Waiting times for colonoscopy and colorectal cancer diagnosis

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ABSTRACT

Objective: To evaluate whether prolonged waiting times for colonoscopy in public hospitals could result in delayed diagnosis of colorectal carcinoma.

Design, setting and patients: Analysis of all outpatient colonoscopies performed at a Western Australian tertiary teaching hospital, 1 November 2003 – 31 October 2005. Colonoscopy data, corresponding pathological findings, category of urgency at referral for colonoscopy, and waiting time for colonoscopy were obtained. Patients were coded as having cancer if it was diagnosed by colonoscopy or if colonoscopy identified a lesion subsequently diagnosed as cancer.

Main outcome measures: Colorectal carcinoma detected by outpatient colonoscopy and length of waiting time to colonoscopy.

Results: 1632 outpatient colonoscopies were recorded. Category I patients received a colonoscopy within the recommended 30 days from referral. Median waiting times for Category II and Category III patients exceeded recommendations (observed, 113 days and 258 days; recommended, within 90 days and 180 days, respectively), although the number of cancers detected was low (2.4% and 0.6% of referrals, respectively in each category). Early- and late-stage cancers had similar median waiting times from referral to diagnosis. Age over 65 years and the blood-loss indications — a positive faecal occult blood test or iron deficiency/anaemia — were predictors of an increased risk of carcinoma at colonoscopy.

Conclusions: Waiting time for colonoscopy was not associated with an increase in the proportion of late-stage cancers diagnosed. Age over 65 years and evidence of blood loss increased the likelihood of a cancer diagnosis.

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Within the public health system, there can be long waiting times for some endoscopic procedures. With colonoscopy, this can cause concern, as this procedure is often perceived as a cancer exclusion test. Because colorectal cancer (CRC) is a common internal malignancy in Western countries, it is likely to be present in some people waiting for colonoscopy, regardless of the indication for the investigation. Studies of screening colonoscopy in asymptomatic people suggest that up to 1% of men and 0.1% of women in the age group 55–74 years have invasive malignancy.[1,2]

Introducing a national colorectal cancer screening program would increase the demand for colonoscopy, with the risk of diverting resources from people with symptoms of CRC. The experience of the Bowel Cancer Screening Pilot Program in Australia suggests that increased demand can come from non-participants as well as those with positive results of a faecal occult blood test (FOBT).[3] As a result, waiting times can increase, but this can depend on various factors, such as the rate of positive test results in the program.[3] Within an FOBT-based screening trial conducted in the United Kingdom, the number of hospital colonoscopies at participating sites increased by 20%–30%, which increased average waiting times for symptomatic patients from 10 to nearly 18 weeks.[4]

Like many institutions, Fremantle Hospital in Western Australia has experienced increasing difficulty in meeting recommended waiting times for semi-urgent and routine colonoscopy. A waiting-list reduction initiative was introduced by the state government in 2004.

We aimed to determine whether increased waiting times were associated with a more advanced stage of carcinoma diagnosed by colonoscopy; to identify factors that predict a diagnosis of CRC; and to evaluate the impact of the government's waiting-list strategy.

METHODS

Fremantle Hospital is a 450-bed tertiary hospital with two endoscopic procedural rooms. Generally, about 25 colonoscopies are performed each week.

Records of outpatient colonoscopies performed at Fremantle Hospital were extracted from an electronic database for endoscopy reporting for the time period 1 November 2003 to 31 October 2005. If the reported findings included pathological changes, the corresponding histopathology results were obtained to determine the presence of CRC. Any duplicated records within the databases were deleted and, when a patient had had multiple procedures, only the first colonoscopy was included in the study. We excluded patients who had undergone a colonoscopy in the 6 months before the study period, as these would not reflect new outpatient referrals.

Colonoscopy records were linked to a central hospital network to obtain the date of listing of the colonoscopy request and the triaged category of urgency. Fremantle Hospital uses three categories of clinical urgency: Category I (recommended to have procedure within 30 days), Category II (procedure within 90 days) and Category III (procedure within 180 days). All referrals received by the Endoscopy Unit are reviewed by a gastroenterologist on a daily basis to determine the suitability for colonoscopy and the clinical urgency of the referral. Procedures are then booked directly or the patient is seen at the clinic for further assessment before scheduling the colonoscopy. All procedures are arranged through the public system. The number of days on the waiting list was determined from the date of listing and the date of colonoscopy.

Patients were also categorised by the indication for colonoscopy. As the endoscopy reporting program allows a large number of indication selections, we chose broad groupings comprising:

- *Blood-loss indications* — rectal bleeding, melaena, anaemia (haemoglobin level less than the normal sex-specific range or anaemia reported in the referral), a positive FOBT result, or iron deficiency (serum ferritin level below the normal sex-specific range or deficiency reported in the referral);
- *Follow-up examination* — if the term "follow-up" was included as an indication;
- *Abdominal pain*;

1 Indications for colonoscopy by category of clinical urgency

Indication for colonoscopy	Category of clinical urgency* All categories (*n* = 1632)	I (*n* = 352)	II (*n* = 777)	III (*n* = 503)
Strong suspicion of colorectal cancer	5%	17%	3%	1%
Blood loss	28%	32%	37%	13%
Alteration in bowel function	21%	20%	26%	14%
Abdominal pain	8%	9%	10%	5%
Screening because of family history	11%	3%	7%	22%
Follow-up procedure	27%	11%	20%	48%
Other indications	12%	19%	12%	5%

* Recommended waiting times are: Category I, < 30 days; Category II, < 90 days; Category III, < 180 days. ◆

2 Number of patients with colorectal cancer (CRC) detected and waiting time by triage category over a 2-year period, November 2003 – October 2005

	Category of clinical urgency* I (*n* = 352)	II (*n* = 777)	III (*n* = 503)
Mean age (years)	59	59	60
Median waiting time (days) to colonoscopy	17	113	258
CRC detected (no. [%])	43 (12.2%)	19 (2.4%)	3 (0.6%)
Median waiting time (days) to CRC diagnosis	7	43	213
Proportion of colonoscopies performed within time limit	81%	42%	36%

* Recommended waiting times are: Category I, < 30 days; Category II, < 90 days; Category III, < 180 days. ◆

- *Any alteration in bowel function* — constipation, diarrhoea, urgency, tenesmus;
- *Family history of CRC, polyps or polyposis syndrome*; and
- *High risk of CRC*, including radiological abnormalities and rectally palpable lesions.

About 11% of patients with indications such as weight loss and assessment of diverticular disease did not fit into these broad groups.

The WA Government's waiting-list reduction strategy, introduced in the second half of 2004, targeted certain procedural items, including colonoscopy. Individuals who had been waiting extended periods for colonoscopy were offered places on procedural lists created by this initiative although, more recently, new referrals were also accepted. Procedures were performed by qualified specialists at secondary hospital sites after named referrals from general practitioners to that specialist, with proceduralist fees claimed through Medicare. Most patients were on the Category III waiting list. We compared waiting times over two time intervals, 1 November 2003 – 31 October 2004 (Period 1) and 1 November 2004 – 31 October 2005 (Period 2), to determine whether this scheme had reduced waiting times for colonoscopy at Fremantle Hospital.

Statistical analysis

Data are expressed descriptively. Mann–Whitney testing was used to determine differences in median waiting times.

Waiting time to colonoscopy

The time to colonoscopy was examined using a generalised linear model approach, with days until colonoscopy the response, using a γ response and inverse link. The fixed factors of urgency (Categories I, II or III), time period (Period 1, Period 2), and CRC (present, not present) were considered along with their respective interactions to determine whether these had an effect on the waiting time. In addition, results were adjusted for the demographic variables of sex and age.

Modelling CRC as outcome

Logistic regression was used to examine the binary response of CRC with possible predictors: sex, age (> or < 65 years), and the various indications for colonoscopy (blood-loss indications, changes in bowel habits, follow-up examination, screening for family history, pain, and a suspected lesion), all considered in a backwards, stepwise selection approach. Significant predictors from the final model selected are presented, and odds ratios with 95% confidence intervals are given.

RESULTS

Over the 2-year period, 1771 outpatient colonoscopies were performed by the Endoscopy Unit at Fremantle Hospital, with 1632 patients meeting our inclusion criteria. The mean age of those undergoing colonoscopy was 59 years, and 51% were women. Complete visualisation of the colon was achieved in 97% of procedures. The indications for colonoscopy are shown in Box 1.

Category I patients

Category I patients had short waiting times, well within the recommended time frame (Box 2), with a median waiting time of 17 days. The detection rate of CRC was highest in this category — 12.2% of colonoscopies reported malignancy — but this included patients in whom there was a strong suspicion of cancer (eg, lesions seen on radiological examination, or palpable rectal masses). However, six of the 43 patients diagnosed with CRC waited more than 30 days for colonoscopy, with the maximum waiting time being 37 days.

Category II and III patients

Across the 2-year period, median waiting times for Category II and Category III patients were substantially longer than recommended at 113 and 258 days, respectively (Box 2). Nineteen Category II patients (2.4%) were diagnosed with cancer (18 CRC and one anal squamous cell carcinoma). Six of these 19 patients waited more than 90 days, with four having blood-loss indications. Three Category III patients (0.6%) were diagnosed with cancer with a median waiting time of 213 days. One patient with an indication of family history waited 463 days. Details of patients with CRC who waited more than the recommended category-specific number of days are shown in Box 3.

Risk factors for CRC

Age over 65 years and a raised suspicion of CRC before colonoscopy were significant risk factors for CRC on univariate analysis. All blood-loss indications taken together were not significantly associated with increased risk, although having iron deficiency/anaemia was a significant predictor of CRC diagnosis (CRC detection rate, 12%). No other indication group was associated with a significantly increased rate of CRC detection. Additionally, no sex-specific differences were observed in our cohort.

In a logistic regression model, age 65 years or over, positive results of an FOBT, iron deficiency/anaemia, and a raised suspicion of CRC before colonoscopy were significant predictors of a diagnosis of CRC (Box 4).

Waiting time and CRC stage

To investigate the possibility that delayed colonoscopy may compromise cancer outcome, we compared waiting times for early-stage CRC (Dukes A or B or stage T1 squamous cell carcinoma) and late-stage CRC (Dukes C or D) for cancers diagnosed within Categories II and III (Box 5). Patients with late-stage disease detected at colonoscopy had not experienced delayed colonoscopy compared with patients with early-stage disease, with median waiting times of 51 versus 43 days (difference not significant). Seventy per cent of patients with late-stage cancer had had colonoscopy within 90 days compared with 54% of patients with early-stage cancer. In a logistic regression model, no demographic variable or procedural indication predicted diagnosis of early-stage compared with late-stage CRC.

Factors affecting waiting time to colonoscopy

We evaluated variables that may have influenced whether colonoscopy was performed within the recommended time frames. The tests of fixed effects indicated that there were differences in the three categories of urgency, as well as an effect of time period and whether or not the patient had CRC. Compared with the preceding year without the waiting-list reduction strategy, patients ultimately found to have CRC were more likely to have had a colonoscopy within the desirable time frame (odds ratio [OR], 2.6; 95% CI, 1.3–5.1). Patients with no CRC were also more likely to have had a timely procedure (OR, 1.7; 95% CI, 1.2–2.5). Category I patients were much more likely to have their procedure on time (OR, 7.5 for Category I compared with Category III), although there was no statistically significant effect of a difference between Category II and Category III.

3 Patients in Category II and Category III diagnosed with colorectal cancer (CRC) after longer waiting times to colonoscopy than recommended for their triage category

Category/ sex/age (years)	Indication for colonoscopy	Waiting time (days)	Stage of cancer at diagnosis
Category II			
M/70	Anaemia/FOBT+	313	Dukes C
F/33	Bleeding	214	Dukes A
F/62*	Iron deficiency/ bleeding	460	Unavailable
F/56	FOBT+	210	T1 SCC
M/81	Altered bowel habit	108	Dukes C
F/73	Weight loss/diarrhoea	228	Dukes B
Category III			
M/78	Family history of CRC/ altered bowel habit	213	Dukes A
M/57	Family history of CRC	463	Dukes A

* This patient was originally triaged to Category II but the booking was rescheduled and the patient did not attend. CRC was detected 12 months later when she participated in a flexible sigmoidoscopy CRC screening trial and an urgent colonoscopy was arranged.
FOBT+ = positive result of a faecal occult blood test.
SCC = squamous cell carcinoma. ◆

4 Predictors of increased risk of colorectal cancer (CRC) at colonoscopy ($n = 1604$)*

Variable	CRC detection rate, if indication present*	Odds ratio (95% CI)
Strong suspicion of CRC	27/85 (31.8%)	24.0 (13.0–44.1)
FOBT+	2/14 (14.3%)	5.9 (1.2–29.7)
Iron deficiency/anaemia	12/98 (12.2%)	5.6 (2.7–11.8)
Age ⩾ 65 years	41/642 (6.4%)	2.1 (1.2–3.8)

* Indication not listed for 28 patients.
FOBT+ = positive result of a faecal occult blood test. ◆

DISCUSSION

Our study has documented that waiting times for semi-urgent and routine colonoscopies have exceeded institutional recommendations for provision of colonoscopy in a public tertiary hospital. However, the cancer detection rate is not high in these Category II and Category III patients, with CRC being detected in 2.4% and 0.6% of patients, respectively.

Our data show that the number of cancers detected is higher in patients aged 65 years or over and those who have indications for colonoscopy of a positive result of an FOBT, iron deficiency/anaemia, or a strong pre-test suspicion of CRC. These findings argue for prioritisation of these patients when booking for colonoscopy, whereas currently, for example, positive results of an FOBT would be considered a Category II indication. When there is a strong suspicion of cancer before colonoscopy, CRC is frequently confirmed, and the health system demonstrates a capacity to provide an appropriate service for patients with an urgent need for testing.

We have found no evidence to support a link between prolonged colonoscopy waiting time and stage of carcinoma at diagnosis. Of the eight patients with CRC whose waiting times exceeded clinically desirable parameters, there were five with early stage disease (Dukes A or B or a T1 anal squamous cell carcinoma) and two with Dukes C disease (data on stage was not available for one patient). The median waiting times for colonoscopy for patients with early- and late-stage disease were 43 and 51 days, respectively. However, one patient triaged as Category II, who waited 313 days, was found to have Dukes C cancer and could potentially have benefited from earlier diagnosis.

While few studies have investigated colonoscopy delay and cancer outcome, there are data evaluating the impact of duration of symptoms before surgery. It has been suggested that a delay may be an adverse factor for rectal cancer stage at diagnosis, but not for colon carcinoma,[5] although others have not found any negative association.[6,7] Young et al reported that a delay of more than 3 months was associated with lower likelihood of Stage A disease at surgery.[8]

Reducing waiting times for colonoscopy could be achieved by increasing endoscopic capacity and productivity or by rationalising service provision. The current ambulatory surgery initiative in operation at Fremantle Hospital uses an alternative funding mechanism and allows new procedural lists to be created to take advantage of excess capacity within the state health system. The waiting-list reduction initiative seems to have enabled an increase in the proportion of patients having colonoscopy within acceptable time frames. Other measures can also allow more colonoscopies to be performed, such as ensuring the appropriateness of procedures. Bampton et al studied the effect

5 Comparison of waiting times to colonoscopy for patients diagnosed with early- or late-stage colorectal cancer — Category II and Category III patients

	Cancer stage	
	Early*	Late†
Number of patients	11	10
Mean age (years)	66	74
Median waiting time (days)	43‡	51‡
Range of waiting times (days)	15–463	12–313
Proportion of colonoscopies performed within 90 days	54%	70%

* Early stage = Dukes A or B if colorectal cancer, or a T1 stage squamous cell carcinoma.
† Late stage = Dukes C or D.
‡ Difference between early- and late-stage disease not significant by Mann–Whitney test. ◆

of disseminating the then National Health and Medical Research Council (NHMRC) guidelines[9] within an endoscopy unit. After the intervention, the proportion of post-polypectomy surveillance decisions matching the guidelines increased from 37% to 96%, with a 23% reduction in the number of post-polypectomy surveillance colonoscopies performed per year.[10] Likewise, a 17% reduction in colonoscopies performed on the basis of family history was achieved. Yusoff et al reviewed the appropriateness at their institution of referrals for colonoscopy for a family history of CRC and surveillance after CRC resection. Almost half of the patients referred because of a family history of CRC did not meet NHMRC guidelines.[11] It was also concluded that surveillance colonoscopies after CRC resection were performed too frequently and the release of NHMRC guidelines had not changed practice. Only one patient with CRC was found in 990 such examinations.[12]

Managing current demand for colonoscopy has become an increasingly important issue with the imminent roll-out of a national CRC screening program in Australia based on FOBT. A trial of FOBT screening in the United Kingdom resulted in a 21%–31% increase in demand for colonoscopy at participating hospitals due to increased screening procedures and, at times, a near doubling of waiting time for symptomatic patients.[4] Evaluation of data collected during the Australian Bowel Cancer Screening Pilot Program suggests that the number of colonoscopy referrals generated from the target screening group may be up to 50% more than the number of positive results of FOBT, because of factors such as increased awareness of family history and gastrointestinal symptoms.[3]

Our data are subject to certain limitations. Within the three categories of urgency, patients may still be triaged with a more specific time frame for colonoscopy; for example "< 4 months" or "routine", based on a decision by the reviewing specialist. This may also be influenced by whether the referral is for direct access to colonoscopy or after clinical review of the patient. Category III patients are particularly subject to this, making interpretation of the broad range of waiting times in this category (8–1126 days) difficult. Category II data, predominantly relating to symptomatic patients, are more robust, and it is in Category II patients that improved waiting times are likely to be of most benefit.

In conclusion, our study shows that waiting times for colonoscopy for Category II and Category III patients have been longer than clinically desirable, although the number of cancers detected in these groups was low. Waiting-list reduction initiatives are capable of reducing waiting times for semi-urgent colonoscopy; however, longer waiting times do not appear to be associated with an increased risk of late-stage CRC. The recognition of risk factors for a diagnosis of cancer, including age over 65 years and certain blood-loss indications, could ensure that most patients with cancer are diagnosed within a 3-month waiting period after referral.

COMPETING INTERESTS

None identified

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