Racial and Age Differences in Colon Examination Surveillance Following a Diagnosis of Colorectal Cancer

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Purpose: The purpose of this analysis is to describe factors associated with colorectal surveillance following diagnosis and treatment of nonmetastatic colorectal cancer. Methods: Subjects were identified as part of the HMO Cancer Research Network’s study of colorectal cancer survivors. To be eligible for the main study, patients had to be part of the staff model components of health maintenance organizations in southeastern Michigan and Minnesota. Using computerized databases, individuals were identified who were 40 years or older with incident nonmetastatic colorectal cancer diagnosed between January 1, 1990, and December 31, 2000. Using data current through 2002, we analyzed the cohort using chi-square test statistics, life tables, and Cox proportional hazards models to understand variations in posttreatment surveillance practices. Subjects were followed up from date of diagnosis to date of recurrence, death, disenrollment from the health plan, or loss to follow-up, which ever came first. We assessed factors associated with colorectal surveillance at 1, 3, and 5 years after treatment. We also included an analysis comparing those who received an exam and those who didn’t regardless of exam timing. Results: A total of 908 patients were eligible for the main study. Of these, we excluded subjects who were not white or African American (n = 27), resulting in an analytic sample of 881 (97% of the eligible cohort). Twenty-five percent of subjects were African American, 43% were female, and 48% were aged 70 years or older. The proportion who received an exam at 1 year was 18%, at 3 years was 60%, and at 5 years was 67%. Chi-square tests showed that African Americans were statistically significantly less likely than whites to receive an exam at any three time points. The Cox proportional hazards model for examinations regardless of timing and adjusted for confounders showed that African Americans were still less likely than whites to receive an exam (hazard ratio = 0.62; 95% confidence interval [CI] = 0.51 to 0.75). The same trend in undersurveillance was also observed for those 80 years of age or older at diagnosis, with an adjusted hazard ratio of 0.39 (95% CI = 0.26 to 0.57). Conclusion: Our data indicate that colorectal cancer survivors who are African American or aged 80 years or more at diagnosis are less likely to receive posttreatment colorectal surveillance. Whether these differences are due to system or patient level barriers needs further study. [J Natl Cancer Inst Monogr 2005;35:96–101]
population-based research program comprised of the enrollees, research centers and data systems of 11 U.S. HMOs. The health care delivery systems participating in the CRN are as follows: Group Health Cooperative, Harvard Pilgrim Health Care, Henry Ford Health System/Health Alliance Plan, HealthPartners Research Foundation, the Meyers Primary Care Institute of the Fallon Healthcare System/University of Massachusetts, and Kaiser Permanente in six regions (Colorado, Georgia, Hawaii, Northwest [Oregon and Washington], Northern California, and Southern California). The 11 health plans have nearly 10 million enrollees. The CRN conducts collaborative research on variations in cancer prevention and treatment policies and practices. Two HMOs participated in this study: one that is representative of the metropolitan area of Detroit, Michigan, and surrounding suburbs and one that serves primarily the metropolitan areas of Minneapolis and St. Paul, Minnesota. The data presented were collected as part of a larger study to examine recurrence and survival of colorectal cancer patients. This protocol was approved by the institutional review boards at both health plans.

Study Population

To be eligible for the main study, patients had to be HMO members and aged 40 years or older at diagnosis, diagnosed with an incident Stage 0, I, II, or III colorectal cancer between January 1, 1990 and December 31, 2000. Patients with Crohn disease, ulcerative colitis, and irritable bowel syndrome were excluded (n = 49) from the original study because these comorbidities may affect screening behaviors, recurrence, and survival. For this analysis we included those subjects from the main study who were recorded from medical record review as being either African American (n = 222; 25%) or white (n = 659; 75%).

Subject Identification

Cohort subjects were identified by using the automated data resources at each health plan. Tumor registry data at the Michigan site was used to identify all primary cases of colorectal carcinoma that fit the age and stage criteria. In Minnesota, where an onsite tumor registry was not available, cases were identified through electronic data. An algorithm was first developed at the Michigan site using the tumor registry as a “gold standard” and then applied to databases at the Minnesota plan. The final case ascertainment algorithm identified cases that had received a pathology read less than 7 days after a colon procedure and had a subsequent ICD-9-coded encounter for colorectal cancer. Comparing the algorithm against the gold standard in Michigan (tumor registry), we estimated 87% sensitivity in identifying potential cohort subjects.

All individuals deemed eligible from the administrative databases were subject to medical record review to confirm eligibility. Cases were excluded if there was a history of colorectal cancer prior to the study period, personal history of bowel disease (as described above for exclusion), or colorectal cancer stage greater than stage III. American Joint Commission on Cancer (AJCC) criteria were used to assess cancer stage and all cases were reviewed by a certified tumor registrar to affirm the stage captured at each site by the medical abstractors. Information collected and used for this analysis included age, race, sex, colorectal cancer diagnosis date and site, personal history of bowel disease, colorectal cancer staging, surveillance procedures, recurrence, and vital status.

Patient Examinations and Follow-up

For the main study, patients were followed up from diagnosis until date of death, last encounter, or disenrollment from the health plan, whichever occurred first. Surveillance examinations were captured from the medical record review. Whenever possible, the colonoscopy report was reviewed; however, if this was not available then a doctor’s note was used. The definition of a complete colonic exam included either colonoscopy or sigmoidoscopy and barium enema combined (defined as within 3 months of each other). Exams that occurred between diagnosis and 6 months were considered part of the initial episode of care for the colorectal cancer diagnosis and not counted as surveillance.

Covariates

Potential confounders examined in the analysis included age at diagnosis, race, sex, previous polypectomy, and cancer stage and site. Age was stratified into decades of life: 40–49, 50–59, 60–69, 70–79, and 80 or older. Race was categorized as African American and white. Cancer stage was abstracted during the medical record review using the AJCC guidelines. All cases were reviewed for accuracy of staging by a certified tumor registrar. Location of the tumor was dichotomized as rectal and nonrectal. History of previous polypectomy was collected if noted during the peridagnostic period. Information on the histology of the removed polyp was not systematically available and therefore is not included in our analysis.

Data Analysis

We calculated chi-square test statistics for univariate comparisons and report the associated P value. Also, life tables for overall receipt of exam and examination within 1 year, 3 years, and 5 years for each covariate strata were calculated; these include a P value for a log-rank test of difference in proportions receiving the exam. When appropriate we calculate the Mantel–Haenzel chi-square test for linear trend and report the associated P value. For time to exam comparisons, a two-sided t test was used to measure differences in the mean time to exam. The mean time to exam and the P value are reported for these comparisons. Finally, we calculated Cox proportional hazards models with adjustment for the covariates outlined above. We report the hazard ratio with 95% confidence intervals for examination overall without regard to timing and at 1, 3, and 5 years.

Results

Study Population

A total of 908 patients were eligible for the main study. Of the main cohort, we excluded subjects who were not white or African American (n = 27), resulting in an analytic sample of 881 (97% of eligible cohort). Of those included in this analysis, 25% were African American, 43% were female, and 15% were aged 80 years or more at the time of diagnosis (Table 1). Seventeen percent of the analytic cohort were reported to have had at least one polypectomy prior to diagnosis. At the time of the initial colorectal cancer diagnosis, 7% presented with Stage 0, 28%...
with Stage I, 35% with Stage II, and 30% with Stage III. Age at diagnosis and previous polypectomy were marginally statistically significant (P = .05 and .07, respectively), but otherwise there were no differences by race within the cohort.

Receiption of Exam

Within the analytic cohort, the proportion of subjects receiving an exam without regard to timing was 68%, with most of the subjects receiving a colonoscopy (99%) rather than a sigmoidoscopy/barium enema (1%). The overall mean time to exam was 19 (±16.3) months.

Table 2 presents examination receipt data by demographic and diagnostic variables. The median time to exam is statistically significantly different by race (P = .0002), age (P < .0001), and sex (P = .03). The chi-square tests for the proportion receiving an exam at 1, 3, and 5 years demonstrates a persistent trend by race and age. Those who are older at diagnosis (80 years or older) are less likely to receive an exam at 1 (P = .005), 3 (P < .0001), and 5 years (P < .0001). Likewise, African Americans are less likely than white people to receive an exam at year (P = .0008), 3 years (P < .0001), and 5 years (P = .0009).

Results of the Cox proportional hazard models with adjustment for all other available variables are given in Table 3. Race was statistically significantly associated with a delay in receipt of an exam at all time points assessed. Being 80 years or older at the time of diagnosis was statistically significantly associated with a delay in examination overall and at the 1-, 3-, and 5-year time points.

Figures 1 and 2 show the Kaplan–Meier curves for receipt of an exam by race and age at diagnosis between 6 months and 5 years postdiagnosis, reflecting these findings. Figure 3 depicts the Kaplan–Meier curves for time to exam for year of diagnosis comparing 1990–1993, 1994–1996, and 1997–2000. The log-rank P value for differences in time to exam by year of diagnosis is 0.73.

Relative to females, males were 42% more likely to have received an exam 1 year postdiagnosis; however, this difference was not maintained at the 3- or 5-year time points or in the overall assessment. Relative to Stage 0, later stage at diagnosis was associated with an increased likelihood of receiving an exam, which was statistically significant for Stage III cases overall (1.50; 95% confidence interval [CI] = 1.04 to 2.17), at 3 years (1.55; 95% CI = 1.05 to 2.30), and at 5 years (1.50; 95% CI = 1.04 to 2.17). Because the location of the tumor may influence the receipt of examination, we assessed rectal tumors versus tumors elsewhere in the colon. Those who had rectal tumors were statistically significantly less likely to have received a complete surveillance exam overall (0.65; 95% CI = 0.51 to 0.83) and at 3 (0.62; 95% CI = 0.48 to 0.80) and 5 years (0.64; 95% CI = 0.50 to 0.81) postdiagnosis. Figure 4 shows the Kaplan–Meier curves for receipt of examination with median time to exam (regardless of timing) and proportion receiving an exam within 1 year, 3 years, and 5 years of colorectal cancer diagnosis.
DISCUSSION

We conducted an observational cohort study to assess the proportion of colorectal cancer survivors who receive postdiagnosis surveillance. Our results suggest that not all patients receive complete colon exams even 5 years following a diagnosis of colorectal cancer. In our observational cohort, those over 80, African Americans, or those diagnosed with a rectal tumor were less likely to receive an exam.

Our findings are similar to those of previous studies. McFall et al. (21) found that 49% of 798 cases of colorectal cancer in their population did not have a surveillance colon examination during the follow-up period. The reasons cited in this study were because of advanced age, poor prognosis, or early death (21). In a study of an HMO population in Seattle, Rulyak et al (22) found 60% of colorectal cancer survivors received an exam within 18 months and 80% within 5 years of diagnosis. Our findings were 60% receiving an exam within 1 year of diagnosis and 67% within 5 years of diagnosis (including censoring the proportion is approximately 80%).

Cooper et al. (1999), in a population of Medicare beneficiaries, found that 49.3% of African Americans received a surveillance colonoscopy compared to 52.6% of those of other races. African Americans were also less likely to receive a sigmoidoscopy (13.6% versus 18.5%, respectively) but were more likely to receive a barium enema (14.5% versus 12.9%) (23).

![Fig. 1. Cumulative proportion receiving an exam (6 months–5 years) by race.](image)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Overall HR</th>
<th>95% CI</th>
<th>1-y HR</th>
<th>95% CI</th>
<th>3-y HR</th>
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<th>5-y HR</th>
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<td>0.50 to 1.62</td>
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<td>≥80</td>
<td>0.39</td>
<td>0.26 to 0.57</td>
<td>0.42</td>
<td>0.20 to 0.86</td>
<td>0.38</td>
<td>0.25 to 0.58</td>
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<td>1.14</td>
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<tr>
<td>I</td>
<td>1.41</td>
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<td>1.51</td>
<td>0.63 to 3.60</td>
<td>1.41</td>
<td>0.95 to 2.10</td>
<td>1.39</td>
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<td>2.22</td>
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<td>0.85 to 4.67</td>
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<td>1.05 to 2.30</td>
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<td>0.48 to 0.80</td>
<td>0.64</td>
<td>0.50 to 0.81</td>
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</table>

*Adjustment for all other factors in the model. Variables include race, age, sex, polypectomy history, stage, and site of cancer. HR = hazard ratio; CI = confidence interval; — = not applicable.
Ellison et al. (2003) report that elderly blacks were less likely to receive posttreatment surveillance not explained by socioeconomic, hospital, or clinical characteristics (24). Although socioeconomic variables were not available for our analysis, we conclude as well that African Americans, despite being insured by health plans in which colonoscopy is a covered benefit and after adjustment for other demographic and clinical variables, are substantially less likely to receive postdiagnostic surveillance.

Among a Medicare population, Knopf et al. (2001) found that a substantial proportion of elderly were not receiving postdiagnostic surveillance (25), findings that are very similar to our own and those reported by Rulyak et al. (22).

Several potential barriers exist that may have contributed to the disparity seen for African Americans and the patients over age 80 in this managed-care population. In a study by Elston Lafata conducted at Henry Ford Health System (Michigan site for this study), the investigators found that as median household income increased, the likelihood of receiving follow up testing also increased in both racial groups (26).

It may be that the providers’ approach to treatment truly differs by age—that is, they are less aggressive with older patients. There is some evidence to this effect with breast cancer treatment (27). It also could be that differences in the groups themselves make them less likely to seek or agree to follow up. The number of comorbidities the patients may have in the older age group may have also played a role in the timing of surveillance exam or the choice to have a surveillance examination at all.

A study conducted by the American Society of Colon and Rectal Surgeons (ASCRS) observed that although there are recommendations on what surveillance measures should be employed after patients are treated with curative surgery, a wide variation in practices was found and no clear consensus of a pattern could be identified (9).

By looking only in the medical record and automated data, we could not obtain information regarding possible barriers to draw a conclusion regarding why some patients did not receive the follow-up examination or why there was a difference in time to obtain an examination. Because both systems represent prepaid health plans and have clinics throughout their metropolitan areas, access should play less of a role than in other health care settings. More information needs to be collected at both the patient level and health system level to identify possible barriers that prevent African Americans, individuals 80 and older, or those diagnosed with a rectal tumor from receiving a surveillance colon examination after a diagnosis of colorectal cancer.

Our study does not address whether the surveillance would have decreased the incidence of recurrence of colorectal cancer. Future analysis of this data will look at the impact of the time to surveillance exam on overall survival in this cohort of patients.

REFERENCES


NOTES

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