

# South Carolina Surgical Quality Collaborative Colon Surgery Outcomes Vary by Age and Race

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Identifying disparities in surgical outcomes among patient populations may help hospitals target patients at highest risk for complications. The South Carolina Surgical Quality Collaborative (SCSQC) is a regional collaborative made up of eight facilities whose goal is to improve the quality and value of general surgical care in South Carolina. Using SCSQC data, we reviewed colon surgery outcomes to determine whether disparities exist between specific patient populations. SCSQC colon surgery data were reviewed from August 2015 to August 2017. SSI, length of stay, return to the ED, and reoperation rates were used as outcome measures. They were evaluated in patient populations stratified by gender, race (white, black, and other), and age (<50, 50–70, and >70 years). A total of 2611 patients were included in this study. Statistically significant differences in outcomes were identified between white and black patients in length of stay (6.0 vs 7.5 days,  $P < 0.0001$ ) and return to the ED (8.1% vs 14.7%,  $P < 0.0001$ ), but not in SSI (6.4% vs 6.8%,  $P = 0.8839$ ) or reoperation rates (6.4% vs 8.4%,  $P = 0.1886$ ). Length of stay increased with increasing age (4.1 vs 7.1 vs 8.8,  $P < 0.0001$ ). SSI varied by age (4.0% vs 8.2% vs 6.4%,  $P = 0.0005$ ), as did return to the ED (11.2% vs 9.7% vs 7.6%,  $P = 0.0987$ ) and reoperation rates (4.5% vs 8.1% vs 8.2%,  $P = 0.0034$ ). SCSQC data indicate that race and age may place patients at risk for negative outcomes after colorectal surgery.

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**S**OUTH CAROLINA SURGICAL Quality Collaborative (SCSQC) facilities abstract 25 general surgery cases during an eight-day abstraction cycle. Colon cases are preferentially abstracted, as they are high-volume and high morbidity cases with significant opportunity for quality improvement initiatives. Colon surgery data were reviewed from all sites between August 2015 and August 2017. Surgical site infection, length of stay (LOS), return to the emergency department, and reoperation rates were used as outcome measures. Outcomes were compared in disparate patient populations stratified by gender, race (white, black, and other), and age (<50, 50–70, and >70 years).

A total of 2611 patients were included in this study. Statistically significant differences in outcomes were identified between white and black patients in LOS (6.0 vs 7.5 days,  $P < 0.0001$ ) and return to the ED (8.1% vs 14.7%,  $P < 0.0001$ ), but not in SSI (6.4% vs 6.8%,  $P = 0.8839$ ) or reoperation rates (6.4% vs 8.4%,  $P = 0.1886$ ). LOS increased with increasing age

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Differences in outcomes between races are commonly recognized, but the underlying causes for these differences are not well understood and are likely multifactorial. Previous studies evaluating disparities list contributing factors such as increased coexisting comorbidities, decreased willingness to undergo surgery, advanced presentation, and higher likelihood of open procedures to be potential explanations for disparities in outcomes in black patients compared with white patients.<sup>1,2</sup> Another study showed that even after adjusting for patient-specific (e.g., comorbidities, American Society of Anesthesiologists score, smoking, and malnutrition) and procedure-specific (e.g., laparoscopic vs open) variables, black patients still had a 9 per cent longer LOS compared with white patients without any increase in complication rate.<sup>3</sup> Our study demonstrated that black patients had a longer LOS and higher incidence in return to the ED, without increased SSI or reoperative rate (Table 1). This may suggest that disparities actually stem from an increased need for social support and/or post discharge resources in this

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TABLE 1. *SCSQC Colon Surgery Data Outcomes Stratified by Race*

	Black (n = 687)	White (n = 1888)	Other (n = 36)	P Value
LOS (mean ± SD)	7.5 ± 7.0	6.0 ± 6.1	7.0 ± 10.1	<0.0001
LOS median	5.6	3.0	4.4	<0.0001
SSI (%)	47 (6.8%)	120 (6.4%)	2 (5.5%)	0.8839
Return to ED (%)	101 (14.7%)	152 (8.1%)	2 (5.5%)	<0.0001
Re-op (%)	58 (8.4%)	121 (6.4%)	2 (5.5%)	0.1886
Age (mean ± SD, years)	54.8 ± 17.5	55.5 ± 17.5	51.1 ± 19.6	0.2483

TABLE 2. *SCSQC Colon Surgery Data Outcomes Stratified by Age*

	Age < 50 years (n = 859)	Age 50–70 years (n = 1240)	Age > 70 years (n = 512)	P Value
LOS (mean ± SD)	4.1 ± 4.9	7.1 ± 6.6	8.8 ± 7.2	<0.0001
LOS median	2.4	5.0	6.6	<0.0001
SSI (%)	34 (4.0%)	102 (8.2%)	33 (6.4%)	0.0005
Return to ED (%)	96 (11.2%)	120 (9.7%)	39 (7.6%)	0.0987
Re-op (%)	39 (4.5%)	100 (8.1%)	42 (8.2%)	0.0034

population, rather than from patient or surgery-specific issues. Additional research is needed to determine the causes for these observed differences.

Outcomes such as readmission and return to ED have significant financial ramifications, especially in colorectal surgery. One study cited that 14.7 per cent of patients were readmitted or presented to the ED within 30 days of discharge after colon surgery, with a median of \$7030 associated with the increased care.<sup>4</sup>

We found a statistically significant increase in LOS with age. Of interest, SSI, return to ED, and reoperative rates were highest in patients 50 to 70 years old (Table 2). Other studies have found that age <65 years is also a risk factor for readmission and increased incidence of return to the ED after colorectal surgery.<sup>4</sup> Identifying the causes for these differences may help facilities target specific patients for quality improvement efforts.

Our study has several limitations. The data were collected in a retrospective manner from eight sites with different patient populations, variable colon surgery protocols, and variable skill sets. We did not control for specific risk factor variables or socioeconomic status, which may impact outcomes. Our analysis does not elucidate why patients had increased LOS, returned

to the ED, or required reoperation, but it does provide information on specific patient groups.

SCSQC data demonstrate that disparities exist in outcomes based on age and race in patients undergoing colorectal surgery. Identifying populations vulnerable to complications and a better understanding of the source of these disparities can help guide hospitals' quality improvement efforts with the goal of decreasing financial burden, diminishing disparities, and improving overall outcomes for all patients.

#### REFERENCES

1. Haider AH, Scott AK, Rehman KA, et al. Racial disparities in surgical care and outcomes in the United States: a comprehensive review of patient, provider and systemic factors. *J Am Coll Surg* 2013;216:482–92.
2. Le H, Ziogas A, Lipkin SM, et al. Effects of socioeconomic status and treatment disparities in colorectal cancer survival. *Cancer Epidemiol Biomarkers Prev* 2008;17:1950–62.
3. Giglia MD, DeRussy A, Morris MS, et al. Racial disparities in length-of-stay persist even with no postoperative complications. *J Surg Res* 2017;214:14–22.
4. Bliss LA, Maguire LH, Chau Z, et al. Readmission after resections of the colon and rectum: predictors of a costly and common outcome. *Dis Colon Rectum* 2015;58:1164–73.