



The colorectal cancer patients' journey: the Auckland region

Melissa Murray, Julie Brown, Victoria Hinder, Arend Merrie, Andrew Hill,
Michael Hulme-Moir, Katrina Sharples, Michael Findlay

Abstract

Aim To identify the time taken from referral to first treatment of patients with colorectal cancer (CRC) in the Auckland region and benchmark these against available guidelines for timeliness.

Method Retrospective study of clinical records of all patients diagnosed with CRC identified from the national registry and Auckland regional databases in the years 2001 and 2005. Data extracted included demographics, dates and types of interventions and the patient journey from referral to initiation of first treatment.

Results Of the 1128 patients diagnosed and treated in these cohorts, 68% were referred through their general practitioner and 58% saw a surgeon at their first specialist appointment. Seventy-nine percent received initial treatment with curative intent. The median time from initial referral to first treatment was 35 days, with only 68% of patients being treated within 62 days of initial referral.

Conclusion The colorectal patient journey is complicated by multiple pathways of presentation and treatment and by patient choice. These factors need to be considered when assessing the acceptability of transit times based on summary data. That nearly one-third of patients did not complete the United Kingdom-based target of 62 days from referral to first treatment indicates there is a need for further improvement in service delivery for patients developing CRC in the Auckland region.

Colorectal cancer has the second highest cancer mortality in New Zealand with rates ranking among the highest in the OECD.¹

New Zealand non-Māori women have the highest age-standardised rate of colon and rectal cancer worldwide and non-Māori males have the fourth highest age/gender standardised incidence of colon cancer and second highest of rectal cancer.²

The New Zealand Cancer Control Strategy Goal 3 is to 'ensure effective diagnosis and treatment of cancer to reduce morbidity and mortality'.³ The primary objective of this goal is to 'provide optimal treatment for those with cancer' which includes 'ensuring timely access to treatment currently recognised as providing optimal outcomes'.³ Previous audit-based studies of colorectal cancer patients in New Zealand have focused on incidence, pathology, management (including diagnostic testing, treatment and follow-up) and survival.⁴⁻⁸ Yet the timeliness of specialist assessment, diagnosis and initial treatment following referral has to our knowledge not been reported in New Zealand colorectal cancer patients.

The aim of this study is to provide a baseline report on the median duration of key phases of the patient journey from referral to first treatment, along with details of demographics, pathology, and management of colorectal patients receiving treatment

in the Auckland region. It is anticipated that such information will enable future comparisons following implementation of new service delivery initiatives such as population screening or interventions aimed at reducing barriers to timeliness.

Currently there are no Australasian guidelines outlining optimum waiting times for the various components of the colorectal patient journey so we have compared the results of our study to the Cancer Waiting Time targets set out in the UK Guidelines.⁹

Methods

Patients treated for colorectal adenocarcinoma (ICD-10-AM codes C18-C21) in the calendar years 2001 and 2005 in the Auckland region were identified through the New Zealand Health Information Service (NZHIS), three District Health Board (DHB) databases and private clinician databases. Patients with: recurrent disease, age < 18 years; squamous cell carcinoma (SCC) of the anal canal; rare tumour histology (e.g. carcinoid, small cell cancer), and patients who received their first treatment out of the Auckland region were excluded.

Data extracted from patients' medical records included: patient demographics including sex, age, and ethnicity (Māori patients were classified using the 'Ever-Māori' method);⁹ symptoms recorded in the initial referral and first specialist assessment; comorbidities present at the time of treatment; diagnostic and staging investigations carried out prior to diagnosis; tumour pathology (where available); and treatment type (both initial and any subsequent first line interventions).

The duration of each stage of the clinical journey was calculated using definitions based on the guidelines from the United Kingdom (UK).⁹

- (a) **Referral to first specialist assessment:** The number of days between the date on the referral letter/fax/attendance at Accident and Emergency (A&E) or the Emergency Department (ED) and the date first seen by a clinical specialist.
- (b) **First specialist assessment to diagnosis:** The number of days between the date first seen by a clinical specialist and the date of pathological diagnosis or radiological diagnosis (where pathology was unavailable) as given on the pathology/radiology report.
- (c) **Referral to diagnosis:** The duration of the combined journey for stages (a) and (b).
- (d) **Diagnosis to treatment:** The number of days between the date of the pathological/radiological report that diagnosed colorectal tumour and the date of either (i) the first treatment; (ii) the decision not to treat; or (iii) the date the patient refused treatment.
- (e) **Referral to treatment:** The duration of the combined journey for stages (c) and (d).

Statistical comparisons were made between number of days using a Wilcoxon rank sum test, and between proportions using a Chi-squared test.

Results

Population—There were 1321 diagnoses of colorectal cancer in the years 2005 (n=654) and 2001 (n=667) within Waitemata, Auckland and Counties-Manukau DHBs. Of these 1128, were included in this study. Reasons for study exclusions included treatment outside of study dates, recurrent disease, no medical file available at the hospital, no evidence of cancer in the medical file, treatment outside of the Auckland region, duplicate NHIs, invalid NHIs, non-adenocarcinoma e.g. squamous cell carcinoma (SCC), carcinoid, GIST, cholangiocarcinoma, gall bladder cancer and in one instance metastatic breast cancer.

The demographics of the study population are outlined in table 1. Patients had a median of 2 comorbidities (interquartile range (IQ) ((0, 4)) at the time of diagnosis. The most common comorbidities were hypertension (39%), gastrointestinal (37%), cardiac (36%), musculoskeletal (23%), respiratory (18%) and hyperlipidaemia (17%).

Table 1. Study population demographics

Variables		Total (n=1128)		
Number of cases included in study		n	(%)	
Cases in 2001		542	(48)	
Cases in 2005		586	(52)	
Sex		n	(%)	
Female		555	(49)	
Male		573	(51)	
Average age at pathological diagnosis		Mean	(SD)	
All		70	(12.9)	
Female		71	(13.7)	
Male		70	(12.2)	
Ethnicity		n	(%)	
NZ European		764	(68)	
Māori		49	(4)	
Other		224	(20)	
Unknown		91	(8)	
Number of comorbidities		Median	IQ (Q1,Q4)	
		2	(1,4)	
Site of treatment	2001		2005	
	n	(%)	n	(%)
Auckland City Hospital	136	(25)	159	(27)
Middlemore Hospital	127	(23)	145	(25)
North Shore Hospital	187	(35)	175	(30)
Private practice	71	(13)	103	(18)
Missing	21	(4)	4	(1)
Total	542	(100)	586	(100)

Specialist referral—The most frequent mode of referral was by general practitioner (68%). Emergency presentation accounted for 9% of total referrals, and referrals by ‘other means’ (internal referrals, other hospitals, other specialty, self referrals, screening, rest home or endoscopy suite) accounted for 10%. Overall referral data were missing for 13% of cases, and it was noted that twice as many cases had missing referral data in 2001 (19%) as in 2005 (9%).

Presenting features—The most commonly documented symptoms were abdominal pain, experienced by 44% of cases, abnormal investigations (such as areas of thickening on CT scans, obstruction on abdominal X-rays, and mass on digital rectal examination) 42%, rectal bleeding 35%, altered bowel habit 33%, anaemia (or pallor) 32% and other gastrointestinal symptoms 30%.

First specialist assessment—For the total study population, 58% of first specialist assessments were with the surgical service, 19% with gastroenterology or endoscopy, 9% with general medicine and 1% with Oncology. The remainder (4%) were seen by other specialties leading to colorectal cancer diagnoses such as emergency medicine, gerontology, vascular surgery, respiratory medicine and haematology. Data were not available for 10% of patients.

Diagnostic and staging investigations—Patients had a median of 3 diagnostic investigative procedures (IQ ((2, 4)). The most common diagnostic investigative procedures in 2001 were colonoscopy (56%), chest or abdominal X-ray (54%), and sigmoidoscopy (33%). In 2005 the most common were colonoscopy (74%), CT scan

(64%) and chest or abdominal X-ray (35%). The percentage of patients receiving CT scans increased from 22% in 2001 to 64% in 2005.

The most common investigation for patients who presented non-acutely was colonoscopy (undertaken in 72% of cases as opposed to 45% of cases that presented acutely). The percentage of cases undergoing CT and MRI was similar in both the presentation groups (47% and 18% respectively in the non-acute and 45% and 13% in the acute).

Pathology—Pathological data were obtained from pathology reports, including both biopsy results from colonoscopy/sigmoidoscopy prior to treatment and pathology reports on the surgical specimen(s). Radiological diagnosis was used in the absence of surgical pathology. Table 2 illustrates the distribution of Dukes stage and pathological grade for this cohort.

Table 2. Pathological demographics of the study population

Variables	Number of patients	(%)
Site		
Caecum	130	(12)
Appendix	9	(1)
Ascending colon	97	(9)
Hepatic flexure	48	(5)
Transverse colon	87	(8)
Splenic flexure	35	(3)
Descending colon	45	(4)
Distal colon	4	(0)
Sigmoid colon	220	(20)
Rectosigmoid	104	(9)
Rectum	259	(23)
Anal canal	2	(0)
Synchronous	35	(3)
Missing data	53	(5)
Dukes' stage (n=1065)		
A	139	(13)
B	358	(34)
C	436	(41)
Not excised	132	(12)
Grade (n=994)		
Well differentiated	165	(17)
Moderately differentiated	598	(60)
Poorly differentiated	120	(12)
Undifferentiated	1	(0)
Not resected	110	(11)
Metastasis (n=1030)		
Yes	237	(23)
No	775	(75)
Not investigated or not stated	18	(2)

In 2001 the median number of nodes excised was 14 (IQ [9, 22]; n=394). This increased to 17 in 2005 (IQ [12, 26]; n=445). In 2001, 27% of patients had less than 10 nodes removed. In 2005, 16% had less than 10 nodes removed. Nodal harvest was

also examined with respect to cancer site and treatment type, with colon cancers having a median number of 16 nodes excised over both years (all treated with surgery), rectal cancers treated with surgery only having a median number of 14 nodes excised, and rectal cancers treated with pre-operative combined chemo-radiotherapy a median number of 12.5 nodes excised.

Treatment—895 patients (79%) received initial treatment with curative intent. The majority of these cases received surgery. The most common surgical treatment was right hemicolectomy (29%), followed by anterior resection (16%) and left hemicolectomy (7%) .

Table 3 outlines the first treatments received by the study population. In total 25 patients (2001=11, 2005=14) within the curative surgery group received an ileostomy, colostomy or temporary stoma prior to definitive surgery or chemoradiation as their first treatment.

Table 3. First treatment received by patients in 2001, 2005 and total

First treatment	2001	(%)	2005	(%)	Total	(%)
Surgery	493	(91)	508	(87)	1001	(89)
Curative	414		455		869	
Palliative	41		46		87	
Intent unknown	38		7		45	
Pre-op chemo-radiation	6	(1)	15	(3)	21	(2)
Curative radiotherapy	1	(0)	4	(1)	5	(0)
Palliative—total (excluding surgical)	33	(6)	56	(10)	89	(8)
Supportive care	32		43		75	
Chemotherapy	1		6		7	
Radiotherapy	1		7		8	
Deceased prior to treatment	2	(0)	0	(0)	2	(0)
n missing	7	(1)	3	(1)	10	(1)

Journey—The median number of days from initial referral to first treatment was 35 (IQ [10, 75]) (Figure 1). There was no statistically significant difference in the median number of days from initial referral to first treatment between 2001 and 2005 (32 IQ [10, 72] and 36 IQ [10, 79] respectively; p-value=0.3), however there was substantially more missing data in 2001 (n (missing)=120 in 2001 versus 67 in 2005). Of the total study population (not including missing) 86% (89% in 2001; 84% 2005) of patients were treated within 31 days of diagnosis and 68% of patients were treated within 62 days of initial referral (Table 4).

Negative values were obtained for some patients at particular stages of the journey (Figure 1). This was most common in the diagnosis to first treatment section, and reflects patients for which the date on the pathological report that first diagnosed definitive malignancy was after the date of first treatment.

Figure 1. Time taken for each stage of the patient journey

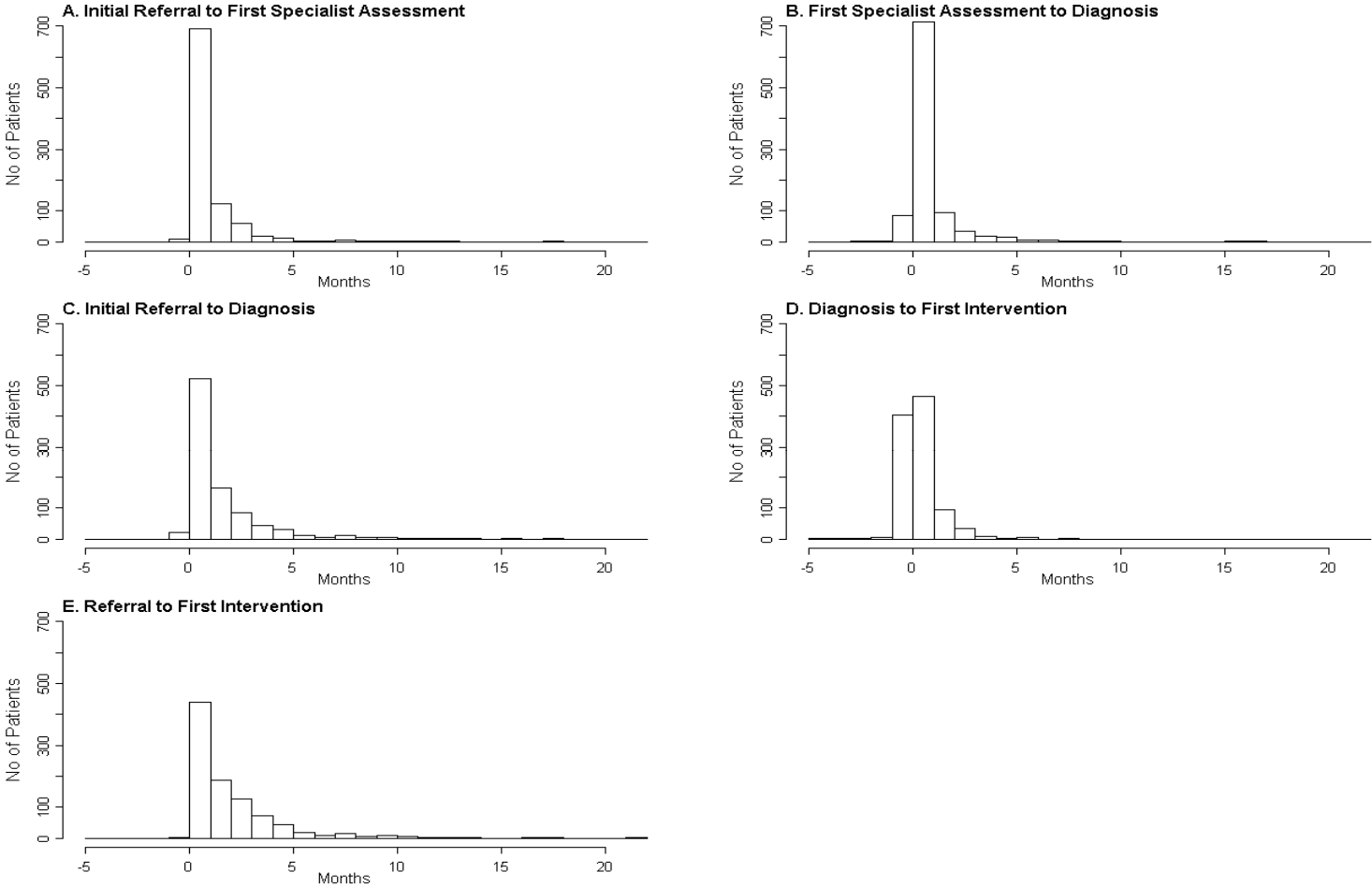


Table 4. Percentages of 2001, 2005 and total patients, Māori and Non-Māori and private and public patients treated within UK national guidelines

Variables	Total (%)	2001 (%)	2005 (%)	Maori (%)	Non-Maori* (%)	Private (%)	Public (%)
Referral to First Specialist Assessment	n=935	n=417	n=518	(n=42)	(n=835)	(n=77)	(n=856)
< 0 days	8 (1)	4 (1)	4 (1)	1 (2)	7 (1)	2 (3)	6 (1)
0 to 14 days	556 (60)	255 (61)	301 (58)	25 (60)	494 (59)	52 (68)	503 (59)
15 to 31 days	142 (15)	65 (16)	77 (15)	7 (17)	124 (15)	9 (12)	133 (16)
>31 days	229 (24)	93 (22)	136 (26)	9 (21)	210 (25)	14 (18)	214 (25)
Diagnosis to First Treatment	n=1027	n=466	n=561	n=48	n=902	n=114	n=902
< -7 days	101 (10)	30 (6)	71 (13)	8 (17)	90 (10)	4 (4)	95 (11)
-7 to -1 days	316 (31)	189 (41)	127 (23)	10 (21)	284 (31)	35 (31)	276 (31)
0 to 31 days	471 (46)	197 (42)	274 (49)	21 (44)	404 (45)	69 (61)	398 (44)
> 31 days	139 (14)	50 (11)	89 (16)	9 (19)	124 (14)	6 (5)	133 (15)
p-value comparing % > 31 days		0.02		0.3		0.006	
Initial Referral to First Treatment	n=941	n=422	n=519	n=42	n=840	n=75	n=864
< 0 days	1 (0)	0 (0)	1 (0)	0 (0)	1 (0)	1 (0)	0 (0)
1 to 31 days	443 (47)	208 (49)	235 (44)	15 (36)	399 (46)	47 (63)	394 (46)
32 to 62 days	193 (21)	86 (20)	107 (21)	14 (33)	164 (20)	15 (20)	178 (21)
>62 days	304 (32)	128 (30)	176 (34)	13 (31)	276 (33)	12 (16)	292 (34)
p-value comparing % >62 days		0.2		0.8		0.002	

Patients presenting acutely—Patients were identified as having presented acutely if their mode of referral was presentation at the Emergency Department (9% of cases). These cases had a median number of days from initial referral to first specialist assessment of 0 (IQ [0, 0], n=104). Those referred via their GP or by other method of referral consequently had a larger median number of days from initial referral to first specialist assessment than the overall total. For those referred by their GP or other method of referral the median was 11(IQ [0, 34]).

Māori patients—The median number of days from referral to first treatment was 47 (IQ [7, 75]) for Māori patients compared with 35 (IQ [9, 79]) for non-Māori. This difference was not statistically significant (p-value=0.9). For the Māori patients in this study, 62% were seen by a specialist within 14 days from referral; 81% received treatment within 31 days from diagnosis and 69% received treatment within 62 days from initial referral (Table 4). For non-Māori patients the percentages seen for the same time points were 60%, 86%, and 67% respectively (Table 4).

Private patients—A total of 174 patients received their initial treatment in the private sector (71 in 2001 and 103 in 2005). The median number of days from referral to first treatment was 23 (IQ [12, 50]) for patients treated in private compared with 37 (IQ [10, 80]) for patients treated in public (p-value=0.04). It should be noted that this data was difficult to obtain from private records, and 57% of cases in the private category had missing data for this variable. Seventy percent of patients treated within the private sector were seen by a specialist within 14 days from referral, compared to 60% treated within the public sector. Ninety five percent of private patients received treatment within 31 days from diagnosis and 84% within 62 days from initial referral, compared to 85% and 66% respectively in the public sector.

Discussion

This study describes the patient journey for 1128 Auckland patients diagnosed with colorectal cancer in 2001 and 2005. The population reviewed was similar to that reported in a National study of colorectal cancer patients, with an almost equal proportion of males and females, and a mean age at diagnosis of 70.⁸ The most common pathway for patients in this cohort was to be referred by a GP (68%) followed by a first specialist assessment with the surgical team (58%), with 89% of patients receiving a surgical intervention as first line of treatment.

Delays were seen in the greatest proportion of patients during the section of the journey from initial referral to first specialist assessment. This was commonly due to a wait for an outpatient colonoscopy, with reasons for long wait times including apparent loss of referrals, resulting in multiple referrals (in some cases up to 3 were noted) being made. This time point is complicated however by patients with low priority having routine colonoscopies for other comorbidities and incidental diagnoses of colorectal cancer being made, and patients choosing not to have the procedure at the initially scheduled time, perhaps due to patient fear of the procedure, and other unforeseeable reasons, such as a death in the patients' family.

The least delays were seen in the diagnosis to first treatment section; however this section was lengthened for patients requiring pre-operative chemo-radiation, as this

requires two separate referrals and appointments with medical oncology and radiation oncology.

Some sections of the journey are reported as having negative values. This was most commonly seen from diagnosis to first treatment and represents pathological diagnosis (as per the date on pathology report diagnosing malignancy or date of radiology if no pathological diagnosis was obtained) occurring after the initiation of treatment. This includes patients undergoing surgery based on radiological or digital (in the case of rectal tumours) diagnoses, those who underwent emergency surgery or surgery for another indication (incidental findings of colorectal cancer), those who received an ileostomy or other non-diagnostic procedure as first intervention prior to later surgery, and those who had colonoscopy for which pathology was not diagnostic of malignancy.

Currently there are no national or Australasian guidelines in place for the timelessness of colorectal cancer treatment. The UK National Cancer Plan requires patients with an urgent GP referral for suspected cancer to be treated within 62 days from referral.⁹ Patients in the Auckland region were moving from referral to treatment in a median of 35 days, with 68% being treated within 62 days from initial referral.

The UK National Cancer Plan also has a two week standard for urgent referrals to be seen by a specialist.⁹ In our cohort, 60% of patients were seen by a specialist within 14 days of referral, compared to 99.9% in England.¹⁰ In comparing the 62 day and 14 day targets however, it should be noted that the UK has an urgent referral system from which these data are generated, whereas in New Zealand there is not a hierarchical referral system, so the data reported in this study reflect all referrals that led to a colorectal cancer diagnosis.

The New Zealand health sector should examine the merits of such a referral system for patients with potential cancers (who will soon be competing for a scarce colonoscopy resource with screen-positive patients). This would also have the benefit of increasing the ability to benchmark internationally. Logically these referral system targets should be developed to facilitate benchmarking with Australia and other countries with similar health sectors such as Canada and the Netherlands.

The UK however also has a target of a maximum one month wait (“31 day target”) from diagnosis to first definitive treatment. This variable should therefore be directly comparable to the Auckland data which showed that 86% of patients were treated within 31 days of diagnosis, compared to 99.5% of patients with all cancers in the UK.¹⁰ Of concern we did find that the proportion of patients meeting this target decreased from 2001 to 2005 ($p=0.02$).

This study aimed to capture all patients managed in the 3 District Health Board regions (Auckland, Counties-Manukau and Waitemata) as well as those in the private sector. Results are reported for all Māori patients included in the study (49; 4%) as compared to those with non-Māori ethnicity and for patients treated in the private system versus the public system. As would be expected, the median number of days for most stages of the journey was shorter for patients seen in the private sector, and a greater percentage of the private patients met the UK targets.

Although similar percentages of Māori and non-Māori patients are being seen within the UK-defined targets, the median duration from initial referral to first treatment

appears longer for Māori patients, however the small patient numbers prevent statistically valid comparisons. Similarly there are insufficient data to explore reasons for any real differences in disease stage, patient comorbidities or broader access issues.

Population-based studies of screening initiatives have shown that screened populations have a decreased incidence of advanced stage colorectal cancer, and a disease specific survival advantage,^{11,12} which suggests that improvement in the timeliness of diagnosis improves patient outcome, through detection of earlier stage disease. Although this seems intuitive, it is important to note that there are studies that have suggested that there is no association between delays in diagnosis and treatment, and colorectal cancer stage.¹³

In particular, a meta-analysis of 17 studies that dealt with colorectal cancer stage and delay including 5209 patients concluded that there is no association between diagnostic delay and disease stage.¹³ The study authors, however, acknowledge limitations in their study, in particular their definitions of delay and their grouping of disease stages for comparison.

This study has identified that the majority of patients with colorectal cancer in the Auckland region are moving through the patient pathway in a timely fashion but that nearly one-third are not and take longer than 2 months to get treatment once referred. Although the treatment pathway for colorectal patients is complicated by multiple factors, by developing strategies to increase the percentage of people completing timely passage through each part of their journey, outcomes should improve and yield benefits to the patient and health sector as a whole.

Competing interests: None.

Author information: Melissa Murray, Clinical Research Officer, Cancer Trials New Zealand, University of Auckland, Auckland; Julie Brown, Senior Research Fellow, Discipline of Oncology, School of Medical Sciences, University of Auckland, Auckland; Victoria Hinder, Research Fellow/Biostatistician, Cancer Trials New Zealand, University of Auckland, Auckland; Arend Merrie, Consultant Colorectal Surgeon, Auckland District Health Board, Auckland; Andrew Hill, Consultant Colorectal Surgeon, Middlemore District Health Board, Auckland; Michael Hulme-Moir, Consultant Colorectal Surgeon, Waitemata District Health Board, Auckland; Katrina Sharples, Biostatistician, Cancer Trials New Zealand, University of Otago, Dunedin; Michael Findlay, Chair of Oncology, Discipline of Oncology, University of Auckland; Director, Cancer Trials New Zealand, University of Auckland, Auckland Consultant Medical Oncologist, Auckland District Health Board, Auckland.

Acknowledgement: This study was funded by the Genesis Oncology Trust.

Correspondence: Melissa Murray, Cancer Trials New Zealand, Discipline of Oncology, Faculty Medical and Health Sciences, University of Auckland, Private Bag 92019, Auckland, New Zealand. Fax: +64 (0)9 3737927; email:

m.murray@auckland.ac.nz

References:

1. Pisani P, Parkin DM, Bray F, Ferlay J. Estimates of the worldwide mortality from 25 cancers in 1990. *Int J Cancer*. 1999 Sep 24;83(1):18-29.

2. Wilmlink AB. Overview of the epidemiology of colorectal cancer. *Dis Colon Rectum*. 1997 Apr;40(4):483-93. Review.
3. Cancer control Taskforce. *The New Zealand Cancer Control Strategy: Action Plan 2005-2010*. Wellington: Ministry of Health; 2005.
4. Frizelle FA, Emanuel JC, Keating JP, Dobbs BR. A multicentre retrospective audit of outcome of patients undergoing curative resection for rectal cancer. *N Z Med J*. 2002 Jun 21;115(1156):284-6.
5. Simpson H, Jeffery M, Hickey B, et al. Postoperative follow-up strategies for patients after potentially curative surgery for colorectal cancer at Christchurch Hospital. *N Z Med J*. 2004 May 7;117(1193). <http://www.nzmj.com/journal/117-1193/873/content.pdf>
6. Robinson B, Frizelle F, Dickson M, Frampton C. Colorectal cancer treated at Christchurch Hospital, New Zealand: a comparison of 1993 and 1998 cohorts. *N Z Med J*. 2005 Feb 25;118(1210). <http://www.nzmj.com/journal/118-1210/1323/content.pdf>
7. Cunningham R, Sarfati D, Hill S, et al. Colon cancer management in New Zealand: 1996-2003. *N Z Med J*. 2009 May 8;122(1294):51-60. <http://www.nzmj.com/journal/122-1294/3581/content.pdf>
8. Keating J, Pater P, Lolohea S, Wickremesekera K. The epidemiology of colorectal cancer: what can we learn from the New Zealand Cancer Registry? *N Z Med J*. 2003 May 16;116(1174). <http://www.nzmj.com/journal/116-1174/437/content.pdf>
9. United Kingdom National Health Service, Department of Health Cancer waiting targets: A guide (version5). http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_063067
10. United Kingdom Department of Health Cancer Waiting Times Statistics for Lower Gastrointestinal Cancer. <http://www.performance.doh.gov.uk/cancerwaits/2008/q3/index.html>
11. Hardcastle JD, Chamberlain JO, Robinson MH, et al. Randomised controlled trial of faecal-occult-blood screening for colorectal cancer. *Lancet*. 1996 Nov 30;348(9040):1472-7.
12. Kronborg O, Fenger C, Olsen J, et al. Randomised study of screening for colorectal cancer with faecal-occult-blood test. *Lancet*. 1996 Nov 30;348(9040):1467-71.
13. Ramos M, Esteva M, Cabeza E, et al. Lack of association between diagnostic and therapeutic delay and stage of colorectal cancer. *Eur J Cancer*. 2008 Mar;44(4):510-21. Epub 2008 Feb 12. Review.