

Is a BRaiST for One, a BRaiST for All? Evaluating the Effect of the BRaiST Trial on Spinal Fusion Rates Across Race and Insurance Status

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INTRODUCTION:

Adolescent idiopathic scoliosis (AIS) affects nearly 3% of the pediatric population, with approximately 10% of cases requiring surgical intervention, most commonly a spinal fusion (SF). Prior to surgical intervention, conservative treatment primarily consists of bracing, which had inconsistent evidence prior to 2013. In 2013, the groundbreaking BRaiST trial published in the NEJM demonstrated the efficacy of bracing in preventing progression to surgical intervention in AIS. Despite the monumental impact of this study on the effectiveness of bracing, limited research has investigated whether it influenced the utilization of spinal fusion, specifically among different sociodemographic groups. Previous studies have reported disparities in the utilization of conservative bracing among different racial groups and insurance coverages. The primary aim of this study was to examine potential disparities in the rates of spinal fusion in AIS before and after the publication of the BRaiST trial, using a national hospital database. We hypothesize that there will be differences in the trend of spinal fusion rates among various sociodemographic groups, as well as differences in the response following the BRaiST trial.

METHODS:

This study utilized the Kid's Inpatient Database (KID), which is part of the larger Healthcare Cost and Utilization Project (HCUP). Using ICD-9 and ICD-10 codes, a cohort of AIS patients who underwent SF in 3-year periods between 2003 and 2019 was identified. To identify whether the response to the BRaiST study differed by race and insurance status, PROC SURVEYMEANS (SAS) was used to output a national estimate and standard error for each 3-year period and sociodemographic group between 2003 and 2019. Estimates were divided by denominators calculated using US census data (the number of adolescents ages 10-19, in units of 100,000) averaged over the corresponding 3-year period. Resulting rates were plotted by 3-year time periods, and patterns were observed graphically. Interrupted time series models were used to test differences in intercepts and slopes (β) before and after the BRaiST study was published in 2013.

RESULTS:

A total of 28,523 SF procedures in AIS patients were included in the analysis. The average age was 14.2 years (SEM: 0.03 years) and the cohort was primarily female (74.6%), White (62.4%), using private insurance (66.8%). There was a statistically significant difference in the response following the BRaiST study between racial groups with respect to both slope (change in rate across timepoints) and intercept (total number of spinal fusions/100,000 patients). Among white patients, the intercept ($P < 0.001$) and slope ($P < 0.001$) both significantly decreased following the BRaiST study. Among Black patients, there was a significant decrease in intercept ($P < 0.001$), but no change in slope ($P = 0.06$) before and after 2013. There was no significant change in intercept or slope among Hispanic or Asian patients. Comparing insurance coverages, the intercept among patients with private ($P < 0.001$) and Medicare/Medicaid ($P < 0.001$) insurance significantly decreased; however, the same was not seen among self-pay patients ($P = 0.94$). There was no statistically significant change in slope in any of the groups.

DISCUSSION AND CONCLUSION:

The results of this study demonstrate the impact of the BRaiST trial and its publication in the NEJM, providing strong evidence of the efficacy of bracing in preventing curve progression in AIS. Following this publication in 2013, a significant decrease in the number of SFs and the rate over time of SFs was observed, specifically among White patients. Among Black patients, while there was a significant decrease in SFs after the BRaiST publication, the increase from 2016-2019 was similar to what was observed prior to 2013. Among Hispanic and Asian patients, no significant difference was seen in SF rate after 2013 or between 2016-2019. A similar observation was seen among Self-pay patients, often considered uninsured, while private insurance and Medicare/Medicaid patients saw decreasing SF rates after 2013.

These findings suggest potential inequity in the utilization of SF for AIS, despite the evidence supporting conservative bracing. This may be due to disparities in the dissemination of evidence among different sociodemographic groups. For example, among Hispanic patients, there may be a language barrier causing poor dissemination of evidence to providers and patients. Further research is necessary to identify the more variables, such as native language, and the underlying factors contributing to the differences in SF rates after BRaiST publication, and to explore how information regarding treatment options is disseminated among patient populations with varying socioeconomic statuses.