
Articles

Practice Setting and Physician Influences on Judgments of Colon Cancer Treatment by Community Physicians

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Objective. This article compares judgments about the treatment of Dukes' B2 and C colon cancer made by general surgeons to those of internists and family practitioners. Physician and practice variables were specialty, affiliation with a Community Clinical Oncology Program (CCOP) hospital, time in practice, professional centrality (level of participation in cancer information networks), solo practice, and number of colon cancer patients.

Data Collection Methods. Data are combined from national probability samples of CCOP- and non-CCOP-affiliated physicians. This study focused on 1,138 internists, family physicians, and general surgeons who participated in decision making for patients diagnosed with Dukes' B2 or C stage colon cancer. Judgments were elicited using brief vignettes.

Methods of Analysis. Judgments of adjuvant therapy are classified as (a) consistent with the National Institutes of Health Consensus Conference recommendations (experimental for Dukes' B2, accepted for Dukes' C); (b) accepted treatment for both stages; or (c) experimental for both stages. Multinomial logit analyses were used to examine the association of practice setting and physician characteristics to judgments of treatment.

Results. Surgeons and CCOP-affiliated physicians were more likely to endorse the NIH consensus conference position. Surgeons, younger physicians, and those in group practice were more likely to approve of chemotherapy for both cancer stages. The most common position (chemotherapy experimental) was more likely from nonsurgeons, solo practitioners, and non-CCOP physicians.

Conclusion. Physician and practice setting characteristics, including organized structures such as the CCOP, are possible mediating structures that can facilitate dissemination of standards of treatment.

Key Words. Colonic neoplasms, therapy; practice characteristics; medical decision making

Colorectal cancer, a major public health problem in the United States, is the second most common cancer and in cancer mortality is surpassed only by lung cancer (Garfinkel 1991). The primary treatment is surgery, with more than 80 percent of patients operable at the time of diagnosis (Moertel, Fleming, MacDonald, et al. 1990; Sugarbaker 1986). The overall five-year rate of survival is about 50 percent for African Americans, and 60 percent for whites (Miller, Ries, and Hankey 1994; Chu, Tarone, Chow, et al. 1994). However, survival is strongly influenced by disease stage: the survival rate is as high as 90 percent for local disease and 60 percent for regional disease, but only 7 percent for distant disease (Miller, Ries, and Hankey 1994).

This article compares the judgments of colon cancer treatments made by general surgeons to judgments by internists and family practitioners. We examine the medical decision making of community physicians for two reasons. First, community physicians have a prominent role in the treatment of this prevalent cancer, either directly or through referral. In this study, community physicians are physicians who are not oncologists or hematologists, but include family practitioners, internists, and general surgeons. Since 80 percent of all cancer is treated in local communities and substantial proportions of primary care physicians report participating in treatment decision making, factors influencing the judgments of primary care physicians are critical (Kaluzny, Ricketts, Warnecke, et al. 1989). We examine medical decision making in relation to this condition because the dynamic nature of technology has led to the accumulation of evidence that points to the potential of adjuvant treatments for colorectal cancer.

A consensus conference on adjuvant therapy for colon and rectum cancer was held in 1990 (National Institutes of Health 1990). Such conferences are called when the belief is growing (not always well founded) that sufficient evidence exists to lead to the emergence of consensual positions to guide practice and research. The consensus development process is intended to assist in the timely and appropriate application of research findings into medical

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practice (National Institute of Medicine, Council on Health Care Technology 1990). The judgments of physicians, which are the focus of this study, were gathered shortly before the consensus conference met, as part of a larger evaluation of the Community Clinical Oncology Program (CCOP). While the timing of data collection is not ideal for this article, the CCOP evaluation data permit examination of physician judgments in a time of considerable uncertainty about the relative role of wholly surgical and adjuvant therapeutic approaches.

Studies evaluating adjuvant treatment of colon cancer have been taking place for about 30 years. With respect to methodology, studies have become increasingly attentive to issues of internal validity, with greater use of randomized studies; precision in the description of the tumor, the tumor's location, and staging; and the use of larger samples in order to examine subgroups and enhance statistical power (Buyse, Zeleniuch-Jacquotte, and Chalmers 1988; Gilbert 1986; Ajani 1988).

The 1990 consensus conference was called to determine the status of adjuvant therapies for colon and rectal cancer following several studies finding improved survival. The purpose of a consensus conference is to assess data and come to a conclusion (consensus) that a treatment is clearly accepted or remains experimental, that is in need of further study. The consensus conference recommended that Dukes' A (Dukes 1956) or Stage 1¹ colon cancer patients should be treated with surgery alone because of its favorable survival rate. Patients with Dukes' C (Stage 3) colon cancer were recommended to be treated with adjuvant therapy. The consensus panel did not recommend any specific adjuvant therapy for Dukes' B2 (Stage 2) patients outside of clinical trials. Continued clinical trials to assess adjuvant therapies were encouraged for both colon and rectal cancer.

The objectives of this study are to (1) assess the extent of agreement among primary care physicians with the current treatment options for colon and rectal cancer, and (2) examine physician and practice setting characteristics associated with assessment of adjuvant therapy for two different stages of colon cancer.

Characteristics of Physicians and Practice Settings

This research was guided by literature on medical decision making and the adoption of medical and surgical innovations such as procedures, drugs, and other technologies. Our prior research on physician judgments of treatment for breast cancer was also useful (McFall, Warnecke, Kaluzny, et al. 1994).

Several physician and practice setting characteristics are hypothesized to influence judgments of treatments. Specialty is expected to be influential in judgments (Grilli, Apolone, Marsoni, et al. 1991). Surgical oncology has been a leading specialty in both the development of treatment protocols and the conduct of clinical trials for colon cancer. Therefore, we expect surgeons to be more aware of current practice patterns.

An additional physician characteristic expected to be influential is the length of time in practice. The period in which a physician receives basic training, or correspondingly, the length of time since graduation, influences the adoption of new procedures (Freiman 1985). Physicians in practice longer are shaped by their practices and judgments made during their period of training and early practice. Our prior research found older physicians less likely to be in agreement with the consensus conference position on treatment of breast cancer (McFall, Warnecke, Kaluzny, et al. 1994). Older physicians have also been found more likely to hospitalize patients for conditions commonly treated on an outpatient basis (Siu, Manning, and Benjamin 1990). Length of time in practice is most likely to be influential in practice areas experiencing rapid change.

Practice setting shapes the informal and formal opportunities to discuss and observe different treatment alternatives. Physicians who practice alone are less likely to be aware of new information regarding patient care (Freiman 1985) and physicians in rural, solo practices are less likely to adopt new procedures (Coleman, Katz, and Menzel 1966). Thus, we hypothesize that physicians in solo practice will be less aware of the utility of new practice patterns.

Physicians also differ in their access to information concerning practice guidelines and evidence from clinical trials. We hypothesize that physicians participating in networks that disseminate information about cancer treatment and research will be better informed about treatment options than physicians who do not participate in such information networks (McFall, Warnecke, Kaluzny, et al. 1994; Grilli, Apolone, Marsoni, et al. 1991). We refer to level of participation in dissemination networks as professional centrality.

Affiliation with the CCOP is a particular example of participation in a dissemination network. One purpose of the CCOP networks, which were initiated in 1981, is to provide community-based physicians with access to state-of-the-art information about the treatment and prevention of cancer (Kaluzny, Lacey, Warnecke, et al. 1994; Kaluzny, Warnecke, Lacey, et al. 1995). Physicians affiliated with CCOP hospitals may have greater access than other physicians to current information about the treatment of colon

cancer. Prior studies found that CCOP physicians were early innovators in recommending chemotherapy for Stage I breast cancer (McFall, Warnecke, Kaluzny, et al. 1994).

An adequate patient volume has been linked to acceptable performance of hospital units and individual physicians (Jollis, Peterson, DeLong, et al. 1994). Physicians with greater experience in treating a particular condition have been shown to be more aware of treatment guidelines than their less-experienced counterparts. Thus, we hypothesize that number of colon cancer patients will influence the treatment judgments of physicians.

METHODS

SAMPLE DESIGN AND EXECUTION

These data were collected in a national survey of physicians, conducted as part of the evaluation of the National Cancer Institute's Community Clinical Oncology Program (CCOP-II) (Kaluzny, Warnecke, and Gillings 1992). This survey of physicians in four primary care specialties (family practice, internal medicine, gynecology, and general surgery) was designed to obtain information on community physicians' knowledge and attitudes about cancer patient management and to assess whether the presence of the CCOP influenced the attitudes and self-reported practices of physicians in the community regarding cancer treatment and screening. Other components of the evaluation examined treatment patterns using medical record review. The project was reviewed and approved by the institutional review boards at the University of North Carolina at Chapel Hill and the University of Illinois at Chicago.

Two samples of physicians were selected. The CCOP community physicians were a stratified, systematic random sample of physicians in the four designated specialties who had admitting privileges at CCOP component hospitals, but who were neither oncologists nor hematologists. The other sample of community physicians was a stratified, systematic random sample drawn from the American Medical Association's (AMA) listing of physicians in all 50 states and Puerto Rico in the four designated specialties with admitting privileges at hospitals not affiliated with a CCOP. In selecting both samples, the goal was to obtain representative samples of community physicians who might identify, initially diagnose, and refer adult cancer patients, but who did not specialize in oncology or hematology.

Interviews were conducted between October 2, 1989 and March 31, 1990. A brief telephone screening interview verified eligibility. The initial

sample of CCOP community physicians included 3,136 physicians and the initial non-CCOP sample consisted of 2,879 physicians. After screening, 481 CCOP community physicians and 428 non-CCOP physicians were ineligible because of specialty; because they had retired, died, or did not treat adults; or, in the case of the CCOP sample, because they were no longer affiliated with a CCOP hospital. The final eligible samples included 2,655 CCOP community physicians and 2,451 non-CCOP physicians. Interviews were completed with 1,898 (71 percent) physicians in the eligible CCOP sample and 1,538 (63 percent) in the eligible non-CCOP sample. By specialty, completion rates ranged from 67 percent to 77 percent for the non-CCOP and CCOP surgeons and gynecologists, and the CCOP family physicians. Completion rates were 52 percent to 59 percent for the non-CCOP and CCOP internists, and the non-CCOP family practitioners.

For this study the sample was further restricted by excluding gynecologists, since relatively few had patients with colorectal cancer. Then, the sample was limited to physicians who had seen patients diagnosed with Dukes' B2- or C-stage colon or rectal cancer in the past year and who reported participating in decision making about the patients' treatment. The analysis is thus limited to 1,138 physicians who were actively involved in treatment and referral decisions. The AMA and CCOP samples were combined because they were similar in physician and practice setting characteristics and in judgments of treatment options.

MEASUREMENT

Mini-vignettes were used to assess physician opinions about treatment for Dukes' B2- or C-stage colon cancer and rectal cancer. The question wording was

"Listed below are procedures for the treatment of Dukes' B2 colon cancer. For each one, do you consider it to be experimental, an accepted or common practice, outmoded or never appropriate treatment?"

Parallel wording was used for items dealing with treatment of Dukes' C colon cancer. The specific treatments were

1. Surgery alone for (Dukes' B2, Dukes' C) colon cancer, or
2. Surgery followed by adjuvant multidrug chemotherapy for (Dukes' B2, Dukes' C) colon cancer.

We have focused in this study on the two items that address judgments of surgery with adjuvant multidrug chemotherapy for Dukes' B2 and Dukes' C colon cancer.

Several physician and practice setting characteristics were examined. For specialty, family practitioners and internists were combined to represent nonsurgeons, with general surgeons representing the reference category.² CCOP affiliation was a dichotomous variable with CCOP physicians coded “1.” “Years in practice” assigned a code “1” to those who graduated from medical school 20 or more years before the study; all other options were coded “0,” the reference category. We also examined this variable coded continuously and classified as 1–9 years, 10–19 years, and 20 years or more. The judgments of physicians practicing longer than 20 years were the most distinctive, so we contrasted that group with physicians practicing 19 years or fewer.

“Practice setting” was a single dichotomous variable with those in solo private practice coded as “1”; those in a group practice, in a two-physician private practice, or in other settings were the reference category, coded “0.”

Professional centrality assessed whether physicians participated in information networks about cancer treatment and research. Professional centrality was indicated by four variables. The first three included (a) referral or direct enrollment of patients in clinical trials in the past year, (b) membership or participation in a professional association concerned with cancer research or treatment, and (c) completion of continuing education or other seminars in oncology or cancer care in the past two years. The fourth indicator was awareness of the Physician Data Query (PDQ) system. The PDQ is a cancer database of the National Cancer Institute that includes information about investigative cancer treatments, a directory of oncologists, and a listing of clinical trials with patient openings. We classified as high on centrality physicians with a positive response on any two of the four indicators.

Physicians reported the number of patients diagnosed with colon cancer in the past year. A square-root transformation was used to reduce the skewness of this variable.

ANALYSIS

We present descriptive information on characteristics of the analysis sample. We next show the physician rating of adjuvant chemotherapy for the two cancer stages by specialty group. Physician judgments are presented for four categories:

1. Dukes' B2 experimental, Dukes' C accepted practice, or the NIH position;
2. Accepted practice for both cancer stages or premature adoption of chemotherapy for less invasive cancers;

3. Experimental for both cancer stages, which is the most conservative position; and
4. Some other response.

A small proportion of physicians (less than 10 percent overall) had the last response pattern and were not included in the multivariate analyses.

We use multinomial logit analysis to assess the effect of physician and practice setting characteristics on physician judgments about adjuvant chemotherapy for colon cancer. In multinomial logit analyses with dependent variables having three categories, there are two sets of coefficients corresponding to specific contrasts among categories of the dependent variable. In this article we contrast physicians recommending the NIH consensus conference position to those rating chemotherapy as experimental and to those rating it as accepted practice for both stages. The results of these analyses are expressed as adjusted odds ratios with 95 percent confidence intervals.

RESULTS

Table 1 presents the percentage of physicians, by specialty, who reported seeing patients with colon cancer in the past year and the percentage of that group who participated in decision making about the surgical or nonsurgical treatment of the patients. General surgeons were highly likely (79.6 percent) to see patients diagnosed with colon cancer, while fewer than half of the nonsurgeons had patients with this condition. Virtually all general surgeons with colorectal cancer patients reported participating in decision making about treatment, and more than half of nonsurgeons also participated in decision making beyond referral of the patient. The remainder of the analysis was conducted on the subset of physicians who participated in decision making.

Surgeons differed from nonsurgeons on several of the characteristics examined. The former, for example, were more likely to be in solo practice and to have been in practice for more than 20 years than the nonsurgeons. The general surgeons also scored higher on professional centrality and had a greater volume of colon cancer patients.

JUDGMENTS ABOUT TREATMENT AND SPECIALTY

Figure 1 shows the judgments of surgeons and nonsurgeons of adjuvant chemotherapy for Dukes' B2 and C colon cancer, jointly considered. The modal response for both surgeons (38 percent) and nonsurgeons (50 percent)

Table 1: Percentage of Physicians with Colorectal Cancer Patients, Participation in Decision Making, and Description of Study Sample, by Specialty

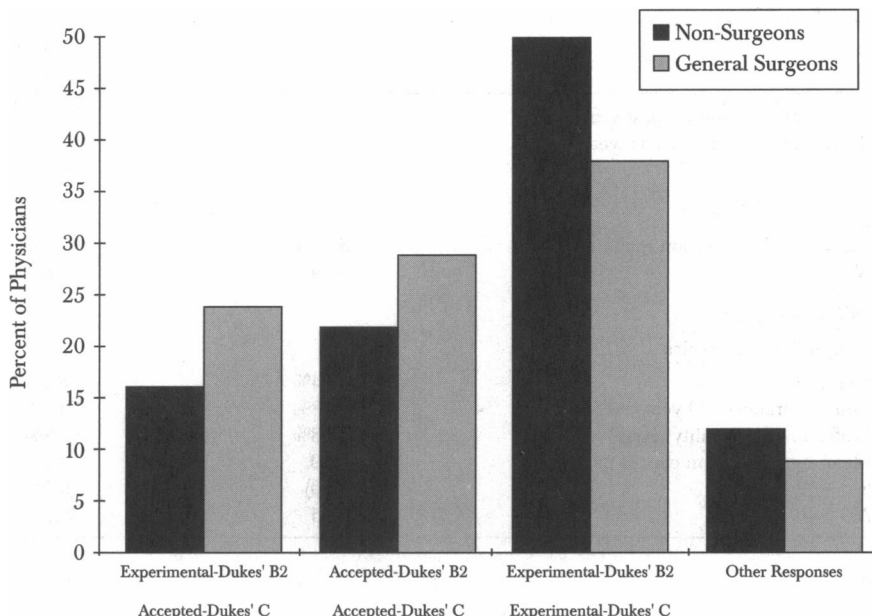
	<i>Non-Surgeon</i>	<i>General Surgeon</i>
Colon cancer patients, past year	44.1%	79.6%
Rectal cancer patients, past year	23.1%	67.1%
<i>N</i>	1487	950
<i>Of Those with Patients:</i>		
Participated in decision making	56.6%	96.6%
<i>N</i>	699	768
<i>Of Decision Makers:</i>		
<u>Sample Characteristics</u>		
Solo practice	38.4%	48.1%
Time in practice (20 years +)	39.8%	60.9%
Professional centrality (High)	33.8%	65.8%
Mean number colon cancer patients	4.0	10.2
(s.d.)	(6.0)	(9.5)
<i>N</i>	395	742

was that adjuvant therapy was experimental for both cancer stages. Twenty-two percent of nonsurgeons and 29 percent of surgeons rated adjuvant therapy as common/accepted practice for both stages. The NIH consensus conference position (experimental for Dukes' B2 and accepted practice for Dukes' C colon cancer) was selected by 16 percent of nonsurgeons and 24 percent of surgeons. The responses of about 10 percent of physicians did not fall into these three categories.

MULTIVARIATE ANALYSES

We conducted multinomial logit analyses to examine the effect of physician and practice setting characteristics on the selection of the three alternatives. The significant predictors were specialty, solo practice, and time in practice. The variable describing whether the physician was affiliated with a CCOP hospital was of borderline statistical significance ($p = .056$). Table 2 presents the results of these analyses. The first column contrasts the selection of the NIH position relative to rating adjuvant therapy as experimental for both stages. The second column compares the selection of the NIH position relative to the acceptance of adjuvant therapy for both stages.

Figure 1: Physician Ratings of Colon Cancer Treatment for Dukes' B2 and C Stages



Consensus Conference Position versus Experimental for Both Stages

General surgeons were two times more likely than nonsurgeons to select the consensus conference position than to view adjuvant therapy as experimental. CCOP-affiliated physicians were more likely to select the NIH position than to view adjuvant therapy as experimental. That is, CCOP-affiliated physicians were slightly more likely than non-CCOP physicians to pick the NIH position (23 percent versus 19 percent), and 47 percent of non-CCOP physicians judged adjuvant therapy experimental compared to 39 percent of the CCOP-affiliated physicians. The distinction between solo and group or small group practice was significantly linked to physician judgments ($p = .0002$). However, the individual contrasts between the NIH position and the other two alternatives were of borderline significance based on the Wald tests. The chief distinction is that solo practitioners were more likely than those in group practice to view chemotherapy as experimental for both stages (49

Table 2: Physician Judgments of Adjuvant Chemotherapy for Dukes' B2 and Dukes' C Colon Cancer (Adjusted Odds Ratios and 95% Confidence Intervals)

Variable	NIH Position versus Experimental Treatment		NIH Position versus Accepted Practice	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
General surgery	2.18	1.52–3.12	1.02	0.68–1.52
CCOP* affiliation	1.45	1.05–2.00	1.13	0.80–1.61
Time in practice	0.92	0.66–1.28	1.47	1.02–2.10
Solo practice	0.73	0.53–1.02	1.42	0.99–2.05

*Community Clinical Oncology Program.

percent versus 37 percent), but they were about equally likely to endorse the NIH position. Time in practice was not associated with this comparison.

Consensus Conference Position versus Accepted for Both Stages

Time in practice was influential for this comparison. Older physicians were more likely than younger physicians to select the NIH position relative to viewing chemotherapy as accepted practice, but did not differ in contrasting the NIH and experimental positions. In examining the proportions, young and old physicians were equally likely to select the NIH position (22 percent versus 20 percent). However, younger physicians were more likely than older physicians to rate chemotherapy as an accepted treatment for both cancer stages (32 percent versus 22 percent). Similarly, solo and non-solo practice physicians did not differ in selecting the NIH position (21 percent each); but the non-solo physicians were more likely to view chemotherapy as accepted practice (32 percent versus 20 percent). Specialty and CCOP affiliation were not associated with this comparison.

Analyses using a simple dichotomous coding (consistent with the NIH position versus other judgments) were also conducted. The only variable with a significant relationship to that outcome was specialty. More surgeons had judgments consistent with the NIH position. The multinomial logit analyses permitted us to distinguish practice and physician characteristics associated with different directions of divergence from the NIH position.

DISCUSSION

In this study we examined characteristics of primary care physicians and practice settings associated with judgments of treatment options for colon cancer. The sample was restricted to physicians participating in treatment decisions, from whom we could expect a more direct interest in cancer treatment.

The physicians' judgments of treatments were made about the time of the NIH consensus conference on the use of adjuvant therapy for colon cancer. The consensus conference recommended adjuvant chemotherapy for Dukes' C, but not for Dukes' B2 colon cancer. We classified physician views as consistent with the NIH position, common/accepted practice for both stages (premature acceptance of chemotherapy for less invasive cancer), or experimental for both stages. The last position is a conservative one that lags behind the NIH position. One potential use of this information is to describe the distribution of these judgments. Clearly, the dominant position among both surgeons and nonsurgeons is that adjuvant chemotherapy is an experimental treatment. Dissemination efforts must convey the evidence supporting the benefits of adjuvant therapy for enhancing survival time of patients with Dukes' C colon cancer.

The study also permits us to examine physician and practice setting characteristics associated with judgments of chemotherapy for colon cancer. Those in agreement with the consensus conference position can be viewed as early adopters. The early adopters in the study were more likely to be surgeons or affiliated with a CCOP. Other physicians approved of chemotherapy in both cancer stages, a pattern of premature acceptance of chemotherapy for less invasive tumors. They may have been aware of the usefulness of chemotherapy in some situations and then "guessed" or overgeneralized these benefits to the treatment of both cancer stages in advance of the scientific evidence. This position was more common among surgeons, younger physicians, and those in group practice. These groups have been found to be more aware of state-of-the-art treatment (McFall, Warnecke, Kaluzny, et al. 1994), and this awareness is shown in judgments of colon cancer as well. However, the awareness of the utility of adjuvant chemotherapy was not precisely targeted. Dissemination efforts must clarify the importance of cancer stage for judgments of treatments. The third and largest group of physicians rated chemotherapy as experimental for both cancer stages. This position was more common among nonsurgeons, solo practitioners, and physicians without an affiliation with CCOP. This group is poised in a position that

may for the moment be satisfactory; yet, with the passage of a little time, it will leave them as late adopters of therapeutic approaches associated with improved survival.

These findings bear on structures that reinforce quality of care. Communication with other physicians is important in shaping judgments and is enhanced by practicing in the company of others or by being more central, that is, having greater participation in information networks. Practice setting, information networks, and organized structures such as the CCOP are possible mediating structures that can facilitate communication about standards of treatment (Kaluzny, Warnecke, Lacey, et al. 1995). Affiliation with a CCOP hospital was found consistent with a newly advanced state-of-the-art treatment in both colon and breast cancer (McFall, Warnecke, Kaluzny, et al. 1994).

Communities in which treatment is provided by primary care physicians rather than oncologists represent a special challenge. Failure to address the challenge of linking physicians to advancing technology will limit the ability of local communities to benefit from therapeutic developments.

NOTES

1. Several staging methods are available. The Dukes classification is based on depth of tumor invasion into the bowel wall. It has a long history of use and has been criticized because revisions have reduced its clarity. A rough correspondence can be made between the Dukes and the Tumor, Node, Metastases (T,N,M) methods. We used the Dukes system because we believed that more community physicians would be familiar with the ramifications for treatment of the various Dukes' stages. Dukes' B2 would be included in Stage II based on the T,N,M system, and Dukes' C would be included in Stage III.
2. Alternative analyses contrasting each specialty with that of general surgery produced similar results.

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