Racial Disparities in Rectal Cancer Treatment
A Population-Based Analysis

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Hypothesis: We hypothesized that there are significant racial disparities in delivery of care to rectal cancer patients. We examined differential surgical and radiation treatment for these patients and determined whether blacks were less likely than whites to undergo sphincter-sparing procedures, which are associated with a higher quality of life than sphincter-ablating procedures.

Design: Cross-sectional cohort study.

Patients and Setting: The Surveillance Epidemiology and End Results database provided population-based data for rectal cancer patients who were diagnosed between 1988 and 1999, were older than 35 years, and had no prior colorectal or other pelvic cancer.

Main Outcome Measures: Using logistic regression, we compared receipt and type of surgical therapy and radiation therapy, controlling for age, sex, year, geography, stage, and anatomic location.

Results: Among 52,864 patients, 3,851 were black and 44,010 were white. Blacks were younger than whites and had more advanced disease (P<.001). Among patients who underwent operation, rates of sphincter-ablating procedure were 37% for whites and 43% for blacks (adjusted odds ratio [AOR], 1.42; 95% confidence interval [CI], 1.23-1.65). Moreover, 53% of whites and 56% of blacks received no radiation therapy for stage II to III disease (AOR, 1.30; 95% CI, 1.15-1.47).

Conclusions: Blacks with rectal cancer were diagnosed at a younger age and more advanced disease stage than whites, implying a need for more aggressive screening. After adjusting for stage and other covariates, surgical and radiation treatment also differed along racial lines. Our data suggest that treatment disparities may contribute to differences in outcome among racial/ethnic groups with rectal cancer, and they highlight the need for improving access to state-of-the-art surgical care for minority patients with rectal cancer.

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With a projected incidence of 135,000 cases this year, colorectal cancer is the third most common malignancy diagnosed in the United States and is the second leading cause of cancer mortality.1 Recently, there has been an overall decline in the incidence of and mortality from colorectal cancer. However, black patients have not enjoyed the same decline.2 From 1992 to 1998, the annual decrease in death rate for white males was 2.1% compared with 0.9% for black males; similarly, the annual decrease in death rate for white females was 1.9% compared with 0.6% for black females.3

Two broad hypotheses could explain these outcome discrepancies. Blacks may be physiologically vulnerable and experience a more aggressive disease course. Alternatively, the higher rate of socioeconomic disadvantage among blacks as a group may render their medical care different from that of whites.4 No evidence to date indicates that colorectal cancer itself behaves differently between the races; studies controlling for stage at diagnosis and those with standardized treatment protocols describe virtually identical outcomes for blacks and whites.6,7 Conversely, lower socioeconomic status in patients with colorectal cancer is significantly associated with worse outcomes.8,9 Taken together, these findings suggest that the possibility of disparities in medical care as a potential influence on outcomes merits further investigation.

See Invited Critique at end of article

Although colon and rectal cancer are combined in most large databases and are histologically identical, their dif-
Medicare. Similarly, data agreement for resection of colorectal cancer, with 94% concordance with radiation therapy claims in radiation therapy use in SEER is considered high for rectal cancer, and follow-up for vital status. The ascertainment of logic characteristics, stage at diagnosis, first course of treatment and Utah, and has been expanded to include Los Angeles and Hawai, New Mexico, San Francisco–Oakland, Seattle-Puget Sound, ascertainment for SEER began in 1973 in Atlanta, Detroit, Hawai, and has been expanded to include Los Angeles and San Francisco–Oakland since 1992. The registries collect data, including patient demographics, primary tumor site, morphologic characteristics, stage at diagnosis, first course of treatment, and follow-up for vital status. The ascertainment of radiation therapy use in SEER is considered high for rectal cancer, with 94% concordance with radiation therapy claims in Medicare. Similarly, data agreement for resection of colorectal cancer between SEER and Medicare claims has also been excellent, with κ values from 0.78 to 0.84. Owing to removal of all patient identifiers and the public availability of the data, this study was approved as exempt from full institutional review board consideration.

SUBJECTS

Data were collected for all patients diagnosed as having rectal cancer and entered into the SEER database between 1988 and 1999. Patients were excluded from analysis if they had a prior diagnosis of colon or rectal cancer, a prior diagnosis of cancer requiring irradiation or surgery in the pelvis (the entire lower urinary tract, female organs, male organs, and anus), or were younger than 35 years at the time of diagnosis.

METHODS

SETTING

The National Cancer Institute–funded Surveillance Epidemiology and End Results (SEER) Cancer Incidence Database is an anonymous nationwide population-based database in the public domain. During the era of interest, SEER drew from 11 cancer registries that covered approximately 14% of the US population, with oversampling of racial and ethnic minorities. Case ascertainment for SEER began in 1973 in Atlanta, Detroit, Hawai, New Mexico, San Francisco–Oakland, Seattle-Puget Sound, and Utah, and has been expanded to include Los Angeles and San Jose–Monterey since 1992. The registries collect data, including patient demographics, primary tumor site, morphologic characteristics, stage at diagnosis, first course of treatment, and follow-up for vital status. The ascertainment of radiation therapy use in SEER is considered high for rectal cancer, with 94% concordance with radiation therapy claims in Medicare. Similarly, data agreement for resection of colorectal cancer between SEER and Medicare claims has also been excellent, with κ values from 0.78 to 0.84. Owing to removal of all patient identifiers and the public availability of the data, this study was approved as exempt from full institutional review board consideration.

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VARIABLES

We examined race as a primary predictor variable and performed analyses based on black vs white race. Main outcome variables included the proportion of patients undergoing any surgical treatment, the proportion of patients undergoing a sphincter-sparing procedure vs abdominoperineal resection, the delivery of any radiation treatment, and the delivery of neoadjuvant irradiation. Covariates included age, sex, the American Joint Committee on Cancer stage of disease, year of diagnosis, location in the rectum or rectosigmoid, and the SEER site of entry.

STATISTICAL ANALYSIS

We compared racial differences in age at diagnosis and stage of disease using the χ² test for trend. We examined the treatment provided to patients of different race with stage II and III disease, using χ² analyses to calculate the unadjusted odds ratio (OR) and multiple logistic regression methods to determine the OR and 99% confidence interval (CI), controlling for main effects of the covariates. Rates and proportions were calculated for categorical data, and means and SEs were calculated for continuous data. Sample size calculations for α=.05 and power=.9 revealed that a 3% or greater difference in treatment rate could be determined with minimum samples of 1040 and 12730. Statistical analyses were performed with STATA version 7 software (Statacorp, College Station, Tex).

RESULTS

Between 1988 and 1999, 56940 patients with rectal cancer were entered into the SEER database. After applying exclusion criteria, 52864 patients remained (Table 1). Blacks (n=3851) with rectal cancer were younger than whites (n=44010) at the time of diagnosis (age, mean±SD, 64±12 years and 69±12 years, respectively; test for trend, P<.001). The SEER site of entry varied markedly among patients of different race (Table 2), with most blacks entered in Detroit (33%), Los Angeles (23%), Atlanta (15%), and San Francisco–Oakland (15%).

Although nearly all patients underwent some surgical treatment, the type of operation differed along racial lines (Table 3). Among patients with stage II and III disease, 4% of whites and 6% of blacks had no operation (adjusted OR [AOR], 1.30; 95% CI, 1.12-1.95). Among patients who underwent surgical treatment, 37% of whites and 43% of blacks underwent abdominoperineal resection (a sphincter-ablating procedure) (AOR, 1.42; 95% CI, 1.23-1.65).

Table 4 presents a comparison of adjuvant treatment by race among patients with stage II and III disease. Fifty-three percent of whites and 56% of blacks received no radiation therapy (AOR, 1.30; 95% CI, 1.15-1.47). Rates of neoadjuvant radiation therapy delivered were 7% for both groups.
COMMENT

Racially disparate incidence and outcomes among cancer patients have become well-established phenomena cited by a number of databases and studies. A later stage at diagnosis, potentially resulting from a lower rate of screening, has been identified as one etiologic factor. We found that disease was detected in blacks at a significantly younger age and more advanced stage compared with whites, reaffirming previous findings that more targeted or more effective screening could improve outcomes among these patients.

To examine the effect of race on disparate outcomes in more detail, we investigated the delivery of care to blacks vs whites, using a national population-based database. We chose to examine the experience of patients with rectal cancer specifically because the standard of care has been changing during the past 12 years. Surgical therapy has gradually shifted to a dominance of sphincter-sparing procedures (resulting in bowel continuity) over sphincter-ablating procedures (resulting in permanent ileostomy). The shift toward sphincter-sparing procedures has indicated similar or improved outcomes among these patients.11,28

In treatment pertaining to quality of life issues among patients with rectal cancer there has been a growing awareness of the significance of psychological distress, restrictions in social function, and impairment in sexual function compared with those without ostomy. However, patients with ostomy have reported increased psychological distress, restrictions in social function, and impairment in sexual function compared with those without ostomy. After controlling for stage of disease at diagnosis, we identified the type of operation performed as the most notably divergent outcome between blacks and whites. Among patients undergoing either a sphincter-sparing operation or an abdominoperineal resection, the adjusted odds of having a permanent colostomy were 42% greater for blacks than whites. Although our data do not allow us to establish a precise mechanism for this discrepancy, controlling for age, sex, stage of disease, geographic region, year of diagnosis, and even approximate tumor site (“rectum” vs “rectosigmoid”) only increased the odds of a more invasive sphincter-ablating procedure among blacks. To our knowledge, racial variation in treatment pertaining to quality of life issues among patients with rectal cancer has not been addressed previously, although one may presume that the desire for intestinal continuity traverses racial barriers.

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recurrent cancer. Neoadjuvant radiation therapy provides
a consensus conference on adjuvant therapy for colon and
rectal cancer since the 1990 National Institutes of Health
consensus conference on adjuvant therapy for colon and
rectal cancer. Treatment regimens for rectal cancer. The
differences in provision of surgical and adjuvant care do not
appear to be based wholly on biological predicates, such as
comorbid disease.

We also specifically investigated rectal cancer treat-
ment because radiation therapy has been increasingly ac-
ncepted as the standard of care for stage II and III rectal
cancer since the 1990 National Institutes of Health
consensus conference on adjuvant therapy for colon and
rectal cancer. Neoadjuvant radiation therapy provides the
added benefit of tumor shrinkage, potentially allowing
a sphincter-sparing procedure to be performed on pa-
tients with more distal tumors. Among stage II and III
patients, we found that any radiation therapy was less
likely to be delivered to blacks than whites. We were
surprised to find that less than 50% of patients overall
underwent radiation treatment. Using a linked SEER-
Medicare database, Schrag and colleagues documented
slightly higher rates of radiation treatment among pa-
tients older than 65 years, but these were insured pa-
tients assessed between 1992 and 1996, and those with
local excision or rectosigmoid disease were excluded. Our
decision to include patients diagnosed as having rec-
tosigmoid cancer was based on the highly variable anat-
omic transition of rectum to sigmoid colon and would
tend to bias our results toward the null hypothesis.

A recent publication examining the treatment of rec-
tal and rectosigmoid cancer patients in California be-
tween 1994 and 1996 noted that only 44% of patients
with stage II disease and 60% of patients with stage III
disease received some adjuvant therapy. However, these
patients experienced wide variation in treatment regi-
ments that could not be wholly explained by clinical data.
Our finding that an even smaller proportion of patients
received the recommended treatment on the national level
likely reflects regional differences in the diffusion of stan-
dardized care.

Neoadjuvant radiation therapy, which can facili-
tate sphincter preservation and may be a marker for increased
expertise in rectal cancer care, was delivered more equ-
itably but to only 7% of patients overall. As neoadjuvant
radiation therapy is more widely performed in the future,
monitoring its delivery may provide further insights into
whether race-based variations in care are narrowing.

This study has several limitations. Using the SEER
data bases limited our ability to assess the effect of poten-
tially important confounders, including some tumor-
related features, patient comorbidities and preferences,
provider and hospital system characteristics, and socio-
economic variables. Future investigations using linked da-
bases will allow us to account for many of these potential
confounders. Additionally, we did not have detailed
information regarding technical issues, such as precise loca-
tion of the tumor in the rectum, which may influence
the type of procedure performed. However, while previ-
ous studies suggest that blacks have a higher incidence of
proximal colon cancer, there is no evidence to suggest
that blacks have a higher incidence of distal rectal cancer
than whites. Furthermore, we found a relatively in-
creased proportion of women among black patients with
rectal cancer, and the female pelvis renders a sphincter-
sparing operation more technically feasible.

Despite these limitations, we found evidence of con-
sistent racial disparities in the receipt of established treat-
ment regimens for rectal cancer. The differences ex-
tended most markedly to the disparate rates of sphincter-
ablating operations, which mandate permanent colostomy,
and may have a profound effect on self-image and qual-
ity of life. We also identified discrepancies in the appli-
cation of recommended surgical and radiation therapy,
which have been consistently shown to enhance sur-
vival. Further studies are warranted to investigate the
relationships among race, treatment, and, ultimately, sur-
vival, controlling for patient- and provider-related vari-
able. These findings further underscore the need for sur-
geons, oncologists, and health care policy makers to
intensify their efforts to deliver state-of-the-art com-
bined modality rectal cancer therapy to all patients.

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REFERENCES

1. Surveillance Epidemiology and End Results Cancer Incidence Database. Silver
Spring, Md: Information Management Services Inc; 1998.

Table 4. Comparison of Adjuvant Radiation Therapy by Race Among Patients With Stage II and III Rectal Cancer

<table>
<thead>
<tr>
<th>Radiation Therapy</th>
<th>Rate of Treatment, %</th>
<th>Odds of No Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Any None Unadjusted OR Adjusted OR (95% CI)</td>
<td></td>
</tr>
<tr>
<td>White (n = 17 493)</td>
<td>47 53 Reference Reference</td>
<td></td>
</tr>
<tr>
<td>Black (n = 1434)</td>
<td>44 56 1.15 1.30 (1.15-1.47)</td>
<td></td>
</tr>
</tbody>
</table>

Neoadjuvant Radiation Therapy

| White (n = 17 158) | 7 93 Reference Reference |
| Black (n = 1402)   | 7 93 0.96 1.04 (0.87-1.36) |

Abbreviations: CI, confidence interval; OR, odds ratio.