery and implications for patient travel times. *JAMA*. 2003;290(20):2703–2708

Surgical Mortality and Race as a Risk Factor: A Compass, Not a Destination

Nia Heard-Garris, Ekene Onwuka and Matthew M. Davis

Pediatrics 2018;141;
DOI: 10.1542/peds.2017-3894 originally published online January 10, 2018;

PEDIATRICS®
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Surgical Mortality and Race as a Risk Factor: A Compass, Not a Destination

Nia Heard-Garris, Ekene Onwuka and Matthew M. Davis

Pediatrics 2018;141;
DOI: 10.1542/peds.2017-3894 originally published online January 10, 2018;