

Prevalence of screening in patients newly diagnosed with colorectal cancer in Ontario

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OBJECTIVES: The primary objective was to determine the proportion of individuals with a new diagnosis of colorectal cancer (CRC) in Ontario in whom the cancer was screen detected. The secondary objectives were to determine the cancer stage at diagnosis and the indications for the procedure in patients who received their first colonoscopy.

PATIENTS AND METHODS: Individuals admitted to a hospital with a new diagnosis of CRC were randomly selected after stratifying by hospital type (teaching or community). The Canadian Institute for Health Information's Discharge Abstract Database was used to identify individuals with a first diagnosis of CRC during calendar year (CY) 2000, and Ontario Health Insurance Plan data were used to identify people 50 to 74 years of age who had their first colonoscopy during CY 2000. Up to 20 individuals were selected for each group (CRC or colonoscopy) in each of seven randomly selected community hospitals and three randomly selected teaching hospitals. Data were abstracted from the hospital charts.

RESULTS: The hospital charts of 152 patients with a new diagnosis of CRC were examined. Of the 133 patients in whom screening status could be determined, eight had screen-detected cancers (6.0%). Of the 99 patients (65% of the sample) in whom stage could be determined, 43 (43.4%) had advanced disease (tumour-node-metastasis stage III or IV) at diagnosis. The hospital charts of 184 patients who underwent their first colonoscopy were examined. Of the 175 patients in whom the indication for colonoscopy could be determined, 45 underwent the procedure for screening purposes, 10 were for diagnostic workup of anemia and 120 for evaluation of symptoms.

CONCLUSIONS: The low proportion (6%) of screen-detected CRC and the high proportion of patients (43.4%) with advanced disease at diagnosis reflect the lack of an organized screening program.

Key Words: *Cancer stage; Colorectal cancer; Screening*

Colorectal cancer (CRC) is the second leading cause of cancer deaths in Canada, accounting for approximately 12% of all cancer deaths (1). In 2007, it was estimated that 20,800 Canadians will be diagnosed with CRC and 8700 will die from the disease (1).

The two screening methods endorsed by the Canadian Task Force on Preventive Health Care for people at average risk for CRC who are 50 years of age and older are the fecal occult blood test (FOBT) and/or flexible sigmoidoscopy (2). Screening with the FOBT (coupled with colonoscopy for

Prévalence du dépistage chez des patients ayant un diagnostic récent de cancer colorectal en Ontario

OBJECTIFS : Le principal objectif était de déterminer la proportion d'individus ayant reçu un diagnostic récent de cancer colorectal (CCR) en Ontario par suite d'un dépistage. Les objectifs secondaires étaient de déterminer le stade du cancer au moment du diagnostic et les indications de l'intervention chez les patients qui en étaient à leur première colonoscopie.

PATIENTS ET MÉTHODES : Des personnes hospitalisées pour un diagnostic récent de CCR ont été randomisées, après stratification selon le type d'hôpital (universitaire ou communautaire). La base de données sur les congés des patients de l'Institut canadien d'information sur la santé (ICIS) a été utilisée pour identifier les sujets ayant reçu un premier diagnostic de CCR au cours de l'année 2000 et les données du régime d'Assurance-santé de l'Ontario ont été utilisées pour identifier les personnes de 50 à 74 ans qui ont subi leur première colonoscopie au cours de l'an 2000. Jusqu'à 20 personnes ont été sélectionnées dans chaque groupe (CCR ou colonoscopie) dans chacun des sept hôpitaux communautaires et des trois hôpitaux universitaires choisis au hasard. Les données ont été extraites des dossiers hospitaliers.

RÉSULTATS : Les dossiers hospitaliers de 152 patients porteurs d'un diagnostic récent de CCR ont été examinés. Parmi les 133 patients chez qui le statut à l'égard du dépistage pouvait être déterminé, huit étaient porteurs d'un cancer dépisté (6,0 %). Parmi les 99 patients (65 % de l'échantillon) chez qui le stade a pu être déterminé, 43 (43,4 %) présentaient une maladie avancée (tumeurs, ganglions, métastases de stades III ou IV) au moment du diagnostic. Les dossiers hospitaliers de 184 patients qui ont subi leur première colonoscopie ont été examinés. Parmi les 175 patients chez qui l'indication de la colonoscopie pouvait être déterminée, 45 ont subi l'intervention à des fins de dépistage, 10 à des fins diagnostiques en présence d'anémie et 120 pour évaluation de symptômes.

CONCLUSIONS : La faible proportion (6 %) des CCR dépistés et la forte proportion (43,4 %) des sujets atteints d'une maladie à un stade avancé au moment du diagnostic reflètent bien l'absence d'un programme de dépistage bien structuré.

diagnostic workup of patients with a positive test) is associated with a decrease in CRC incidence and mortality, and is associated with a reduction in the incidence of Dukes' stage D cancer (3-7). The Task Force concluded that insufficient scientific evidence existed to either recommend or deter use of colonoscopy for screening. The extent to which these cancers are screen detected in Canada is not known. In addition, although rates of colonoscopy use are increasing in Canada (8,9), the extent to which this reflects increased use of the procedure for screening has not been reported.

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The primary objective of the present research was to determine the proportion of individuals with a new diagnosis of CRC in Ontario in whom the cancer was screen detected. The secondary objectives were to determine the completeness of information in the hospital charts concerning cancer stage at diagnosis and the indications for the procedure in patients who received their first colonoscopy.

PATIENTS AND METHODS

Data sources

Two data sources were used in the present study:

- 1) Information about colonic evaluation procedures (colonoscopy, flexible sigmoidoscopy and barium enema) performed in Ontario between 1991 and 2000 was obtained from the Ontario Health Insurance Plan (OHIP) database of physician billings; and
- 2) The Canadian Institute for Health Information's Discharge Abstract Database was used to identify individuals with a new diagnosis of CRC. This database contains information about all discharges from acute care hospitals (including same-day surgery) for Ontario residents since 1988.

Patient selection

Patient selection was designed to achieve population-representative samples of two defined groups of Ontario residents during calendar year (CY) 2000: individuals with a new diagnosis of CRC and individuals who received their first colonoscopy. These groups were defined independently (ie, with replacement and could be sampled for both).

Patients were eligible for the first colonoscopy group if they had undergone a colonoscopy in CY 2000, were in the screen-eligible age group of 50 to 74 years and had no OHIP record of a previous colonic evaluation procedure (ie, colonoscopy, flexible sigmoidoscopy or barium enema) between 1991 and 1999.

CRC patients were identified in the Canadian Institute for Health Information's Discharge Abstract Database, based on the International Classification of Diseases, Ninth Revision, Clinical Modification diagnosis codes of either '153' or '154' during CY 2000. Patients with prior hospitalizations between 1989 and 1999 that included a diagnosis code of '153' or '154' were excluded. There was no age restriction in that group.

The sampling design involved stratification by hospital type and clustered selection of individual patients within hospitals. All hospitals in Ontario in which 20 or more colonoscopies were performed in 2000 were included (therefore, 18 hospitals were excluded). These hospitals were stratified into one of two strata (teaching or community), and hospitals were selected as follows: three hospitals were randomly chosen from the 12 teaching hospitals that were affiliated with a university, and seven hospitals were randomly chosen from the remaining 109 community hospitals. Within each hospital (cluster), up to 40 patients were randomly selected (20 patients with a new diagnosis of CRC and 20 patients who received their first colonoscopy).

Data abstraction

Research Ethics Board approvals were obtained from Sunnybrook and Women's College Health Sciences Centre (Toronto, Ontario) and each hospital from which hospital

charts were abstracted. Abstraction forms were developed specifically for the present study. All abstraction was done by a single abstractor. During the study, the abstraction forms were revised to include questions about family history. Data abstracted from hospital charts included date of birth, sex, date of colonoscopy or CRC diagnosis, and symptoms recorded on the date of colonoscopy or cancer diagnosis. For individuals who were diagnosed with CRC, information pertaining to cancer stage was also abstracted.

Because the focus was on determining the extent of information that was available in hospital charts, relevant physicians or clinics were not contacted to obtain information that was not available in the hospital charts. Patients for whom no information beyond sex and birth date could be obtained from hospital charts were considered to be failed abstraction attempts and were excluded from the study. Patients with partial information were included in the study.

Cancer stage was determined in one of two ways. First, the hospital charts were examined for mention of either Dukes' or tumour-node-metastasis (TNM) staging. If that information could not be identified in the chart, the notes were examined for information (such as imaging and pathology reports) that could be used to determine TNM stage.

RESULTS

Patient population and characteristics

In total, 152 charts of CRC patients and 184 charts of patients who underwent a first colonoscopy during CY 2000 were successfully abstracted. In addition, there were 16 patients who had been selected through the sampling procedure but who were not included in our study because their charts could not be successfully abstracted. These included four patients whose charts could not be located by the hospital medical record department staff, two patients who had previously undergone a colonoscopy and were ineligible (one had had a colonoscopy 12 years previously, and the second had a colonoscopy in another province), and six patients who had received care at a teaching hospital where none of the information recorded at outpatient clinic visits was included in the hospital chart.

The mean age at diagnosis of the 152 CRC patients was 69.9 years (range 32.2 to 99.2 years), and 52.6% were men. For the 184 patients in the first colonoscopy group, the mean age was 62.0 years (range 39.8 to 75.4 years), and 48.4% were men.

Screening status of CRC patients

As noted earlier, patients whose charts did not include information beyond sex and birth date were excluded. However, if there was additional information, the patient was included; therefore, complete information was not available for all patients. As shown in Table 1, 19 patients did not have sufficient information in their hospital charts to determine screening status. Of the remaining 133 patients, the cancer was screen detected in eight patients (6.0%) (either by initial screening colonoscopy or by colonoscopy follow-up of a positive FOBT performed for screening purposes), and the remaining 125 patients were symptomatic at diagnosis. In six of the eight screen-detected patients, the cancers were detected at initial screening colonoscopy. In one screen-detected patient, the cancer was detected when a positive FOBT was followed up by colonoscopy, which detected the cancer. The form of screening used in the remaining patient was not recorded in the chart.

TABLE 1
Screening status in a random sample of patients with a new diagnosis of colorectal cancer in Ontario during calendar year 2000 (n=152)

Screening status	Patients at teaching hospitals, n (%) [*]	Patients at community hospitals, n (%) [*]
Screening (asymptomatic)	1 (0.7)	7 (4.6)
Diagnostic (symptomatic)	44 (28.9)	81 (53.3)
Unable to determine	11 (7.2)	8 (5.3)
Total, n	56	96

^{*}Percentages are based on the total number of patients (n=152)

TABLE 2
Distribution of stage of disease in a random sample of patients with a new diagnosis of colorectal cancer in Ontario during calendar year 2000 (n=152)

TNM stage at diagnosis	Patients at teaching hospitals, n (%)	Patients at community hospitals, n (%)
I	6 (10.7)	15 (15.6)
II	21 (37.5)	14 (14.6)
III	9 (16.1)	12 (12.5)
IV	11 (19.6)	11 (11.5)
Unable to determine	9 (16.1)	44 (45.8)
Total, n	56	96

TNM Tumour-node-metastasis

Cancer staging information

Cancer stage could be determined for 99 of the CRC patients (65.1%) (Table 2). Of those, 43 (43.4%) had advanced disease, as denoted by TNM stage III or IV.

Indication for colonoscopy

In 175 of the 184 charts (95%) of patients who underwent their first colonoscopy, the indication could be determined (Table 3). In 45 of those patients (25.7%), the colonoscopies were performed for screening; this included one patient who had a colonoscopy to follow up a positive FOBT. In 130 patients, the colonoscopies were for diagnostic workup of anemia (10 patients) or symptoms (120 patients). Three of the 130 patients with symptoms had a positive FOBT, which led to the colonoscopy. The most common indication for diagnostic colonoscopy was rectal bleeding (Table 4), which was reported in 54.6% of the 130 patients.

Family history

Of the 41 charts of newly diagnosed cancer patients examined for family history of the disease, the information was available in 10 charts. Of the 51 charts of the patients in the first colonoscopy group examined for family history, the information was available in 33 charts.

DISCUSSION

In our clustered random samples of patients with a new diagnosis of CRC in CY 2000 in Ontario, we determined screening status in 88%; among these, cancer was screen detected in only 6%. This low proportion of screen detection highlights a missed opportunity and reflects the lack of an organized province-wide CRC screening program. For those whose cancer stage could be determined (65% of the sample), 43.4% had advanced disease, again reflecting a lack of screening, which

TABLE 3
Indication for colonoscopy in a random sample of patients 50 to 74 years of age who underwent their first colonoscopy in Ontario during calendar year 2000 (n=184)

Indication for colonoscopy	Patients at teaching hospitals, n (%) [*]	Patients at community hospitals, n (%) [*]
Screening	2 (1.1)	43 (23.4)
Diagnostic	41 (22.3)	89 (48.4)
Unable to determine	5 (2.7)	4 (2.2)
Total, n	48	136

^{*}Percentages are based on the total number of patients (n=184)

TABLE 4
Indications for colonoscopy in a random sample of patients 50 to 74 years of age who underwent their first colonoscopy for diagnostic purposes in Ontario during calendar year 2000 (n=130).

Indication	Patients, n	Patients, %
Anemia	38	29.4
Rectal bleeding	71	54.6
Diarrhea	13	10.0
Abdominal pain	33	25.4
Other (weight loss, bowel obstruction)	62	47.7

More than one symptom could be reported per patient

would cause a shift toward earlier stage at diagnosis. In approximately one-quarter (25.7%) of the random sample of patients aged 50 to 74 years who underwent their first colonoscopy, the procedure was performed for screening purposes.

Our findings were similar to a recent study in the United States, which used the linked Surveillance, Epidemiology and End Results – Medicare database to estimate that in 6.6% of newly diagnosed CRC patients in 1999, the cancers were screen detected (10). In that study, the percentage of patients who had regional or distant disease at diagnosis (54%) was similar to our sample (43.4%).

There were striking differences in the proportions of screening colonoscopies when comparing teaching hospitals (4.7% screening) and community-based hospitals (32.6% screening). That finding may reflect our sampling methods (we used a cluster design). However, the finding may also reflect the greater colonoscopy capacity in community hospitals than in teaching hospitals (8).

For individuals aged 50 to 74 years who underwent their first colonoscopy in CY 2000 for diagnostic purposes, the most common indication was rectal bleeding (54.6%). These findings were similar to a study in the United States of 94,131 adults who underwent colonoscopy between 2000 and 2002 at 73 clinical practice settings (11). In that study, the most common indication for diagnostic colonoscopy was rectal bleeding (43%).

The Ontario Expert Panel on Colorectal Cancer (12) and the National Committee on Colorectal Cancer Screening (13) called for the establishment of province-wide organized CRC screening programs. On January 23, 2007, the Ontario Ministry of Health and Long-Term Care announced funding to implement a province-wide CRC screening program. The anticipated long-term impact of the program is a demonstrable decrease in CRC incidence and mortality, the two key indicators of cancer

burden in a population. In addition, the proportion of patients with CRC in whom the cancer is screen detected should increase, accompanied by a shift toward earlier cancer stage at diagnosis. For example, biennial screening with a FOBT in average-risk individuals (which will be implemented in Ontario) is estimated to result in 23% of CRCs detected as Dukes' stage A, compared with 12% in the unscreened population (14). Furthermore, a study that modelled the impact of biennial FOBT screening in Canada estimated that screening 67% of individuals aged 50 to 74 years would result in a 10-year CRC mortality reduction of 16.7% (15).

It will be important to be able to determine whether the new province-wide CRC screening program is delivering the anticipated benefits. Toward this end, it is important to demonstrate the feasibility of obtaining an estimate of the proportion of patients with newly diagnosed CRC in whom the cancers are screen detected to use as a baseline. Additionally, because colonoscopy resources are required to support the province-wide program, colonoscopy use (number of procedures and indication for the procedure) should be monitored.

In the present study, obtaining the information was difficult and inefficient because it involved hospital chart abstraction,

which is not an appropriate method for province-wide monitoring. What is needed is an automated monitoring or reporting system. A reporting system can identify which individuals have their CRCs detected through screening, record the cancer stage of all CRCs at diagnosis and monitor resource use over time (eg, number of colonoscopies and indications for the procedure). Two ways of accomplishing this are to add two additional pieces of information to the existing Ontario Cancer Registry (whether the cancer was screen detected and the cancer stage at diagnosis) and to change the OHIP billing codes so that the reason for the colonoscopy (ie, screening versus not screening) is documented.

The present study provides a basis for the implementation of a province-wide CRC screening program by estimating the proportion of patients with CRC in whom the disease was screen detected. The low proportion (6%) that was screen detected reflects the lack of an organized screening program. In addition, although some information on cancer stage at diagnosis and indication for colonoscopy could be obtained from the hospital charts, automated reporting is required to provide more timely information. These findings establish a basis for key items of information that need to be reported and monitored.

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