A Contemporary Review on Health Care Disparities in Pediatric Ambulatory Anesthesia

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KEYWORDS

• Ambulatory surgery • Pediatric anesthesia • Healthcare disparities

KEY POINTS

- Significant disparities in pediatric anesthesia exist in the ambulatory setting, spanning the preoperative, intraoperative, and postoperative periods.
- These inequities are driven by systemic and provider-level factors, including limited access to pediatric anesthesiologists, socioeconomic and geographic barriers, language differences, and implicit bias.
- Implementation of pediatric-focused accreditation standards, expansion of fellowship-trained anesthesiologist availability, and standardized family-centered education may mitigate disparities and promote equitable outcomes. These measures, combined with addressing broader social determinants of health, may reduce disparities and improve outcomes in outpatient pediatric anesthesia.

INTRODUCTION

Health care disparities in general, regional, and obstetric anesthesia are well documented in the adult literature.[1–3] For example, in patients undergoing inguinal hernia repair, nonmedical factors such as race were found to influence the delivery of anesthesia; African Americans and other minority groups were less likely than White patients to receive local or epidural anesthesia.[4] In obstetric patients, Black and Hispanic mothers are less likely to receive neuraxial technique during vaginal and cesarean deliveries.[3] While research into health care disparities in pediatric anesthesia has lagged, several inpatient studies have highlighted this topic in broad strokes.[5–7] For instance, Latino children may receive fewer medications postoperatively after

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Abbreviations	
ADI	Area Deprivation Index
ASA	American Society of Anesthesiologists
CBPR	community-based participatory research
LEP	low English proficiency
NSIQP	the National Surgical Quality Improvement Program
OR	odds ratio
OSA	obstructive sleep apnea
OSDB	obstructive sleep disordered breathing
PACU	postanesthesia care unit
PET	pressure equalization tube
PPH	parental presence at induction of anesthesia
SDOH	social determinants of health
SES	socioeconomic status
SSI	surgical site infection
SVI	social vulnerability index
T&A	tonsillectomy and adenoidectomy

tonsillectomy and adenoidectomy (T&A),[8] and Black children are less likely to have parental presence at induction of anesthesia (PPH) or receive preoperative midazolam for anxiolysis.[9] Biased practices in health care delivery may exist on the basis of a variety of categorical descriptors, such as gender, sexuality, race, ethnicity, socioeconomic status, and geographic region, among others.[10] The difference in access to high-quality health care among pediatric populations represents a multifaceted and complex dilemma driven by both system-based and individual-based factors.

The objective of this review is to highlight health care disparities that exist in the administration of pediatric anesthesia, with a focus on differences in outcomes occurring in the preoperative, interoperative, and postoperative periods in the ambulatory setting. We will further explore which strategies can be put into place during the perioperative period to provide more equitable care for all patients.

PREOPERATIVE

Preoperative factors such as geographic location, insurance status, household income, and English proficiency contribute to the disparities patients and families encounter. Using the National Health Interview Survey, a nationally representative database, Rabbits and Groenewald found that children from minority backgrounds were significantly less likely to receive a surgical procedure even after controlling for sociodemographic factors such as family income, parental education level, and insurance status.[11] In another 2022 analysis of 31,000 children by Groenewald and colleagues, Hispanic, Non-Hispanic Black, and Non-Hispanic Asian children were less likely to receive care in a hospital outpatient or office-based nonemergency room setting (odds ratios [OR] 0.2 to 0.6, 95% confidence interval [CI] 0.2–0.7).[12] Compared to White children, Hispanic, Non-Hispanic Black, and Non-Hispanic Asian children are therefore unable to take advantage of the benefits of outpatient surgery, such as improved cost, easier surgical scheduling increased access, and higher patient satisfaction.[13]

A child's home location can affect their access to surgical care. In 2009, Hayanaga and colleagues examined the effects of segregation on outpatient surgery access.[14] In the most segregated counties in the United States, every percentage point increase in African American or Hispanic population was associated with a decrease in availability and utilization of outpatient surgical services, as well as an increase in utilization of emergency services. The authors hypothesized that this was due to geographic

isolation and higher rates of unemployment in these counties leading to delayed presentations of illnesses.[14]

Currently, there are about 4000 pediatric anesthesiologists, roughly 8% of all anesthesiologists, and they are unevenly distributed across the United States.[15] Where anesthesiologists practice will impact whether pediatric patients, living in parts of middle America, must travel greater distances to gain access to a pediatric anesthesiologist, especially if the patients have complex comorbidities or medical needs. In 2017, Muffly and colleagues assessed the distribution of pediatric anesthesiologists employed by hospitals using concentric circles encircling 25 miles, 50 miles, 100 miles, or greater than 100 miles.[16] Their report demonstrated that 71.4% of the pediatric population resides within 25 miles of a pediatric anesthesiologist while 13.8% resides greater than 50 miles, with an uneven distribution geographically around the United States. While the study was centered primarily on pediatric anesthesiologists who work at hospitals, similar conclusions might be reached if the concentric circles were placed around ambulatory surgery centers. The work by Muffly and colleagues helped reveal the deep geographic disparities in access to expert pediatric anesthesia care.

Powers and colleagues used Area Deprivation Index (ADI) to assess access to care as a driver for racial disparities in the preoperative period.[17] The ADI is a validated neighborhood disadvantage metric that the National Institutes for Health and Centers for Medicare and Medicaid Services use to study how health outcomes are affected within neighborhoods where highly disadvantaged patients live. Black race, public insurance, and high ADI were associated with a higher frequency of no shows for scheduled pediatric surgery clinic visits as well as postoperative visits.[17]

Intraoperative

Placement of pressure equalization tubes (PETs) for recurrent otitis media is one of the most common pediatric outpatient procedures, performed in nearly 10% of American children. In 2017, Simon and colleagues re-examined whether there were differences in PET placements among different groups of American children.[18] A total of 8.9% of children had undergone PET placements. Non-Hispanic White children were more likely to undergo PET surgery compared with their non-Hispanic Black, Hispanic, and mixed-race counterparts (12.5% vs 4.8%, 4.4%, 5.6%, respectively). The authors surmised that multifactorial reasons were responsible, including genetic factors, insurance status, access to pediatric surgical care, or cultural differences.

Tonsillectomy is another common pediatric ambulatory surgery that has previously been reported to have wide variation in geographic and racial access. In 2021, Cooper and colleagues reviewed the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project State Ambulatory Surgery and Services database of tonsillectomy rates among patients based on race, insurance status, and geographic area of residence.[19] The database included pediatric patients who underwent a tonsillectomy from 2013 to 2017 from 8 geographically and demographically diverse American states. Tonsillectomies were more likely to be performed on White, publicly insured children who lived in nonmetropolitan areas. Tonsillectomy indications differed among patients, with White children more likely to have tonsillectomy performed for infection while African American children were more likely to have the procedure performed for obstructive sleep disordered breathing (OSDB). While their OSDB diagnosis may be due to a higher prevalence of second hand smoking, higher rates of prematurity, and higher rates of obesity, minority families may underutilize tonsillectomy because of challenges obtaining paid time off work, distrust of the medical health care system, and lower health literacy rates.[19] This study by Cooper and colleagues

highlights that additional work is needed to improve trust within the health care system, help parents obtain paid time off, and improve education around health literacy.[19]

Related to children undergoing T&As, Sadhasivam and colleagues reviewed the effects of race on postoperative pain.[20] Pediatric patients (African American and Caucasian) received standardized and weight-based opioids intraoperatively. African American children, especially those with obstructive sleep apnea (OSA), had higher postoperative pain scores and morphine requirements than Caucasian children resulting in longer postanesthesia care unit (PACU) stays. Interestingly, Caucasian race was associated with a higher incidence of opioid-related adverse effects despite lower morphine requirements, also translating into longer PACU stays. Fortunately, serious opioid related complications were rare in all patients. Sadhasivam and colleagues hypothesized that African American children's need for additional opioids may be due to higher morphine clearance or unmeasured factors related to the higher pain scores, like socioeconomic status, leading to increased opioid prescriptions, increased opioid-related complications, or elevated risk of opioid-related narcotic diversion.[21] Anesthesiologists can play an important role in treating pediatric patients' pain while reducing risk by employing opioid-sparing techniques through multimodal analgesia.

Even though weight-based dosing predominates in pediatric anesthesia, disparities still exist in the delivery of intraoperative care. In 2019, Baetzal retrospectively compared Black children to other children with respect to PPH, inhalational induction, and oral premedication. Black children were less likely to receive preoperative anxiolytic medications and to have PPH compared to White counterparts. The authors surmised that Black children may suffer from adultification, and therefore were deemed to not need preoperative anxiolytics or PPH. They also hypothesized that there may be implicit bias at hand, as PPH is at the discretion of the anesthesiologist.

Importantly, there are several studies that have found no difference in intraoperative medication administration between races. Rosenbloom and colleagues retrospectively evaluated a single academic center examining anesthetic medication administration in 1680 pediatric patients undergoing emergency laparoscopic appendectomy.[22] No differences in intraoperative pain medications were observed between White and Black children. While the unadjusted analysis showed that Black children were less likely to receive preoperative anxiolytics, this difference disappeared upon adjusting for patient age, gender, and attending anesthesiologist practice patterns. The work by Rosenbloom and colleagues contributes to the continued controversy of disparities in pediatric anesthesia and stresses the importance of performing further high-quality studies from multi-institutional groups.

In recent years, regional anesthesia has expanded in pediatric anesthesia.[23] Caudal nerve blocks are a cornerstone, especially for urologic, abdominal, and orthopedic surgeries, decreasing overall opioid requirements and enhancing postoperative recovery.[24] Lo and colleagues conducted a retrospective study examining anesthesia type in 4739 children who underwent hospital-based urologic surgeries.[25] Approximately 62% of Hispanic parents and 60% of Black parents did not consent to regional anesthesia for their children. Patients who received a caudal block were more likely to have English speaking parents than Spanish speaking parents (83% vs 80%). Parents who spoke Spanish and those who were Latino or Black were more likely to be on government insurance versus English speaking or Caucasian and Asian parents ($P<.001$ and $<.001$). The authors were unable to account for how anesthesia providers counseled parents on analgesic options. One way to increase pediatric regional anesthesia adoption is to use patient-centered approaches to pain management: increasing preoperative education and ensuring that such education is accessible to all families.[26]

Andrew and colleagues published a 2025 study examining racial and intellectual disability disparities in pediatric regional anesthesia, analyzing 225 patients who underwent inpatient calcaneal osteotomy at a single center from 2013 to 2023.[27] Patients could receive a single shot injection, a peripheral nerve catheter, or no regional anesthesia. Interestingly, minority status was not associated with differences in the receipt of regional anesthesia. However, developmental disability status was associated with a 22% less likelihood of receiving regional anesthesia. Additionally, regional trained anesthesiologists were 30% more likely to perform any block in children with developmental disabilities and 23% more likely to place regional anesthesia catheters. Their findings suggest that provider experience with regional anesthesia and the presence of developmental disability were associated with differences in its use among pediatric patients undergoing calcaneal osteotomy. Though challenging logistically, improving availability of pediatric anesthesiologists and regional anesthesia fellowship training may improve perioperative care for pediatric patients.

POSTOPERATIVE

In the postoperative period, minority children face a disproportionate number of negative outcomes and complications. Nafiu and colleagues accessed the National Surgical Quality Improvement Program (NSQIP) database to retrospectively review 140,666 patients American Society of Anesthesiologists (ASA) Class 1 and 2 pediatric patients undergoing inpatient surgical procedures from 2012 to 2017.[28] The primary outcome was 30-day mortality and secondary outcome was 30 day postoperative complications. On univariate analysis, African American children were more likely than Caucasian children to suffer the primary (composite OR 3.48, 95% CI 1.76–6.87) and secondary (composite OR 1.27, 95% CI 1.22–1.32) outcomes. While overall mortality and complication rates were low, even among healthy African American children, they were more likely to have higher postoperative mortality and complications compared to white children. Further work is needed to improve these outcomes among African American children.

Tying preoperative risk factors with postoperative outcomes, Akbilgic and colleagues analyzed the NSQIP pediatric database between 2012 and 2014 to study the effects of race on postoperative outcomes in children undergoing inpatient surgery.[29] African American children have more preoperative risk factors that were more strongly associated with postoperative mortality than preoperative risk factors found in White children. The authors noted that using a race-based classification tool to stratify surgical risk factors and postoperative mortality allowed for better identification of surgical risk in both African American and White children. Risk stratification data could guide future research on interventions to mitigate race-specific differences in outcomes during the perioperative period.[29]

Ambulatory pediatric tonsillectomy can be associated with unequal surgical outcomes and postoperative courses. Bhattacharyya and colleagues reviewed state ambulatory surgery databases from California, New York, Iowa, and Florida to examine pediatric tonsillectomy outcomes.[30] The cases were linked to the corresponding state emergency department encounters occurring within 2 weeks of tonsillectomy procedure. There were 79,520 patients from 2010 and 2011. The authors noted an inverse association between median household income and postoperative complication rates, with decreasing median household income being strongly associated with postoperative complications and a need for additional visits to health care facilities, persisting after controlling for age, sex, race, and asthma.[30] The study also found a higher incidence of post-tonsillectomy revisits for poorly controlled postoperative pain in Black

and Hispanic children (OR 1.36; 95% CI, 1.10–1.67; and OR 1.34; 95% CI, 1.14–1.57, respectively).

While upper airway events such as laryngospasm, bronchospasm, and postoperative stridor are often studied in the pediatric population, there is a paucity of studies dedicated to studying postoperative pneumonia. In 2023, Warren and colleagues analyzed inpatient data from the NSQIP pediatric database from 2012 to 2022, focusing on Black and White children who developed pneumonia and ultimately died.[31] 3139 children met their criteria, of whom 74.3% were White and 25.7% were Black. There were no significant differences in mortality between the two groups, even after adjusting for confounders. The authors posited that standardized approaches and protocolized strategies to treating pneumonia might have prevented differences in outcomes. While their findings apply only in the inpatient population, there is concern that there could be underreported differences in outcomes in the outpatient pediatric population. Further work is needed in this area to investigate whether other major and minor postoperative outcomes are impacted by race.

There also appears to be differences in pediatric mortality in the postoperative period. A large retrospective cohort study by Willer and colleagues used data from 51 free standing tertiary pediatric centers between 2004 and 2020 to explore the effects of the patient's family socioeconomic status (SES) and race on pediatric mortality following inpatient procedures.[32] Using zip code as a proxy for median household income, the authors demonstrated that among Black and White children, there was a gradual decrease in risk of postoperative death with increasing household income. Interestingly, it appeared that the protective advantage of household income was lost once the effect of race was explored. White children were more likely to experience lower postoperative mortality than Black children of the same income quartile. In addition, the postoperative mortality rate in Black children in the highest income quartile was comparable to White children in the lowest income quartile. These findings draw attention to the impact of race on outcomes and seemingly remove the protective effect of income on mortality.

Readmission rates in the pediatric population after surgical procedures is another rarely studied topic. One analysis by Tarawneh and colleagues examined 30-day readmission rates after hip dysplasia surgery.[33] Of 6561, 540 patients required unanticipated readmissions within 30 days. The readmitted patients were more likely to be medically complex than those who were not readmitted. After controlling for confounders, they found that non-White race and higher ASA Class (III and IV) were independent risk factors for 30-day readmission. Their findings can be extrapolated to pediatric patients undergoing ambulatory surgery. As demonstrated in the adult and pediatric populations, patient selection for ambulatory surgery is critically important to reduce complications, such as readmissions, deep venous thromboembolism, and death.[34,35]

Recently, there has been an interest to identify how larger community-based factors affect social determinants of health (SDOH), such as SES, disability, language, and transportation. The Center for Disease Control and Prevention created a social vulnerability index (SVI), a census-based composite metric that nationally ranks neighborhood level SDOH.[36–38] With the SVI metric, Nieri and colleagues investigated how neighborhood-level factors affected pediatric postoperative outcomes after T&A.[38] The authors found that children from high SVI neighborhoods, those that are most impoverished and disadvantaged, were more likely to experience postoperative complications and readmission. After controlling for age, race, comorbidities, health insurance status, and OSA, high SVI neighborhood children still had higher rates of postoperative complications. These findings imply that a child's preoperative

environment can impact postoperative outcomes, and that interventions may need to target the preoperative environment.

Another retrospective cohort study initiated by Yap and colleagues evaluated the association between SVI and postoperative outcomes in children undergoing inpatient surgeries in California.[37] Pediatric patients from high SVI neighborhoods were more likely than peers from low SVI neighborhoods to develop serious 30-day postoperative complications, defined as postoperative death, readmission, and re-operation. SVI appeared to be an independent predictor of surgical outcomes even after controlling for the effects of individual based socioeconomic and clinical factors (OR 1.58, 95% CI 1.02–2.44); these findings could be generalized to outpatient surgeries.

During the postoperative period, the patient's health insurance (private or public/government) may affect postoperative outcomes, such as surgical site infections (SSIs). In a 5 year study looking at 13,795 patients undergoing ambulatory surgery, Rinke and colleagues reported that pediatric patients who had nonprivate insurance had a higher risk (OR, 4.0; 95% CI, 1.6–9.8) of having an SSI compared to privately insured patients.[39] SSI was associated with increased morbidity including hospital admission or requiring additional operative or bedside procedure.

Several studies have explored the relationship between pain medication administration and race/ethnicity in the postoperative period in the pediatric population. In 2024, Zhu and colleagues examined postoperative opioid use in 831 pediatric patients after outpatient urologic procedures.[40] The authors found that non-English speaking, Hispanic, and publicly insured patients used opioids significantly longer in the postoperative period. Patients whose parents' primary language was not English overall had longer recovery times in the postoperative period. The authors hypothesized that differences in pain medication administration may partly reflect lower comprehension of medication and discharge instructions among non-English-speaking parents. A similar retrospective study by Dixit and colleagues examined PACU opioid use in pediatric patients who had undergone laparoscopic appendectomy.[41] The authors found that patients with low English proficiency (LEP) were more likely than patients with English proficiency to receive opioids in the recovery room even controlling for intraoperative opioid dosing. Nafiu and colleagues conducted a prospective cross-sectional study of pediatric patients undergoing ambulatory surgery to investigate the impact of race and ethnicity on postoperative analgesic administration.[42] While the study demonstrated that minority children were more likely to receive intravenous opioid medications for mild postoperative pain than Caucasian children, overall, race did not appear to be a significant factor in the treatment of severe postoperative pain.[42] However, it has been reported that Black children have higher prevalence of OSA than White children.[43,44]

As demonstrated in the preoperative period with the underutilization of ambulatory surgery centers by minority groups, a similar trend is observed in the utilization of postoperative health services.[12] Chang and colleagues examined use of a triage phone line following pediatric urologic ambulatory surgery and demonstrated differences in utilization based on SDH.[45] Caregivers who lived further away, who had LEP, who were of Native American/Alaska Native descent, and who had Medicaid were less likely to utilize the phone triage line to address postoperative concerns in their children.

DISCUSSION

This updated review summarizes health care disparities in the pediatric population across the perioperative period. Although widely recognized in the medical literature, health care inequities affecting pediatric patients in the ambulatory setting remain understudied. These disparities in pediatric anesthesia span the entire perioperative

continuum—from the geographic maldistribution of pediatric anesthesiologists to the underutilization of regional anesthesia and ambulatory surgery services, as well as differences in intraoperative and postoperative pain management and limited access to postoperative services.[17,18,45,46]

Language barrier is cited as a reason health care disparities exist resulting in longer hospital stays and decreased patient satisfaction. In 2016, Jaramillo and colleagues studied the effect of LEP on surgical care received by 156 pediatric patients.[47] The authors found that patient-provider language concordance was independently associated with more patient-initiated questions and higher overall satisfaction. Importantly, language discordance rather than ethnicity limited patient family participation during clinic visits. This underscores the importance of availability of interpreter services in the perioperative period. While such discordance may hinder effective management of pain, nausea, and discomfort, some authors also cite longstanding systemic oppression and distrust of the healthcare system as additional contributors to perioperative disparities.[1,25]

Provider-related factors can drive health care disparities.[7] Johnson and colleagues administered the Race Implicit Association Test during pre- and post-work shifts to pediatric emergency room residents to assess if self-reported cognitive stressors (fatigue, busyness, and shift stress) affected implicit bias.[48] Their results showed that a majority of residents demonstrated pro-white bias.[49] Furthermore, the study demonstrated that cognitive stressors encountered throughout the physician's work shift resulted in higher levels of bias. The authors highlighted strategies aimed at reducing cognitive stressors at the individual level. Although the authors examined the effects of cognitive stressors on bias in the emergency room, the operating room represents a similarly fast-paced, high-stress environment where comparable findings may occur; however, further research is needed.

Pediatric outpatient care may benefit from the kind of "improved readiness" described by Jenkins and colleagues in the pediatric emergency setting.[50] "Improved readiness" in ambulatory surgery might include increasing the number of fellowship-trained pediatric anesthesiologists at accredited ambulatory locations.

Lastly, health care disparities are recognized to be a systemic issue[1,3]; as such it is paramount to enact community-based changes. To that end, there has been the introduction of community-based participatory research (CBPR), which aims to collaborate with specific communities to enact sustainable enhancements related to the community's health and well-being.[51] CBPR aims to unite cultural norms and practices with evidence-based medicine to bring about patient-centered and culturally competent delivery of care. Rosales and colleagues used the CBPR methodology to develop interventions in the care of Latino children in the perioperative period. CBPR can serve as an important framework to educate families, set expectations, dispel misconceptions, and mitigate inequitable care to the most vulnerable populations.

SUMMARY

This contemporary review adds to the growing literature in pediatric anesthesiology regarding some of the health care disparities that plague certain populations during the perioperative period. Since some of the outcomes were analyzed in the inpatient setting, they may have limited applicability to the outpatient setting. Health care disparities are complex and have different drivers including geographic availability of health care providers, geographic access to ambulatory surgery centers, standardization of anesthetic medications, provider bias, socioeconomic causes, insurance, race, language, and systemic causes. Research with multi-institutional organizations and

collaboration with the disadvantaged communities show promise as ways to mitigate these inequities that children and families face. The future remains bright with so many pediatric anesthesiologists committed to providing equitable care for pediatric patients and their families.

CLINICS CARE POINTS

- Recognition of health care disparities is important in addressing inequalities in pediatric ambulatory anesthesia, as these disparities may meaningfully influence perioperative care and outcomes.
- Clinicians should recognize that a child's lived experiences and social context may influence perioperative risk, communication, and postoperative recovery.
- Effective communication with caregivers is essential in pediatric ambulatory anesthesia; clinicians should prioritize clear, inclusive, and patient-cenetered language when discussing informed consent, perioperative care and postoperative instructions.

REFERENCES

1. Adeola JO, Wall PV, Mehdipour S, et al. Racial and ethnic differences in the use of regional anesthesia for patients undergoing total knee arthroplasty. J Arthroplast 2023;38(9):1663–7.
2. Chaudhary F, Agrawal DK. Racial and ethnic disparity in the administration of general anesthesia. Anesth Crit Care Houst Tex 2024;6(4):68–76.
3. Khusid E, Lui B, Ibarra A, et al. Review of racial/ethnic disparities in obstetrics-related anesthesia administration and pain management. Pain Manag 2023;13(7):415–22.
4. Memtsoudis SG, Besculides MC, Swamidoss CP. Do race, gender, and source of payment impact on anesthetic technique for inguinal hernia repair? J Clin Anesth 2006;18(5):328–33.
5. Willer BL, Mpody C, Nafiu OO. Racial inequity in pediatric anesthesia. Curr Anesthesiol Rep 2023;13(2):108–16.
6. Rosenbloom JM, Mekonnen J, Tron LE, et al. Racial and ethnic health services disparities in pediatric anesthesia practice: a scoping review. J Racial Ethn Health Disparities 2021;8(2):384–93.
7. Baetzel AE, Holman A, Dobija N, et al. Racial disparities in pediatric anesthesia. Anesthesiol Clin 2020;38(2):327–39.
8. Jimenez N, Seidel K, Martin LD, et al. Perioperative analgesic treatment in Latino and non-Latino pediatric patients. J Health Care Poor Underserved 2010;21(1):229–36.
9. Baetzel A, Brown DJ, Koppera P, et al. Adultification of black children in pediatric anesthesia. Anesth Analg 2019;129(4):1118–23.
10. Braveman P. Health disparities and health equity: concepts and measurement. Annu Rev Public Health 2006;27(1):167–94.
11. Rabbitts JA, Groenewald CB. Epidemiology of pediatric surgery in the United States. Paediatr Anaesth 2020;30(10):1083–90.
12. Groenewald CB, Lee HH, Jimenez N, et al. Racial and ethnic differences in pediatric surgery utilization in the United States: a nationally representative cross-sectional analysis. J Pediatr Surg 2022;57(8):1584–91.
13. Young S, Osman B, Shapiro FE. Office-based anesthesia: a contemporary update on outcomes, incentives, and controversies. Curr Opin Anaesthesiol 2023;36(6):643–8.

14. Hayanga AJ, Kaiser HE, Sinha R, et al. Residential segregation and access to surgical care by minority populations in US counties. J Am Coll Surg 2009; 208(6):1017–22.
15. Muffly MK, Muffly TM, Weterings R, et al. The current landscape of US pediatric anesthesiologists: demographic characteristics and geographic distribution. Anesth Analg 2016;123(1):179–85.
16. Muffly MK, Medeiros D, Muffly TM, et al. The geographic distribution of pediatric anesthesiologists relative to the US pediatric population. Anesth Analg 2017;125(1): 261–7.
17. Powers RJ, Mokdad AA, Pezzin LE, et al. Disparities in utilization of outpatient surgical care among children. Surgery 2021;170(6):1815–21.
18. Simon AE, Boss EF, Zelaya CE, et al. Racial and ethnic differences in receipt of pressure equalization tubes among US children, 2014. Acad Pediatr 2017;17(1):88–94.
19. Cooper JN, Koppera S, Boss EF, et al. Differences in tonsillectomy utilization by race/ethnicity, type of health insurance, and rurality. Acad Pediatr 2021;21(6): 1031–6.
20. Sadhasivam S, Chidambaran V, Ngamprasertwong P, et al. Race and unequal burden of perioperative pain and opioid related adverse effects in children. Pediatrics 2012;129(5):832–8.
21. Alalade E, Willer BL. Racial inequities in opioid use disorder management: can the anesthesiologist improve outcomes? Int Anesthesiol Clin 2023;61(1):16–20.
22. Rosenbloom JM, Senthil K, Long AS, et al. A limited evaluation of the association of race and anesthetic medication administration: a single-center experience with appendectomies. Cravero J. Pediatr Anesth 2017;27(11):1142–7.
23. Pinto N, Sawardekar A, Suresh S. Regional anesthesia. Anesthesiol Clin 2020; 38(3):559–75.
24. Monahan A, Deer J, Robles A, et al. Regional anesthesia in babies and children. Int Anesthesiol Clin 2019;57(4):e1–23.
25. Lo C, Ross PA, Le S, et al. Engaging parents in analgesia selection and racial/ethnic differences in analgesia given to pediatric patients undergoing urologic surgery. Child Basel Switz 2020;7(12):277.
26. Murray K, Akinleye O, Siddiqui A, et al. Socioeconomic disparities and trends in the utilization of regional and neuraxial anesthesia for pediatric femur fracture repair. Injury 2025;56(2):112086.
27. Andrew BY, Pfaff KE, Jooste S, et al. Factors associated with the use of regional anesthesia for calcaneal osteotomy in pediatric patients: a single-center, retrospective cohort study. Paediatr Anaesth 2025;35(2):107–17.
28. Nafiu OO, Mpody C, Kim SS, et al. Race, postoperative complications, and death in apparently healthy children. Pediatrics 2020;146(2):e20194113.
29. Akbilgic O, Langham MR, Davis RL. Race, preoperative risk factors, and death after surgery. Pediatrics 2018;141(2):e20172221.
30. Bhattacharyya N, Shapiro NL. Associations between socioeconomic status and race with complications after tonsillectomy in children. Otolaryngol Neck Surg 2014;151(6):1055–60.
31. Warren J, Gibbs A, Mpody C, et al. Failure to rescue following postoperative pneumonia in pediatrics: is there a racial disparity? Pediatr Anesth 2024;34(3): 220–4.
32. Willer BL, Mpody C, Tobias JD, et al. Association of race and family socioeconomic status with pediatric postoperative mortality. JAMA Netw Open 2022; 5(3):e222989.

33. Tarawneh OH, Quan T, Liu IZ, et al. Racial disparities in readmission rates following surgical treatment of pediatric developmental dysplasia of the hip. Eur J Orthop Surg Traumatol Orthop Traumatol 2023;33(7):2847–52.
34. Nordin AB, Shah SR, Kenney BD. Ambulatory pediatric surgery. Semin Pediatr Surg 2018;27(2):75–8.
35. Rajan N, Rosero EB, Joshi GP. Patient selection for adult ambulatory surgery: a narrative review. Anesth Analg 2021;133(6):1415–30.
36. Flanagan BE, Gregory EW, Hallisey EJ, et al. A social vulnerability index for disaster management. J Homel Secur Emerg Manag 2011;8(1). https://doi.org/10.2202/1547-7355.1792.
37. Yap A, Laverde R, Thompson A, et al. Social vulnerability index (SVI) and poor postoperative outcomes in children undergoing surgery in California. Am J Surg 2023;225(1):122–8.
38. Nieri CA, Davies C, Luttrell JB, et al. Associations between social vulnerability indicators and pediatric tonsillectomy outcomes. Laryngoscope 2024;134(2):954–62.
39. Rinke ML, Bundy DG, Heo M, et al. Pediatric surgical site infection (SSI) following ambulatory surgery: incidence, risk factors and patient outcomes. Infect Control Hosp Epidemiol 2022;43(8):1036–42.
40. Zhu T, Baker ZG, Trabold M, et al. Sociodemographic differences in opioid use and recovery following ambulatory pediatric urologic procedures. J Child Health Care Prof Work Child Hosp Community 2024;28(2):291–301.
41. Dixit AA, Elser H, Chen CL, et al. Language-related disparities in pain management in the post-anesthesia care unit for children undergoing laparoscopic appendectomy. Children 2020;7(10):163.
42. Nafiu OO, Chimbira WT, Stewart M, et al. Racial differences in the pain management of children recovering from anesthesia. In: Cravero J, editor. Pediatr Anesth 2017;27(7):760–7.
43. Dudley KA, Patel SR. Disparities and genetic risk factors in obstructive sleep apnea. Sleep Med 2016;18:96–102.
44. Fayson SD, Leis AM, Garetz SL, et al. Racial disparity in residual sleep apnea after adenotonsillectomy. Otolaryngol Neck Surg 2023;169(5):1309–18.
45. Chang E, Nicassio L, Whalen J, et al. Understanding why caregivers call after ambulatory pediatric urologic surgery. Can J Urol 2022;29(4):11243–8.
46. LaGuardia JS, Ali-Khan S, LaBarge D, et al. Pediatric plastic surgery under local anesthesia. Ann Plast Surg 2024;92(5S Suppl 3):S352–4.
47. Jaramillo J, Snyder E, Dunlap JL, et al. The Hispanic clinic for pediatric surgery: a model to improve parent-provider communication for Hispanic pediatric surgery patients. J Pediatr Surg 2016;51(4):670–4.
48. Johnson TJ, Hickey RW, Switzer GE, et al. The impact of cognitive stressors in the emergency department on physician implicit racial bias. Acad Emerg Med 2016;23(3):297–305.
49. Greenwald AG, Poehlman TA, Uhlmann EL, et al. Understanding and using the implicit association test: III. Meta-analysis of predictive validity. J Pers Soc Psychol 2009;97(1):17–41.
50. Jenkins PC, Lin A, Ames SG, et al. Emergency department pediatric readiness and disparities in mortality based on race and ethnicity. JAMA Netw Open 2023;6(9):e2332160.
51. Rosales A, Fortier MA, Campos B, et al. Community-based participatory research: an innovative approach for improving perioperative care of underserved children. Paediatr Anaesth 2017;27(2):126–36.