Impact of racial and ethnic disparities on health outcomes following cervical spine surgery

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Spine Surgery

- Racial and ethnic disparities affect outcomes post-surgery[1]

Blacks ↑ likelihood of post-operative complications compared to Whites[2,3]

[1]Haider et al, 2013 [2]Schoenfeld et al, 2011 [3]Skolasky et al, 2014 [4]Martin et al, 2007

Spine Surgery

- Racial and ethnic disparities affect outcomes in surgical patients[1]

  Blacks ↑ likelihood of post-operative complications compared to Whites[2,3]

- Recovery trajectory of the health outcomes after cervical spine surgery among Hispanics and other non-Hispanic Minorities (e.g., Asians) remains unclear

[1]Haider et al, 2013 [2]Schoenfeld et al, 2011 [3]Skolasky et al, 2014 [4]Martin et al, 2007

- Investigate the effect of race and ethnicity on outcomes such as PROMs of disability, pain, patient satisfaction, and achieving minimal symptom state (MSS)

- Hypothesis: Hispanic or non-Hispanic minorities would report worse PROMs as well as a higher likelihood of not achieving MSS compared to White, after adjusting for demographics, clinical characteristics, and pre-operative disability and pain.

Design & Sample

- The cervical module of the Quality Outcomes Database (QOD) - multicenter prospective registry
- Over 28,000 participants were enrolled from 70 participating centers across 33 states in the United States
- Participants were enrolled in QOD if they underwent surgery for degenerative disc herniation, stenosis, pseudoarthrosis, adjacent segment disease, and cervical instability

[1]McGirt et al, 2013 [2]Archer et al, 2020

Race and Ethnicity

All the participants (N=14,113) included in this study were classified using self-reported question at baseline

- **Hispanic (regardless of race) (N=342)**
- **Black (N=1,189)**
- **Asian (N=112)**
- **White (N=12,470)**

Other race, such as multi-racial or Native Americans, were excluded from the study since they were so few in numbers, and some were unable to be appropriately classified (N=479)

Missing follow-up data (N=13,408)

Patient-reported Outcomes

- Failure to achieve Clinically meaningful improvement for PROMs of disability and pain[1,2]
  - **Disability = 30% reduction in NDI from preoperative visit to 1-year following surgery**
  - **Pain = 30% reduction in NRS-NP/AP scores from preoperative visit to 1-year following surgery**
- PROMs of patient satisfaction with surgical outcomes[3]
  - **Satisfaction item on North American Spine Society (NASS) lumbar spine outcome assessment instrument**
- Failure to achieve Minimal Symptom State (MSS)[4]
  - **Score of ≤20 on NDI and NRS-NP/AP scores ≤2 at 1-year follow-up**

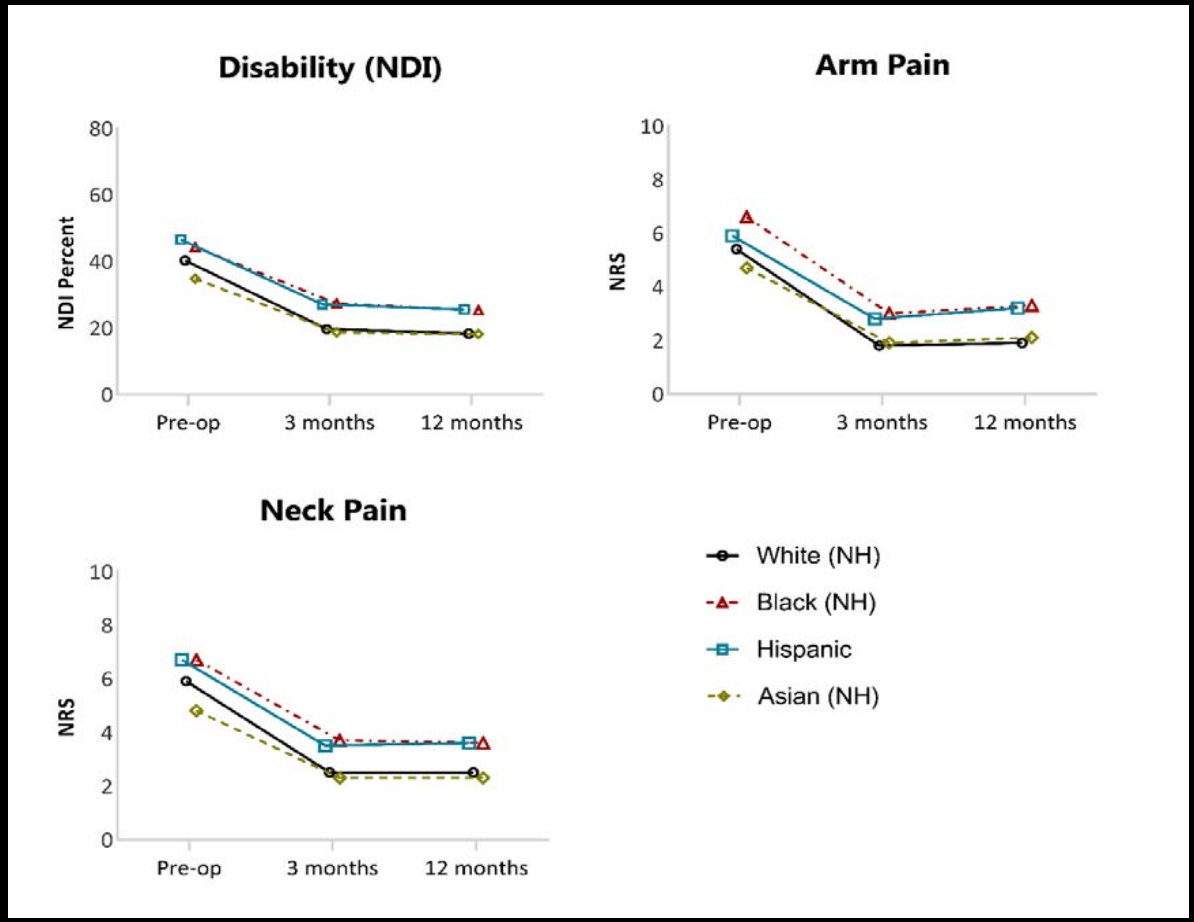
[1]Archer et al, 2020 [2]Asher et al, 2020 [3]Daltroy et al, 1996 [3]Crawford et al, 2019

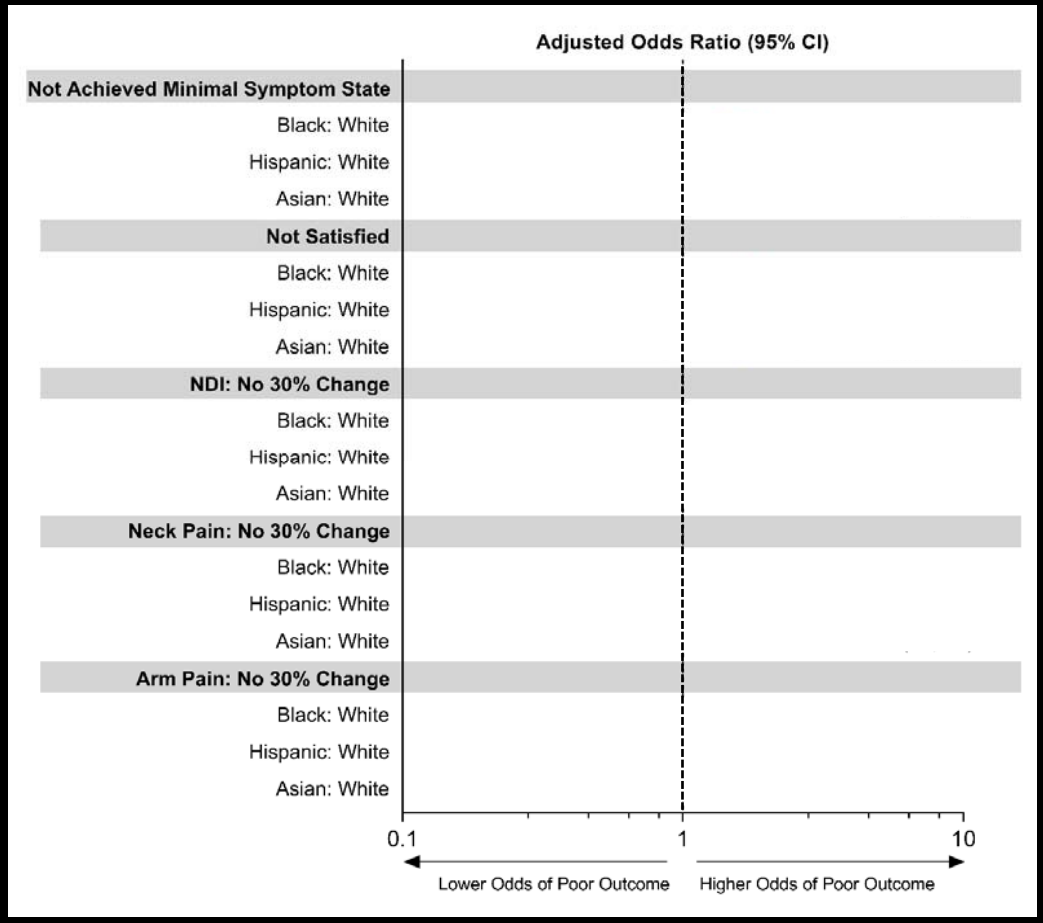
Statistical Analysis

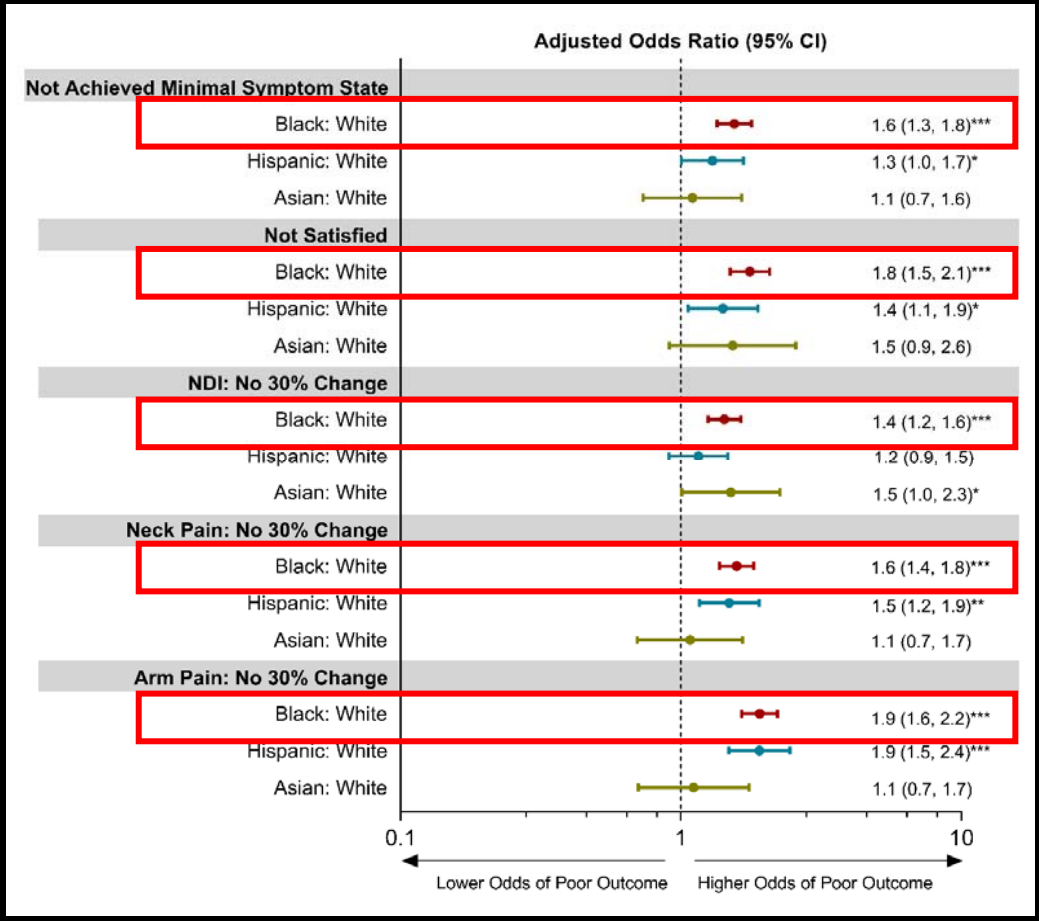
- To determine whether patient's race/ethnicity was an independent risk factor for post-operative outcomes
  - Multivariable logistic regression analyses was performed to compare the Hispanic, Black, and Asian with White participants controlling for covariates
  - Odds ratio (OR) and 95% confidence interval (CI) were computed to quantify the effect
  - 8% of the participants had missing demographic data
  - Multiple imputations using predictive mean matching was used to handle missing data

Subject Characteristics

Total sample size	14,113
Age in years, Mean ± SD	56.8±11.5
Female sex, N (%)	6953 (49.3%)
At least some college education, N (%)	7111 (50.4%)
No use of preoperative opioids, N (%)	8749 (62.0%)
ACDF Procedure, N (%)	11380 (80.6%)
Independent Ambulation, N (%)	12940 (91.7%)


Disability (NDI)
NDI Percent
80
60
40
20
0
Pre-op
3 months
12 months
Arm Pain
NRS
10
8
6
4
2
0
Pre-op
3 months
12 months
Neck Pain
NRS
10
8
6
4
2
0
Pre-op
3 months
12 months
White (NH)
Black (NH)
Hispanic
Asian (NH)


Adjusted Odds Ratio (95% CI)
Not Achieved Minimal Symptom State
Black: White
Hispanic: White
Asian: White
Not Satisfied
Black: White
Hispanic: White
Asian: White
NDI: No 30% Change
Black: White
Hispanic: White
Asian: White
Neck Pain: No 30% Change
Black: White
Hispanic: White
Asian: White
Arm Pain: No 30% Change
Black: White
Hispanic: White
Asian: White
0.1
1
10
Lower Odds of Poor Outcome
Higher Odds of Poor Outcome



40% to 90% increased odd of poor patient-reported outcomes

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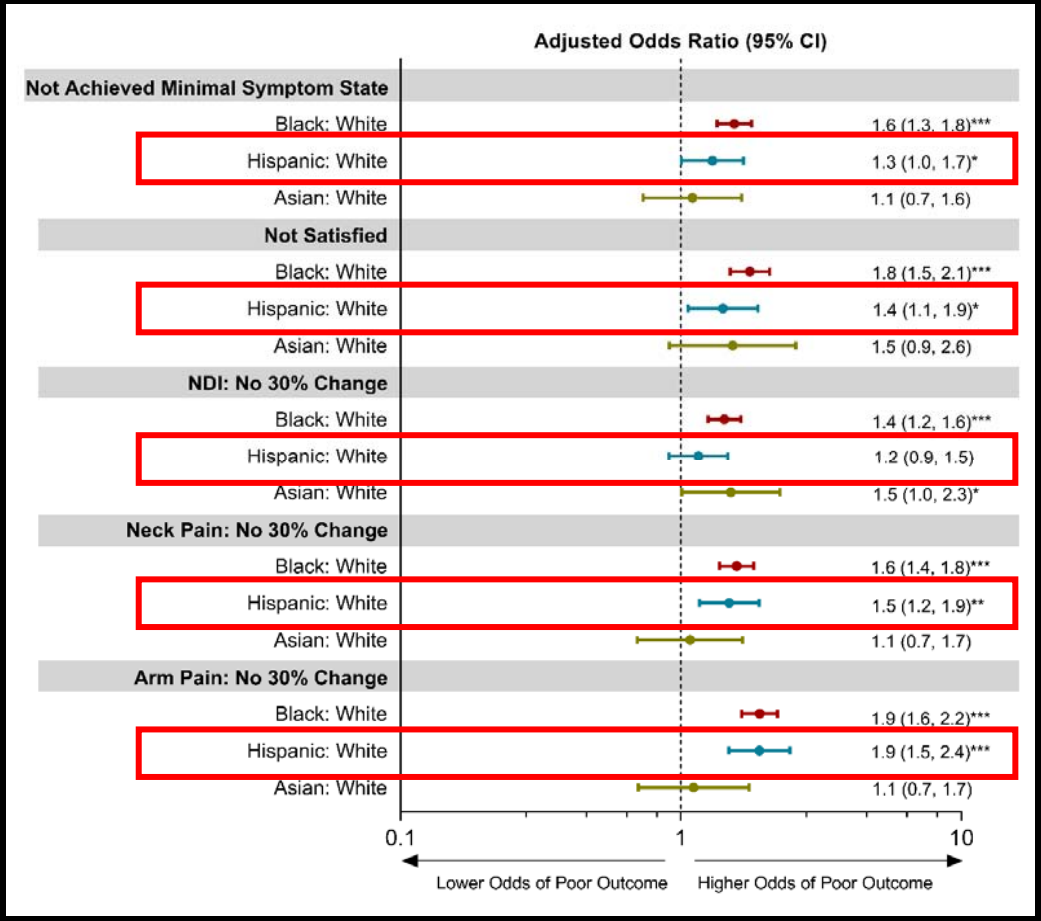

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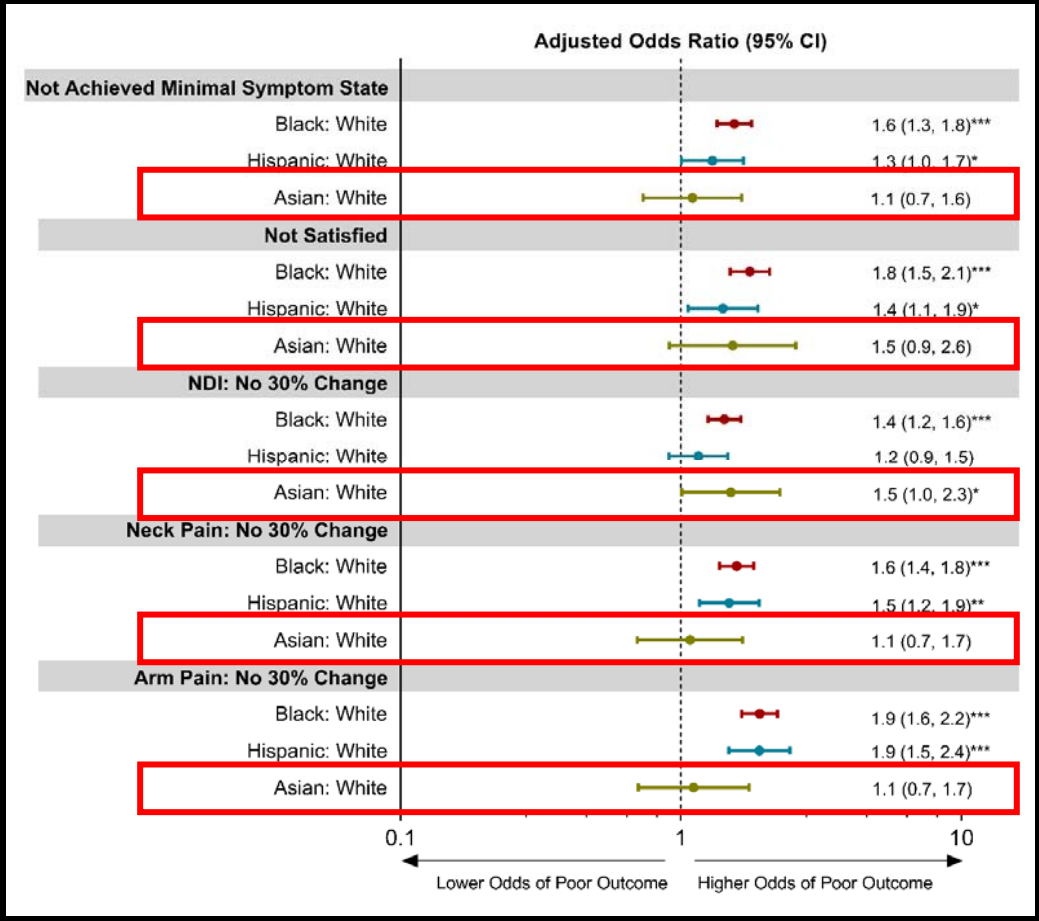

Conflicting

(caution – sample size for Asians is low)

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Study limitations

- Given the observational nature of our study, we are unable to clearly establish a causal relationship between racial/ethnic disparities and outcomes

- Overall 12 month follow-up rate was low in the registry
  - No baseline differences between those who did and did not complete 12 month follow-up

- Compared to White, Hispanic and Black patients did have an increased likelihood of reporting poor outcomes following cervical spine surgery, even after adjusting for potential confounders.

- However, Asian patients did not have an increased likelihood for reporting poor outcomes, except for inability to achieve clinical improvement in disability

- Suggest the need to account for underlying racial and ethnic disparities to better understand the recovery trajectories following cervical spine surgery.

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Thank you

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