

BACKGROUND

- Racial and ethnic disparities in outcomes of pediatric disease state are pervasive
- Among children with American Society of Anesthesiologists Physical Status (ASA PS) 1 or 2, African American (AA) have higher risk of perioperative death as compared to White children with similar ASA PS¹.
- AA children have higher prevalence of risk factors associated with perioperative mortality³.
- Minimal data exists to describe the impact of race/ethnicity on ASA Physical Status determination among children. We hypothesized that ASA PS would differ based on race/ethnicity.

METHODS

- We conducted a retrospective study utilizing the National Surgical Quality Improvement Program-Pediatric (NSQIP-P) database from 2017-2021

- Inclusion criteria:**
- Age 18 years or less
 - ASA Physical Status 1, 2, 3, or 4

Exclusion criteria: Lacking ASA Physical Status data

Primary Exposure: Race/Ethnicity

Primary Outcome: ASA Physical Status 3 or 4

Secondary Outcome: Among Children with ASA Physical Status 3 or 4, factors associated with AA Race (determine a posteriori)

- The prevalence of clinical variables was calculated stratified by race/ethnicity. Univariable and multivariable logistic regression determined the odds ratios (OR) of high ASA PS (3 or 4) comparing non-Hispanic White children to AA, Hispanic, and Asian children.

RESULTS

Table 1: Baseline Characteristics Stratified by Race/Ethnicity

| CHARACTERISTIC | NON-HISPANIC WHITE, % | NON-HISPANIC AFRICAN AMERICAN, % | ABSOLUTE STANDARDIZED DIFFERENCE | HISPANIC, % | ABSOLUTE STANDARDIZED DIFFERENCE | ASIAN, % | ABSOLUTE STANDARDIZED DIFFERENCE |
|----------------------------|-----------------------|----------------------------------|----------------------------------|------------------|----------------------------------|------------------|----------------------------------|
| ASA 3 OR 4 | 28.1 | 39.1 | 0.235 | 27.7 | 0.010 | 26.2 | 0.043 |
| MALE SEX | 55.7 | 56.6 | 0.018 | 54.9 | 0.015 | 54.3 | 0.027 |
| BMI* | 17.3 (14.9-20.8) | 17.2 (14.5-21.0) | 0.014 | 18.0 (15.2-22.6) | 0.083 | 16.5 (14.4-19.2) | 0.133 |
| AGE (YR)* | 8.1 (1.8-13.5) | 6.5 (1.0-12.9) | 0.136 | 8.4 (2.1-13.3) | 0.009 | 7.1 (1.8-12.3) | 0.106 |
| PREMATURE BIRTH | | | 0.398 | | 0.052 | | 0.002 |
| | NO 10.2 | 9.8 | | 9.8 | | 10.2 | |
| | YES 4.2 | 9.1 | | 4.5 | | 4.2 | |
| | UNKNOWN 85.6 | 81.1 | | 85.7 | | 85.6 | |
| URGENT OR EMERGENT SURGERY | 26.6 | 23.2 | 0.079 | 36.6 | 0.22 | 24.2 | 0.016 |

*median values reported with interquartile ranges

Table 2: Univariable and Multivariable Adjusted Odds Ratio of ASA PS 3 or 4

| Race or Ethnicity | Odds of ASA 3 or 4 (95% CI) | P Value | Adjusted Odds of ASA 3 or 4 (95% CI) | P Value |
|-------------------------------|-----------------------------|---------|--------------------------------------|---------|
| Non-Hispanic White | Referent | | Referent | |
| Non-Hispanic African American | 1.65 (1.62-1.67) | <0.001 | 1.22 (1.20-1.25) | <0.001 |
| Hispanic | 0.98 (0.96-0.99) | 0.005 | 0.99 (0.97-1.01) | 0.40 |
| Asian | 0.91 (0.88-0.94) | <0.001 | 0.80 (0.77-0.83) | <0.001 |

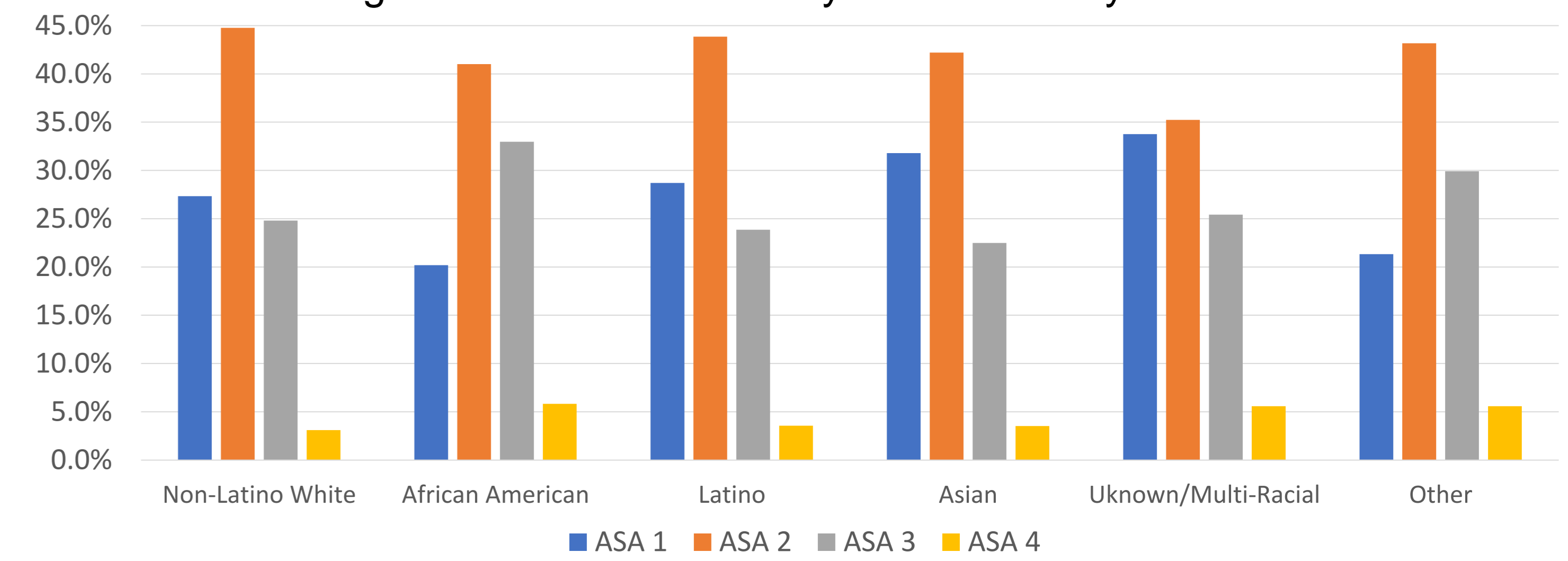
Adjustment Variables: sex, age, year, body mass index>25, ventilation needed, history of asthma, chronic lung disease, need for supplemental oxygen, tracheostomy, pulmonary disease, gastrointestinal disease, prior cardiac surgery, cardiac risk assessment, developmental delay, cerebral palsy, structural central nervous system disease, neuromuscular disease, hematologic disease, sepsis, on mechanical ventilation, vasopressor requirement, CPR in 7 days prior to surgery, congenital malformation, cancer diagnosis past or current, age <30 days, premature birth, urgent/emergent surgery, work RVU, inpatient/outpatient status

Table 3: Multivariable Adjusted Odds Ratio of African American Race

| Characteristics | Odds (95% CI) |
|----------------------------|------------------|
| Premature Birth (<36wks) | 2.04 (1.94-2.15) |
| BMI>25 | 1.40 (1.33-1.47) |
| Ventilator Dependent | 1.49 (1.43-1.56) |
| Asthma | 1.62 (1.54-1.69) |
| Bronchopulmonary Dysplasia | 1.77 (1.71-1.83) |
| Tracheostomy | 1.64 (1.54-1.73) |
| Hematologic Disease | 1.82 (1.75-1.89) |
| Work RVU | |
| 0-25 | Referent |
| 26-50 | 0.80 (0.77-0.83) |
| >50 | 0.58 (0.53-0.64) |

RESULTS

Figure 1: ASA PS Status by Race/Ethnicity



DISCUSSION

- Among 366,289 eligible encounters, 290,085 children with race/ethnicity data were analyzed.
- ASA PS 3 or 4 was most common in AA children
- AA children were more likely than White children to have high ASA both before and after adjustment for all preoperative clinical factors
- Among children with ASA PS 3 or 4, factors which may impact respiratory system were more common among African American children.
- The reasons for the differences in ASA PS are not clear. Clinical factors not available in the database may be more prevalent among AA children. Alternatively, progression of underlying pathology may cause greater illness at time of surgery. Socioeconomic variables that may contribute to delay of care or poor health maintenance cannot be accounted for as they are not available in NSQIP-P database.
- Provider bias when assigning ASA PS must also be considered.

Limitations:

- Only able to analyze and adjust for factors available in the NSQIP-P database
- Variation in procedures may confound provider designation of ASA PS
- Difficult to assess severity of illness at time of presentation.

CONCLUSION

Racial/ethnic differences in ASA PS determination exist which may reflect non-clinical factors and may impact studies of disparities which use ASA PS to determine health status. Alternative methodologies for assessing health status at time of surgery may be needed for studies on Racial/ethnic disparities

References

- Akbulgic O, et al. *Pediatrics*. 2018;141(2).
- Sanford EL, et al. *J Pediatr Surg*. 2022 Apr 12;(22)00266-4.
- Nafiu OO, et al. *Pediatrics*. 2020. Aug;146(2).