THE NEW ZEALAND MEDICAL JOURNAL
Journal of the New Zealand Medical Association

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This Issue in the Journal

Short-term outcomes of laparoscopic resection for colon cancer in a provincial New Zealand hospital
Josese Turagava, Tarik Sammour, Fadhel Al-Herz, Chris Daynes, Mike Young

"Key hole" surgery for colon cancer resection colectomy has some benefits compared to equivalent open surgery. However, most data comes from specialist colorectal units. We compared the outcomes of laparoscopic colectomy in a provincial New Zealand hospital with those from specialist centres. Short term outcomes were shown to be equivalent.

Dietary information for colorectal cancer survivors: an unmet need
Jessie M Pullar, Alexandra Chisholm, Christopher Jackson

Diet is an important risk factor for colorectal cancer, and there is growing evidence that what you eat following diagnosis can impact on your chances of survival. Despite this, few patients with colon and rectal cancer know specifics about how important their diet may be. Our survey examined what information people with colorectal cancer currently receive, and what information they feel they need. We found that less than a third of patients received specific dietary advice following a diagnosis of colorectal cancer, and that 98% of people wanted more information than they currently received. Major sources of information are presently friends and dietitians, but not patients doctors or nurses. As an outcome of this study, we have developed a comprehensive dietary information resource available for patients diagnosed with colorectal cancer.

Dietary patterns and information needs of colorectal cancer patients post-surgery in Auckland
Ryan Cha, Melissa J Murray, John Thompson, Clare R Wall, Andrew Hill, Mike Hulme-Moir, Arend Merrie, Michael P N Findlay

Colorectal (bowel) cancer is the second most common cancer in New Zealand. International research has suggests that eating a diet high in meat, fat and refined grains intake, and low in fruit and vegetables, is associated with an increased risk of getting colorectal cancer. Recent research has also suggested that eating like this after having surgery to remove a colon or rectal cancer may increase the risk of the cancer coming back again. We surveyed 29 patients from Auckland who had recently had surgery to remove a colon or rectal cancer. We asked about what foods they eat regularly and if they had received any information about what they should eat after their surgery. Over 50% reported that they did not receive any dietary information after surgery. Many of the patients did not eat the recommended daily amount of fruit and vegetables as per the New Zealand Food and Nutrition Guideline statements for

healthy adults. We recommend that patients with colorectal cancer be provided with more information on what is good for them to eat.

Vitamin D receptor polymorphisms in colorectal cancer in New Zealand: an association study
Robert W Bentley, Dayle A Keown, Richard B Gearry, Vicky A Cameron, Jacqui Keenan, Rebecca L Roberts, Andrew S Day

Vitamin D has been found to play a role in many diseases including colorectal cancer. Colorectal cancer occurs with a high frequency in the New Zealand (NZ) population, our research is a preliminary study in a NZ colorectal cancer population to test whether variants of the vitamin D receptor gene are linked to the occurrence of this disease. We could not find any statistically significant association.

A prospective study of endoscopist-blinded colonoscopy withdrawal times and polyp detection rates in a tertiary hospital
Gary Lim, Sharon K Viney, Bruce A Chapman, Frank A Frizelle, Richard B Gearry

Polyps are small growths in the bowel that over time can turn into bowel cancers. Removal of polyps using a colonoscope can reduce the risk of bowel cancer. International recommendations have been that the colonoscope should be removed from the end of the bowel in at least 6 minutes. Taking at least 6 minutes has been shown to result in more polyps being found and removed. Our study showed that the mean colonoscopy withdrawal time was 3 minutes 16 seconds. Colonoscopies in general are performed too quickly and should be performed slower.

Computed tomographic colonography (CTC): a retrospective analysis of a single site experience and a review of the literature on the status of CTC
Marcus Ghuman, Ngaire Bates, Helen Moore

Colorectal cancer (CRC) is the second most common cause of cancer death in New Zealand. Barium enema and colonoscopy have been the traditional investigations used in the work up of patients presenting with symptoms suggestive of CRC. Increasingly, computed tomographic colonography (CTC) is displacing barium enema as a non-invasive rapid imaging technique to investigate these patients. This study has reviewed the local data on rates of detection of colonic pathology and it suggests Māori and Pacific Islanders need encouragement from primary health practitioners to present for bowel examination. CTC is a safe, accurate, and non-invasive testing modality for CRC.

Computed tomographic colonography: colonic and extracolonic findings in an Auckland population
Helen Moore, Nicholas Dodd

A review of findings at CT Colonography, (CTC) "Virtual Colonoscopy" was performed in over 2000 studies, mainly performed for patents with bowel symptoms. The vast majority did not have a sinister finding; 10.7% of the group required referral for an invasive test to remove a bowel polyp or assess further for malignancy. Findings outside the bowel (extracolonic findings) were also reviewed, and over half of all patients' had an extracolonic finding reported. However these were almost all of non urgent significance, such as cysts or small renal stones. Only 8.3% of the group required further work-up recommendations to assess an important finding such as a large aortic aneurysm or possible cancer of lymph nodes or kidney. The results of this study are in line with other research in New Zealand and internationally.

Exploring Maori health worker perspectives on colorectal cancer and screening
Suzanne Pitama, Tami Cave, Tania Huria, Cameron Lacey, Jessica Cuddy, Frank Frizelle

There is a growing disparity between the colorectal cancer incidence rates of Maori and non-Maori in New Zealand. This research explored with Maori health workers their experiences with patients/whānau in navigating through the health system in terms of health screening programmes. This research assists us to understand how the new colorectal screening programme may work to be inclusive of Maori and assist in reducing health disparities within this area.

Colonoscopy requirements of population screening for colorectal cancer in New Zealand
Terri Green, Ann Richardson, Susan Parry

A national screening programme for bowel cancer has been recommended for New Zealand. This involves a test called the faecal occult blood test (FOBTi or FIT) which would be offered to people aged 50–74 every 2 years. The test is not 100% accurate and if it shows positive, a colonoscopy which is a complete examination of the bowel, is required to determine presence of cancer (or 'adenomas' which could develop into cancer). Colonoscopies are also required to monitor adenomas found. This paper estimates the volume of colonoscopies required if a national bowel screening programme using the immunochemical faecal occult blood test (FOBTi) for the initial screen for people aged 50–74 (currently being piloted in Waitemata) is introduced in New Zealand. A national bowel cancer screening programme will require a large volume of colonoscopies, estimated at 18,000 in the first year rising to 28,000 after 20 years. Services will need to expand to meet this demand, in order to deliver the colonoscopies following a positive FOBTi, in a timely fashion to confirm diagnosis, whilst also maintaining services for people with symptoms, or at higher risk. Monitoring of small adenomas will need to be carefully managed.

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The New Zealand Bowel Screening Pilot

Mike Hulme-Moir

In 2010 the Ministry of Health invited proposals to run a pilot bowel screening program over a 4-year period. The pilot will inform the Ministry of the feasibility, resource implications, and costs of a national bowel screening programme in New Zealand. Significant background work has been done over the last 15 years leading up to the development of this programme. While international studies provide useful information about the feasibility of bowel screening ultimately only a pilot study will look specifically at the New Zealand situation.

Colorectal cancer (CRC) is a leading cause of cancer death and morbidity in New Zealand. Ministry of Health statistics show new CRC registrations in 2010 were the highest for any cancer affecting both men and women.[1] That year, 2966 new cases were registered, just over half of which were men.[1] In 2008, CRC was the second most common cause of cancer death after lung cancer overall.[2] By 2016, the number of new cases of bowel cancer diagnosed each year is projected to increase by 15% for men and 19% for women to 3302 (for all ages).

New Zealand thus has one of the highest incidence of colorectal cancer in the world (44.4/100,000) and unfortunately one of the highest death rates from CRC in the OECD.[3]

Internationally much research has been done on the various possible colorectal cancer screening modalities. Well-regarded papers have confirmed the validity of screening techniques such as faecal occult blood testing (FOBT)[4–8] and flexible sigmoidoscopy.[9]

In response to the CRC statistics in New Zealand and the emerging evidence for CRC screening in international literature, a working party was established in 1997 by the National Health Committee. Their brief was to make recommendations on the advisability of introducing a publicly funded screening programme based on FOBT screening. They published their findings in 1998[3] and the first of 5 recommendations was:

> "Given the modest potential benefit, the considerable commitment of health sector resources and the small but real potential for harm, population-based screening for colorectal cancer with faecal occult blood tests is not recommended in New Zealand".[3]

In April 2005 the National Screening Unit (NSU) established the Colorectal Cancer Screening Advisory Group to provide the NSU with strategic advice and recommendations on the appropriateness and feasibility of a population colorectal cancer screening programme in New Zealand. This Group made the following recommendation:

> "A feasibility study of CRC screening using FOBTi (or FOBTg and FOBTi) should be considered and planning initiated. This would inform a decision on whether the New Zealand health system could support a FOBTi-based CRC screening program that achieves high participation rates and that is acceptable, effective and economically efficient."[10]

As a direct result of this recommendation, the Ministry of Health National Bowel Cancer Taskforce was formed. The MOH went on to develop and release a competitive RFP (request for proposal) to run a pilot bowel screening programme (BSP) in New Zealand.

A number of important criteria needed to be met in order to submit the RFP. This included adequate numbers of eligible population including appropriate ethnic diversity, (minimum of 6000 eligible Māori), and a mix of urban and rural dwellers. The programme would need to address current inequalities in CRC outcomes experienced by some population groups in New Zealand, for example Māori.[11,12] There had to be a suitable location for colonoscopy and the facility to cope with ensuing increased surveillance and cancer treatment.

The Northern Regional Cancer Network, a Ministry of Health (the Ministry) initiative which includes members from the four northern District Health Boards (DHBs), discussed the RFP with a view to submitting a regional bid. A number of options were examined by the group but in the end the proposal, based on utilisation of the Waitemata DHB (WDHB) catchment was submitted to the Ministry. An important component of this submission was high level regional support from the three Auckland DHBs, the wider Auckland gastroenterology and surgical community, and the WDHB primary health organisations. Our RFP was successful and the pilot awarded to WDHB in late 2010.

The BSP is a 4-year invitation-based programme using biennial iFOBT (immunochemical faecal occult blood test). It will be offered to all eligible WDHB residents aged between 50 and 74 years (approximately 137,000). Exclusion criteria include previous colonoscopy within five years and a past history of bowel cancer.

A registry of eligible participants has been created using NHI (national health index) data from the Ministry and local PHO (primary health organisation). This is updated on a regular basis. From this, invitations are generated by the bowel screening coordination centre so as to offer screening to all eligible people once every 2 years. The data is also being used to monitor the programme to ensure that it meets a number of strict quality standards and to record screening outcomes.

Eligible patients are mailed an introductory letter, followed by an invitation and test kit 1 month later. The test is done at home and the specimen sent in a sealed prepaid envelope via a private bag to LabPLUS for processing. Patients and their General Practitioners (GPs) are notified of a negative result by mail/email. Positive results are sent electronically to GPs who then contact the patients directly with the result and refer them for colonoscopy. Where there is no GP, the BSP Endoscopy Nurse Specialist contacts the patient with the results and organises the colonoscopy.

Colonoscopy is done in a new, dedicated endoscopy suite at Waitakere Hospital in West Auckland. Endoscopists from around the wider Auckland region provide specialist colonoscopy services. Laboratory services are provided at ADHB (Auckland DHB) by LabPLUS. Patients receive a colonoscopy report on the day of the procedure and a follow up letter outlining any histology results and a future management plan. Stringent colonoscopy standards based on the United Kingdom screening programme are being applied and audited as part of the BSP.

Continuous and stringent audit at all levels is a vital component of the programme. The DHB is contracted to provide the Ministry with regular feedback on a number of quality indicators. Two commercial research companies, Litmus and Sapere Research Group have been contracted to carry out in depth evaluation of the programme and to perform a cost utility analysis.

After a huge amount of work at the Ministry, DHB and inter-DHB level, the pilot officially commenced in October 2011. Full roll-out started in late January 2012. The BSP is run from the same physical location as BreastScreen Waitemata Northland in Takapuna where we share many resources including management. This is the first invitation based screening programme ever carried out in this country and the first to involve general practitioners in screening process. It is also the first programme to target men. The BSP team has a number of specific programmes to raise community awareness and to target those population groups who are typically under screened. Resources have been developed for patients and their doctors both in hardcopy form and on the Internet.[13] These are available in all the major languages encountered in WDHB.

At this early stage some preliminary data is available but it is too early to make useful comment on many of the important parameters to be measured. Since January 2012, over 1300 invitations have been sent out per week. As of 4 May 2012 there have been 7612 returned kits but this includes people who have spoilt their first kit and have been re-issued with a new kit. Of these, 489 were positive and were offered colonoscopy. So far 248 colonoscopies have been performed from which nine cancers have been identified. Five of these were malignant polyps i.e. diagnosis made only at histology and the other four were clearly malignant at the time of colonoscopy. Data is not yet available on the stage of these cancers, the pickup rate of advanced polyps or the uptake of screening in the target population.

In summary, WDHB is running a pilot BSP based on biennial iFOBT with a view to informing the country on the feasibility of a national bowel screening programme. We hope to fully clarify any unanticipated process and service issues during the course of the pilot study.

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Laparoscopic colonic cancer surgery in New Zealand: where and when is it safe?

Tim W Eglinton

More than 20 years have passed since laparoscopic colonic surgery was first reported in the literature.[1] Due to greater technical difficulties with laparoscopic colorectal surgery, uptake was initially slow compared with other operations such as cholecystectomy. In more recent years laparoscopic colorectal resection has increased dramatically, with rates as high as 60% in some regions.[2] Over this time, several multicentre randomised trials have demonstrated that laparoscopic colonic surgery has equivalent oncologic outcomes to open surgery[3] and is associated with some short term benefits in patient recovery.[4] While this is level I evidence, it arises from tertiary and academic units, so its applicability to regional New Zealand is questionable.

In this issue of the *NZMJ*, Turagava et al present a case series of laparoscopic colorectal resections from one of New Zealand's larger secondary centres, Palmerston North Hospital (PNH).[5] The authors attempt to address the question of the appropriateness of laparoscopic colorectal surgery in a regional setting. The paper reports the short term outcomes of 76 laparoscopic colonic resections for cancer, the majority of which were performed by one experienced laparoscopic surgeon, over a 10-year period.

The results presented are excellent, demonstrating morbidity and mortality rates of 27.5% and 1.3% respectively. Short-term patient and oncologic outcomes were also very satisfactory. The results were compared with the Australasian Laparoscopic Colon Cancer Surgical (ALCAaS) trial, the short-term results of which were reported in 2008.[6] When compared with the ALCAaS data, there was no difference in mortality, morbidity or return of bowel function. In fact, several of the parameters from PNH compared very favourably; patients tolerated fluids a day earlier and the rate of intraoperative complications was statistically significantly lower in the PNH series.

Does this indicate laparoscopic colorectal surgery can be performed safely throughout regional New Zealand? Before drawing this conclusion, both the context of this study and some of the issues surrounding implementation, training and conducting randomised trials in laparoscopic colorectal surgery deserve further discussion.

Firstly, in considering Turagava et al's study, it is necessary to acknowledge the significant limitations in the comparison of the two datasets from PNH and ALCAaS, which were obtained with very different methods. The collection of data in the setting of a prospective randomised trial has predefined outcomes and is far more rigorous than the case series presented here.

Nowhere is this difference more obvious than in the comparison of intraoperative complications. The ALCAaS trial reported a high rate of intraoperative complications in the laparoscopic arm. Closer inspection of these complications reveals the majority were minor bowel injuries or minor haemorrhage which appeared to be of little

clinical consequence. The fact they were registered at all reflects the RCT methodology where an independent observer was present in the theatre to record these events. Such events are more likely to be recognised and recorded by an independent observer with laparoscopic than open surgery.[7]

Retrospective series such as that from PNH, will inevitably underestimate such minor events as many would not be recorded in standard operation notes. The corresponding author of the PNH study also recently published a meta-analysis confirming a higher rate of intraoperative complications in laparoscopic surgery across 10 trials, including the ALCAaS data.[8] For the reasons already mentioned, and the fact the overall outcomes were not altered, the clinical significance of this finding remains debatable. However, it is a sobering reminder of the need to monitor and avoid the potential for harm to patients with the introduction of new techniques.

The learning curve for laparoscopic surgery (as for training surgeons in open surgery) also creates the potential for harm. Previous trials of laparoscopic surgery that did not employ strict pre-trial credentialing demonstrated a significant learning curve. The MRC CLASSICC trial conversion rate reduced from 45% in the initial phase to 15% in the final year of recruitment, obviously influencing the intention to treat analysis.[9]

The data from PNH presented was predominantly from one very experienced laparoscopic surgeon with 8 years laparoscopic colorectal surgical experience prior to the study period. The key message here is that outcomes from laparoscopic colorectal surgery are highly operator dependent. Adequate training and experience are required, irrespective of the setting, in order to avoid the potential for harm to patients.

In addition to operator dependence, laparoscopic surgery is also heavily technology-dependent. Technology has progressed rapidly in recent years and for this reason the two different time periods compared in Turagava et al's analysis also confound the results. Accounting for the rapid evolution of surgical technique and technology is not a problem unique to this study, but represents a significant issue in interpreting the results of surgical RCTs in the context of contemporary practice.

A long period is required for multicentre trials such as ALCAaS to firstly achieve sufficient recruitment for adequate statistical power and then to observe long term outcomes of interest (e.g. 5-year recurrence and survival). ALCAaS commenced with a pilot study in 1996 then, after 8 grants, took 14 years to complete.[10] Over that time significant developments in monitors, energy devices, laparoscopic bowel graspers, wound protectors, and stapling devices occurred.

These developments, combined with technical refinements associated with increasing experience, all have the potential to produce incremental beneficial effects on the outcomes of the procedure. It is not necessarily reasonable to assume the laparoscopic procedures performed in 1998 at the commencement of recruitment had the same outcomes as those performed in 2012.

Despite these limitations, RCTs remain the most effective tool to assess new techniques against current gold standards and ensure their safety. The point at which surgeons adopt these new techniques will also vary and is influenced by many factors, including the duration of RCTs, the evolution of technology and the effect this has on the balance of equipoise over that period.

The rapid uptake of laparoscopic colorectal cancer surgery occurred during the period of ALCAaS recruitment, despite guidelines recommending such surgery should only occur in the setting of a randomised trial.[11] This was both driven by patients and surgeons and the difficulties are reflected in recruitment rates of patients to trials; many eligible patients were excluded based on their (or their surgeon's) preference for one type of surgery over another.[12]

The practicalities of RCTs mean that surgeons will adopt new techniques prior to full and final results of such trials being available. Once again, the importance of individual surgeon experience and training in this situation cannot be overestimated.

The series from PNH demonstrated what an experienced laparoscopic surgeon can achieve in a secondary setting. While trials, with their inherent limitations discussed, have shown safety and efficacy of laparoscopic surgery, any surgeon undertaking laparoscopic surgery in any setting, has a duty to ensure they and their team are adequately equipped to do so.

Current New Zealand guidelines state that "laparoscopic surgery for colon cancer has equivalent outcomes to conventional surgery" but also recommend that "elective surgery for colon cancer should be performed by a surgeon with specific training and experience in colorectal surgery and with sufficient caseload to maintain surgical skills."[13] These are very general statements. More specific guidelines from professional bodies that better define training pathways and objective minimum standards may help to ensure the appropriate use of laparoscopic colorectal surgery, thus minimising the effect of the learning curve and avoiding potential for harm to patients in adopting this technique.

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Short-term outcomes of laparoscopic resection for colon cancer in a provincial New Zealand hospital

Josese Turagava, Tarik Sammour, Fadhel Al-Herz, Chris Daynes, Mike Young

Abstract

Background Laparoscopic colectomy is associated with modest short-term benefits compared to equivalent open surgery. However, most published data comes from specialist colorectal units. We aimed to evaluate outcomes of laparoscopic colectomy in a provincial hospital setting.

Methods Retrospective review of all patients who underwent laparoscopic colectomy at Palmerston North Hospital (a provincial New Zealand hospital) between March 2001 and April 2010 was performed. Demographic data, intraoperative parameters, postoperative outcome data, and pathological data were compared with published results from the Australasian Laparoscopic Colon Cancer Surgical trial (ALCCaS).

Results Of 138 laparoscopic colonic resections performed, 76 satisfied criteria for inclusion. More left sided resections were performed in the PNH group versus the ALCCaS group (55% vs 40%). The intraoperative complication rate was significantly lower in the PNH group (2.6% vs 10.5%, P=0.039), and patients tolerated fluids one day earlier (P=0.0001), but mean days to passage of flatus, passage of bowel motion, and discharge were nearly identical. There were no statistically significant differences in the postoperative complication rate or in-hospital mortality.

Conclusion Short-term outcomes of laparoscopic colonic surgery for neoplasia in a secondary level provincial setting are equivalent to those from specialist colorectal units.

Laparoscopic colectomy for has been shown to be a safe procedure with equivalent oncological outcomes compared with open surgery.[1–5] In addition, the laparoscopic approach is associated with modest short-term benefits including less post operative pain, improved pulmonary function, shorter length of stay, and a decreased rate of postoperative ileus.[6–8]

The Australasian Laparoscopic Colon Cancer Surgical trial (ALCCaS) is the only published randomized controlled trial in an Australasian setting that compares laparoscopic and open surgical treatments for colon cancer.[9] The study showed significantly quicker return of gastrointestinal function and shorter hospital stay favouring the laparoscopic group, with no difference in reoperation rates or in-hospital mortality.[9] However, as in the ALCCaS trial most, most published data on laparoscopic colectomy comes from specialist colorectal units and tertiary hospitals,[10–13] with sparse literature from non-tertiary settings.[14–16] The issue of wider applicability of these results has been raised.[17]

The aim of this study is to evaluate short-term outcomes of laparoscopic colectomy performed in a single provincial secondary-level hospital in New Zealand and to

compare them to those of tertiary Australasian specialist colorectal units, specifically with published ALCCaS trial results.

Materials and Methods

Hospital and region—Palmerston North Hospital (PNH) is the only public secondary level hospital in the Manawatu region of the lower central North Island of New Zealand, with a base drainage population of approximately 160,000 people. PNH is also one of six national Regional Cancer Treatment Service centres, providing specialist intensive care, medical and surgical subspecialty services for a larger population of up to 500,000.[18]

Patients—All patients who underwent laparoscopic colectomy at PNH between March 2001 (clinical records dating more than 10 years are destroyed) and April 2010 were screened for inclusion in the study. Patients were eligible for inclusion if they were 18 years or older and had a laparoscopic colectomy for a single adenocarcinoma of the left or right colon.

Exclusion criteria were similar to those of the ALCCaS trial.[9,19,20] These were: advanced local disease (tumour size greater than 8 cm on radiologic imaging); metastatic disease; rectal cancer (defined as <15 cm from the dentate line on rigid sigmoidoscopy); emergency presentation; morbid obesity defined as body mass index greater than 35 kg/m^2; an American Society of Anaesthesiologists' (ASA) physical status classification IV or V; associated gastrointestinal disease that required extensive operative evaluation or intervention; pregnancy; or malignant disease in the past 5 years (except superficial squamous or basal cell carcinoma of the skin or in situ cervical cancer).

Data collection—Retrospective review of patient clinical records, the Otago Audit System electronic database[21] (prospectively maintained by the Department of General Surgery since 1993), as well as Operating Theatre and Department of Pathology electronic records was performed by a single investigator (JT). Institutional board approval was gained. Data collected included demographic data, intraoperative parameters, postoperative outcome data, and pathological histological data. All collected data were defined as per the published definitions of the ALCCaS trial.[9,19,20]

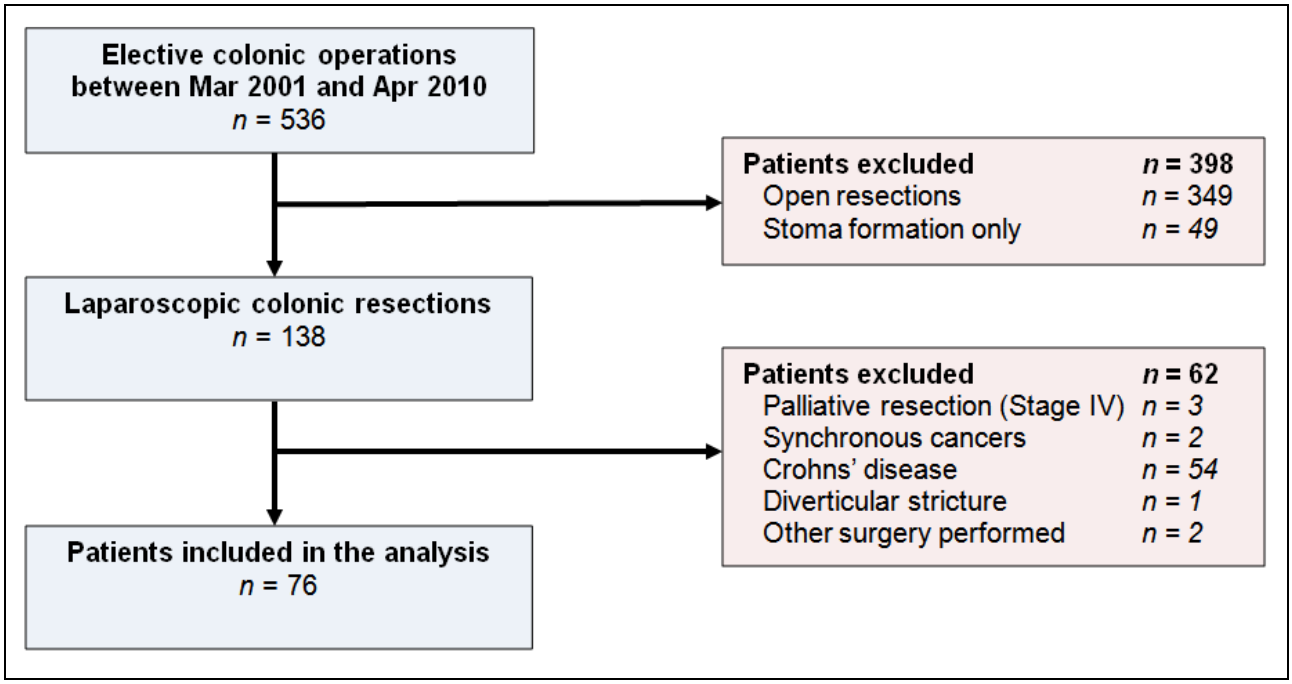
Statistics—Data from the PNH cohort were tabulated for comparison alongside equivalent results from the ALCCaS Trial.[9] Results were analysed using SPSS® for Windows® version 17.0 (Lead Technologies Inc, Chicago, Illinois, USA). The student t test was used to analyse continuous parametric data, and the Fisher's exact test for categorical data. $P<0.05$ was considered statistically significant.

Results

In total, 536 colonic operations were performed between March 2001 and April 2010. Of these 138 were laparoscopic colonic resections and 76 satisfied criteria for inclusion in the study (Figure 1). Fifty of the included laparoscopic colectomies were performed by a single surgeon (MY), who is likely to be past his learning curve having performed his first laparoscopic assisted right hemicolectomy in 1992.

The remaining operations performed by one of five other surgeons at various stages in the early part of the learning curve for laparoscopic colectomy. All of the surgeons in these series were general surgeons, who have had no specific sub-specialty training in laparoscopic colectomy.

Figure 1. Diagram of patient inclusion and exclusion



Patient demographics—The mean age, sex, BMI, and rates of previous abdominal surgery were similar in both groups (see Table 1). There was a significantly higher percentage of ASA 3 patients in the PNH group compared to the ALCCaS group.

Table 1. Baseline patient parameters

Variables	Palmerston North (n=76)	ALCCaS Trial (n=294)	P value
Age (mean in years, SD)	71.9 (11.9)	71.1 (10.4)	0.562
Sex			0.096
Male	45 (59.2%)	139 (47.3%)	
Female	31 (40.7%)	155 (52.7%)	
BMI (mean in kg/m^2, SD)	26.0 (4.3)	25.8 (4.5)	0.728
ASA score			0.003
I	11 (14.5%)	47 (16%)	
II	28 (36.8%)	164 (55.8%)	
III	37 (48.7%)	83 (28.2%)	
Previous abdominal surgery	33 (43.4%)	133 (45.2%)	0.797

SD: Standard Deviation.

Intraoperative parameters—More left sided resections were performed in the PNH group (55% vs 40%), and a much higher percentage of anterior resections were de-functioned with a covering loop ileostomy (76% vs 4%), see Table 2. There were no significant differences in the rates of blood transfusion or conversions to laparotomy between the two groups.

Reasons for conversion in the PNH group included colonic tears (2), inability to visualize critical structures (3), adhesions (1) and inability to mobilise colon (1). There was no significant difference in the conversion rate in the PNH group in the first half of the study vs the second half (11.1% vs 8.6%, P=0.667). The number of patients with at least 1 intraoperative complication was significantly lower in the PNH group (2.6% vs 10.5%, P=0.039). Both complications were colonic tears that required conversion to open (1 was managed conservatively and 1 required open suture repair).

Table 2. Intraoperative parameters

Variables	Palmerston North (n=76)	ALCCaS Trial (n=294)	P value
Operation			< 0.0001
R hemicolectomy	34 (44.7%)	174 (59.2%)	
L hemicolectomy	4 (5.3%)	11 (3.7%)	
Anterior Resection	9 (11.8%)	102 (34.7%)	
Anterior Resection + Stoma	29 (38.2%)	4 (1.4%)	
Transfusion	2 (2.6%)	16 (5.4%)	0.548
Conversion to open	7 (9.2%)	43 (14.6%)	0.262
Intraoperative complication			0.039
Adverse anaesthetic event	0	5 (1.7%)	
Haemorrhage	0	10 (3.4%)	
Minor colonic serosal tear	1 (1.3%)	8 (2.7%)	
Major colonic serosal tear	1 (1.3%)	3 (1.0%)	
Minor small bowel serosal tear	0	3 (1.0%)	
Major small bowel serosal tear	0	1 (0.3%)	
Duodenal injury	0	1 (0.3%)	
Other	0	5 (1.7%)	
Total (per patient)	2 (2.6%)	31 (10.5%)	

R: Right, L: Left

Postoperative parameters—Patients tolerated fluids one day earlier in the PNH group (P=0.0001), but mean days to passage of flatus, passage of bowel motion, and discharge were nearly identical in both groups (Table 3). There were no statistically significant differences in the number of patients with at least 1 postoperative complication, the re-operation rate, or the in-hospital mortality rate (Table 4). The single death in the PNH group was due to a postoperative aspiration pneumonia complicated by multiorgan failure.

Table 3. Postoperative parameters

Variables	Palmerston North (n=76)	ALCCaS Trial (n=294)	P value
Oral fluids (Mean in days, SD)	1.3 (0.5)	2.4 (1.5)	0.0001
Flatus (Mean in days, SD)	3.1 (1.6)	3.2 (1.7)	0.644
Bowel motion (Mean in days, SD)	4.2 (2.5)	4.4 (2.1)	0.478
Day stay (Mean in days, SD)	9.7 (6.9)	9.5 (7.4)	0.832
Postoperative complication			0.109
Pyrexia	2 (2.6%)	28 (9.5%)	
Prolonged Ileus	3 (3.9%)	15 (5.1%)	
Recurrent Ileus	0	23 (7.7%)	
Pneumonia	0	25 (8.5%)	
Urinary tract infection	1 (1.3%)	12 (1.7%)	
Wound infection	2 (2.6%)	17 (5.8%)	
Abdominal sepsis	3 (3.9%)	7 (2.4%)	
Haemorrhage	2 (2.6%)	12 (4.1%)	
Anaesthetic complication	1(1.3%)	7 (2.4%)	
Medical complication	5 (6.6%)	32 (10.9%)	
Other	2 (2.6%)	36 (12.2%)	
Total (per patient)	21 (27.5%)	111 (37.8%)	
Re-operation	6 (7.9%)	16 (5.4%)	0.418

SD: Standard Deviation.

Table 4. Total mortality (all-cause)

Mortality	Palmerston North	ALCCaS Trial	P value
In hospital (n=76)	1.3%	1.4%	0.588
30 day (n=76)	2.6%	NA*	NA*
1 year (n=61)	11.7%	NA*	NA*
3 years (n=29)	28.6%	NA*	NA*
5 years (n=15)	64.3%	NA*	NA*

* Statistical analysis could not be performed as raw data from the ALCCaS trial was not available.
n = number of patients with confirmed follow-up.

Pathology—There was a higher percentage of rectosigmoid tumours in the PNH group compared to the ALCCaS group, which had a much higher recorded rate of purely sigmoid tumours (Table 5). The tumours in the PNH group were better differentiated overall.

Reporting of tumour clearance margins and operative specimen metastases was not standardised in the PNH pathology data in the earlier part of the series. As such, a comparable dataset to that of the ALCCaS trial could not be generated for this parameter. However, TNM staging, and lymph node counts were reliably reported and these are presented (Table 5).

The median number of lymph nodes harvested was lower in the PNH group (11 vs 13), but statistical significance could not be established. There were fewer stage II cancers (26% vs 45%) and relatively more stage III cancers (33% vs 27%) in the PNH group.

Table 5. Pathological parameters

Variables	Palmerston North (n=76)	ALCCaS Trial (n=294)	P value
Tumour location			<0.0001
Caecum	17 (22.4%)	94 (32.0%)	
Ascending colon	12 (15.8%)	68 (23.0%)	
Hepatic flexure	3 (3.9%)	9 (3.1%)	
Transverse colon	3 (3.9%)	5 (1.7%)	
Splenic flexure	2 (2.6%)	1 (0.3%)	
Descending colon	3 (3.9%)	11 (3.7%)	
Sigmoid colon	10 (13.2%)	101 (34.4%)	
Rectosigmoid	26 (34.2%)	3 (1.0%)	
Histological type			0.243
Adenocarcinoma	70 (92.1%)	281 (95.5%)	
Other	6 (7.9%)	13 (4.5%)	
Differentiation			< 0.0001
Well	14 (18.4%)	18 (6.4%)	
Moderate	60 (78.9%)	231 (81.9%)	
Poor	2 (2.6%)	33 (11.7%)	
Lymph nodes (Median, Range)			NA*
Total nodes	11 (0 – 37)	13 (1 – 74)	
Positive nodes	0 (0 – 15)	0 (0 – 13)	
T			0.001
T0	5 (6.6%)	6 (2.0%)	
T1	18 (23.6%)	28 (9.6%)	
T2	10 (13.2%)	53 (18.1%)	
T3	35 (46.1%)	186 (63.5%)	
T4	8 (10.5%)	16 (5.5%)	
TX	0	4 (1.4%)	
N			0.001
N0	48 (63.1%)	211 (72.3%)	
N1	14 (18.4%)	69 (23.6%)	
N2	12 (15.7%)	10 (3.4%)	
N3	2 (2.6%)	2 (0.7%)	
NX	0	0	
Stage			0.009
0	5 (6.6%)	6 (2.1%)	
I	22 (28.9%)	68 (23.4%)	
II	20 (26.3%)	132 (45.4%)	
III	25 (32.9%)	77 (26.5%)	
IV	4 (5.3%)	6 (2.1%)	
Lymphovascular invasion	14 (18.4%)	39 (13.4%)	0.271
Perineural invasion	3 (3.9%)	9 (3.1%)	0.717

*Statistical analysis could not be performed as raw data from the ALCCaS trial was not available.

Discussion

We have conducted a retrospective study looking at the short-term outcomes of laparoscopic colonic resection for neoplasia in a non-tertiary setting. This is the first published study to directly compare outcomes with published data from tertiary institutions.

Patients in the PNH group had a higher ASA score at baseline and were more likely to have undergone an anterior resection for a rectosigmoid tumour with a covering ileostomy compared to patients in the ALCCaS trial. There were also some pathological differences with a statistically significant worse stage, but conversely better tumour differentiation. However, intraoperative and short-term postoperative outcomes were comparable between the two groups.

It is difficult to determine whether the differences in ASA scores and disease distribution between patients in the PNH and ALCCaS groups were due to different population characteristics at baseline, or a variation in patient selection.[22, 23] These differences may have had an impact on reported pathological parameters, including the number of lymph nodes harvested (although variation between pathologists is also a contributing factor).[24–26]

There were some important intraoperative differences between the two groups. The frequent use of a covering ileostomy in the PNH group was largely due to surgeon preference, although the higher percentage of rectosigmoid lesions requiring anterior resection, and the preponderance of ASA 3 patients may have also influenced this.

The use of diverting stomas in colorectal resections is controversial.[27–29] The evidence suggests that diversion reduces the clinical impact of an anastomotic leak in low rectal resections,[30–32] however a benefit in colonic and high rectal resections has not been convincingly demonstrated. Secondly, the intraoperative complication rate was significantly lower in the PNH group, although the difference may well be due to under-reporting bias resulting from retrospective data collection. It is notable, however, that the complication rate in the laparoscopic arm of the ALCCaS trial was significantly higher than in the open arm (10.5% versus 3.7%, P=0.001).[9,17]

The only difference in postoperative outcome was that patients in the PNH group tolerated oral fluids one day earlier. We postulate that this may be due to the early oral intake resumption policy in PNH, with patients routinely allowed free oral fluids immediately after surgery. Otherwise, postoperative recovery parameters were very similar in the two groups. The 5-year all-cause mortality was 64.3%, although only 15 patients had been followed up for >5 years at the time of data collection.

There have been a few published studies from non-tertiary institutions, reporting generally favourable outcomes.[14–16] The largest series included 250 consecutive patients undergoing laparoscopic colectomy for benign and malignant disease.[16] The authors concluded that the short and longer term results were comparable to those from tertiary centers, however, comparisons were observational and no formal statistical comparisons were performed.

A smaller case-control study from Australasia comparing laparoscopic and open colectomy, demonstrated earlier recovery of gastrointestinal function and a reduction in hospital stay when the surgeons moved from the open to the laparoscopic approach.[14] However, there was considerable selection bias in this early phase with patients in the laparoscopic group being younger, and more likely to have benign disease and smaller tumours.[14] Nevertheless, these published results appear to be consistent with our own, and support the use of the laparoscopic approach in a non-tertiary setting.

The main limitation of the current study is the retrospective nature of the data collection. In addition, the majority of operations were performed by a single surgeon who has wide experience with laparoscopic surgery (albeit in a non-tertiary setting) and this may limit applicability to other centres where laparoscopic colonic surgery is not routinely practiced. Another limitation is that, like the ALCCaS trial, the data presented is from a highly selected patient group, and therefore results cannot be generalised to all patients with colonic neoplasia (such as patients with synchronous lesions, with a tumour size greater than 8 cm, obese patients, or patients who present acutely with haemorrhage or obstruction). Also the non-contemporaneous timeline of the two data sets being compared may have influenced the comparison.

Conclusion

In selected patients, short-term outcomes of laparoscopic colonic surgery for neoplasia in a secondary level provincial setting are equivalent to those from specialist colorectal units.

Competing interests: None.

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Dietary information for colorectal cancer survivors: an unmet need

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Abstract

Aim Observational studies have highlighted the association between diet and the risk of colorectal cancer (CRC) recurrence. We aimed to identify the dietary patterns of CRC patients in our region, the level of dietary advice currently received and its impact on behaviour.

Methods A survey was taken of an opportunistic sample of CRC patients at Dunedin and Invercargill Hospitals, New Zealand. Dietary patterns were classified according to previously utilised criteria and the level of information they had received was established.

Results Forty patients were recruited. No patients reported receiving dietary information from their doctor or nurse. Sixty-one percent of patients felt they received too little information. Obese patients were less likely to consider that diet was important in cancer recurrence, but were more likely to be interested in receiving dietary information than normal weight individuals. Ninety-eight percent wanted additional dietary information and 75% would consider changing their diet in response to such information.

Conclusions CRC survivors reported they were prepared to change their diet following diagnosis and treatment, however they report receiving insufficient information to meet their needs. An opportunity for dietary intervention that may improve patient outcome is presently being missed. As a result of this study a comprehensive information package tailored to colorectal cancer survivors has been developed.

Colorectal cancer (CRC) is New Zealand's second most common cancer with over 2800 new cases registered each year and over 1200 deaths annually.[1] Despite a reduction in incidence, there are an increasing number of individuals affected due to an aging population.[2]

Epidemiological studies have underscored the importance of diet on colorectal cancer risk.[3] In addition to obesity[4] and diabetes mellitus[5,6] being risk factors, individual food groups confer risk, such as red, processed or well-cooked meat[7,8] as well as refined sugars and cereals;[9] on the other hand, vegetables and fibre are thought to be protective.[10]

These studies demonstrate an association between the development of colorectal cancer and dietary patterns. However colorectal carcinogenesis is thought to be a multi-step process,[11] with "hits" occurring over several years and most CRC recurrences occur within 3 years of surgery.[12] Therefore simply because long-term

dietary patterns can induce carcinogenesis, it does not necessarily follow that dietary change can reduce risk of CRC recurrence.

Two pivotal studies have demonstrated that there is a relationship between dietary patterns and risk of recurrence following definitive cancer treatment, suggesting a role for dietary intervention as an adjunctive treatment. An observational study embedded within an adjuvant trial for stage 3 colon cancer examined dietary patterns and the risk of CRC relapse.[13] 1009 patients were recruited.

Researchers used previously validated food frequency questionnaires (FFQ) to determine two distinct dietary patterns which participants followed to a varying extent. These included the Western diet: high in red/processed meat, high fat dairy products, refined carbohydrates; and the prudent diet: high in fish, poultry, fruits and vegetables.

Participants in the highest quintile of western diet intake experienced significantly worse disease free survival, compared to those in the lowest quintile for recurrence or death from any cause (HR: 3.25 [95 % CI:2.04–5.19, p<0.00]), as well as a higher rate of disease recurrence (HR 2.85, [95 % CI 1.75–4.63,p<0.001]).

Adherence to a prudent dietary pattern showed no significant association with outcome measures during the course of the study, regardless of intake quintile (HR 1.20 [95 % CI 0.83–1.75, p=0.78]). Results were not significantly affected by participant's age, sex, nodal status, BMI, physical activity, total energy intake or chemotherapy treatment group.

The US Polyp Prevention Trial (USPPT) aimed to establish a relationship between dietary patterns and adenoma formation. Participants with a history of large bowel adenomatous polyps were randomised into intervention (n=1037) or control group (n=1042). The intervention group received dietary advice and set three dietary goals: to limit fat intake to 20% of total energy intake, consume at least 4.30g/megajoule (MJ) of dietary fibre and to consume at least 0.84 servings of fruit or vegetables per MJ/day.

Participants received colonoscopies at year 1 and 4 following randomisation to allow detection of colorectal adenomas. An annually administered FFQ was used to evaluate the number of goals patients reached each year. The maximum number of goals was 12 (three goals per year over 4 years). The study was negative for its primary endpoint, failing to show that dietary intervention could reduce polyp formation. [14] However subgroup analysis identified those participants classed as 'super compliers' (who meet between 9–12 goals) to the dietary intervention had a 35% lower incidence of colorectal adenoma recurrence (OR=0.65, 95 % CI: 0.47–0.92).[15]

Based on the observational evidence that diet remains associated with risk of cancer recurrence, and that cancer survivors are highly motivated to undertake dietary change,[16] we undertook a project aiming to establish the dietary patterns of colorectal cancer patients in our region, the level of dietary advice they currently received and its impact on their behaviour. We utilised this information to develop a resource of dietary advice based on the findings of the Meyerhardt study.

Methods

Study design—We surveyed a convenience sample of patients diagnosed with colorectal cancer who were currently on treatment or undergoing follow-up in surgical or medical oncology clinics at the Southern District Health Board (Dunedin and Invercargill, New Zealand) during April to June 2010. The study received expedited review from the Lower South Regional Ethics Committee. Patients were approached by their doctor or nurse at outpatient attendances, and the study administered by a Dietetics Student (JP).

Inclusion criteria were patients with a diagnosis of CRC (stage II, III or IV), aged 18 or over, with sufficient literacy to comprehend the questionnaire. Exclusion criteria included cancer of the appendix (n=1). All patients provided written informed consent. An original (non-validated) 16-point questionnaire was developed and then tested for comprehension and readability on 3 patients prior to formal commencement of the study, with no amendments deemed necessary by researchers or participants. Demographic information and cancer information was retrieved from the clinical record.

Outcome measures—The outcome measures were participants' perceived level of dietary information received, how this information met their needs, whether they would be interested in additional dietary information, if they would consider changing their diet based on this and in which format they would like to receive this information. Participants were also asked to use a Likert scale to estimate the extent to which diet influenced the risk of cancer recurrence.

Dietary pattern—A simplistic measure of patients dietary pattern was used which involved participants choosing between a dietary pattern which was typically high in Western foods or prudent foods as defined by Meyerhardt et al.[13] This measured participant's subjective perception of their general diet pre and post diagnosis and was not a validated measure of dietary pattern.

BMI category—Participants BMI was calculated by dividing their weight (kg) by their height (m) squared. The World Health Organization (WHO) BMI categories were used to classify participants as underweight (<18.5 kg/m^2), healthy weight (18.5–24.99 kg/m^2), overweight (25–29.99 kg/m^2) or obese (≥30 kg/m^2)[17].

Data analysis—Participants were categorised according to their geographic location (Otago or Southland), BMI value and stoma status. Questionnaire responses were assessed in relation to these groupings. Percentages were calculated to compare responses and characteristics between groups. Data analysis was performed using Microsoft Excel 2007 and STATA I/C 12 for MacIntosh software.

Results

A total of 40 participants were recruited. Patient demographics are described in Table 1. Fifty-two percent of participants reported making dietary changes due to their condition or treatment, whilst 32.5% received advice on dietary change. The most frequent source of dietary advice was a dietitian, or friend/family member. No patients reported receiving dietary information from doctors or nurses. No patients felt they had received too much dietary information, whereas 61% felt they had received too little or far too little (Table 2).

Self reported dietary habits pre and post diagnosis shows a relatively equal split in those identifying with the prudent and Western dietary pattern. Only two participants changed their diets sufficiently to alter their classification from "Western" pattern to "prudent" pattern. For those participants who did report changing their dietary pattern at all post diagnosis, 18% attributed this change to the dietary advice they had received during their treatment.

For the participants who received dietary advice during treatment, 50% received advice relating specifically to their treatment (e.g. stoma advice, weight gain advice or advice for overcoming a low appetite), the other 50% received advice specific to CRC survivorship (e.g. reducing and avoiding red/processed meat and increasing fruits and vegetables).

Table 1. Participant demographic and disease characteristics

Characteristic	n (%)
Gender	
Male	21(53)
Female	19 (47)
Age (years)	
40–49	2 (5)
50–59	10 (25)
60–69	16 (40)
≥70	12 (30)
Ethnicity	
NZ European/Pakeha	38 (95)
NZ Māori	0 (0)
Australian	2 (5)
Body Mass Index (kg/m^2)	
<18.5	1 (2.5)
18.5–24.99	15 (37.5)
25–29.99	18 (45)
≥30	6 (15)
Site of primary tumour	
Caecum	6 (15)
Transverse colon	1 (2.5)
Sigmoid colon	16 (40)
Rectum	17 (42.5)
Cancer stage	
II	6 (15)
III	20 (50)
IV	14 (35)
Concurrent medical conditions	
None	18 (45)
Hypertension	8 (20)
Type 2 diabetes mellitus	3 (7.5)
Renal impairment	2 (5)
Endocrine condition	1 (2.5)
Type of treatment received	
Surgery only	5 (12.5)
Chemotherapy only	3 (7.5)
Surgery and chemotherapy	32 (80)
Completed treatment	
Yes	24 (60)
Currently completing chemotherapy	16 (40)
Stoma status	
None	23 (57.5)
Ileostomy	3 (7.5)
Colostomy	14 (35)

Table 2. Participant responses to needs assessment questionnaire

Participant questionnaire responses	Dunedin (%) (n=27)	Invercargill (%) (n=13)	Total (%) (n=40)
Dietary changes made due to treatment			
Yes	17 (63)	4 (31)	21 (52.5)
No	10 (37)	9 (69)	19(47.5)
Dietary advice received during treatment			
Yes	9 (33)	4 (31)	13 (32.5)
No	18 (67)	9 (69)	27(67.5)
Dietary pattern pre-diagnosis			
Prudent	11 (41)	8 (62)	19 (47.5)
Western	16 (59)	5 (38)	21 (52.5)
Dietary pattern post-diagnosis			
Prudent	14 (52)	7 (54)	21 (52.5)
Western	13 (48)	6 (46)	19 (47.5)
Reason for dietary change post diagnosis			
No change	14 (52)	7 (54)	21 (52.5)
Dietary advice	3 (11)	4 (31)	7 (17.5)
Taste changes	4 (15)	1 (8)	5 (12.5)
Gastrointestinal symptoms	6 (22)	1 (8)	7 (17.5)
Dietary advice received from			
Not applicable	15 (56)	11 (85)	26 (65)
A friend, family member or media source	5 (19)	1 (8)	6(15)
A dietitian	6 (22)	0(0)	6 (15)
A doctor	0 (0)	0(0)	0 (0)
A nurse	0 (0)	0 (0)	0 (0)
A stomatherapist	1 (4)	1 (8)	2 (5)
A complementary health practitioner	0 (0)	0 (0)	0 (0)
An Internet source	0 (0)	0 (0)	0 (0)
Dietary information sufficient to meet needs			
Far too little	4 (15)	3 (23)	7 (18)
Too little	12 (44)	5 (39)	17 (43)
About right	11 (41)	5 (39)	16 (40)
Too much	0 (0)	0 (0)	0 (0)
Far too much	0 (0)	0 (0)	0 (0)

The relationship between BMI and dietary patterns is summarised in Table 3 and Figure 1. Data was analysed using Fischer's exact test. No statistically significant results were observed on either initial categorisations or by combining categories into low/normal (BMI<18.5 and 18.5–25) or overweight/obese (BMI>25). Therefore data reported is considered indicative only.

A higher proportion of obese patients consumed a Western diet compared to healthy/low-weight individuals. No obese patient changed dietary pattern following diagnosis or treatment. Also, although a similar proportion of healthy-weight individuals received dietary advice, all obese patients stated they did not receive any advice. Despite this 33% of obese participants felt the dietary information received met their needs.

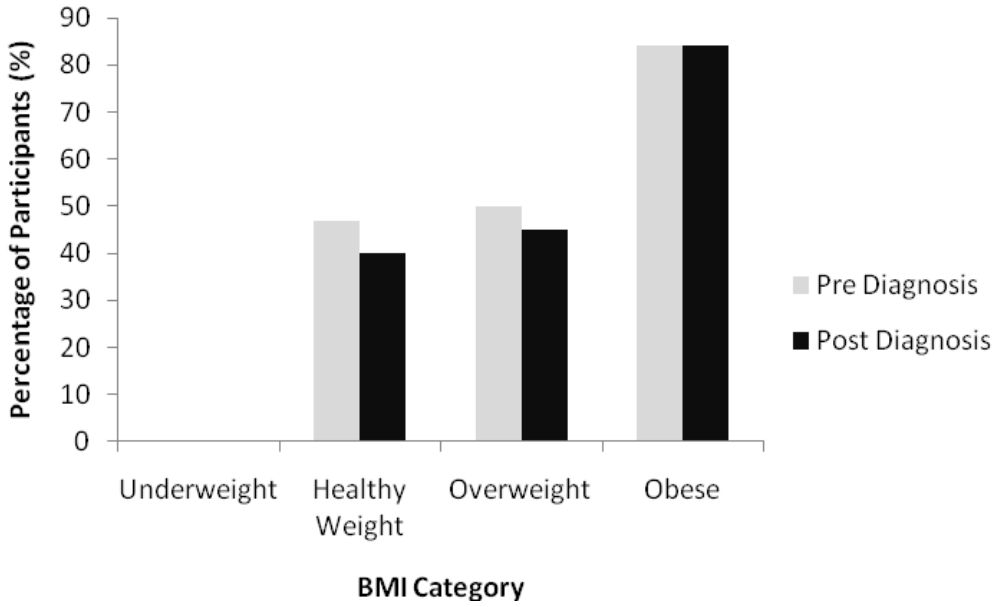
Differences in the perception of diet on recurrence was also analysed according to BMI, and measured according to a 5-point Likert scale with lower scores indicating lower degree of influence on risk of recurrence. Participants in the obese weight

category were likely to consider that diet had less effect on cancer recurrence (2.16/5) than did participants in the healthy (2.93/5) and overweight (2.66/5) categories.

Table 3. Patients questionnaire responses according to WHO BMI category (kg/m^2)

Patient response	Total (%) (n=40)	<18.5 (%) (n=1)	18.5–24.99 (%) (n=15)	25–29.99 (%) (n=18)	≥30 (%) (n=6)
Pre-diagnosis diet					
Prudent	19 (48)	1 (100)	8 (53)	9 (50)	1 (17)
Western	21(53)	0 (0)	7 (47)	9 (50)	5(83)
Post-diagnosis diet					
Prudent	21 (53)	1 (100)	9 (60)	10 (56)	1(17)
Western	19 (48)	0(0)	6 (40)	8 (45)	5(83)
Received dietary advice during treatment					
Yes	13 (33)	0 (0)	6 (40)	7 (39)	0 (0)
No	27(68)	1(100)	9 (60)	11 (61)	6 (100)
Level of dietary information received					
Far too little	6 (15)	0 (0)	2 (13)	3 (17)	1(17)
Too little	15(38)	0 (0)	5 (33)	8 (40)	2(33)
About tight	19(48)	1 (100)	8(53)	7 (33)	3(50)
Too much	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Far too much	0 (0)	0 (0)	0(0)	0 (0)	0 (0)
Dietary information sufficient to meet needs					
Far too little	7 (18)	0 (0)	3 (20)	3 (17)	1 (17)
Too little	17 (43)	0 (0)	6 (40)	8 (44)	3 (50)
About right	16 (40)	1 (100)	6 (40)	7 (39)	2 (33)
Too much	0 (0)	0(0)	0 (0)	0 (0)	0 (0)
Far too much	0 (0)	0(0)	0 (0)	0 (0)	0 (0)
Belief: influence of diet on CRC recurrence					
None	6 (15)	0 (0)	3 (20)	1 (6)	2 (33)
Possible influence	14 (35)	0 (0)	3(20)	9 (50)	2 (33)
A little influence	8 (20)	1 (100)	2(13)	4 (22)	1 (17)
Significant influence	10(25)	0 (0)	6 (40)	3(17)	1 (17)
A big influence	2 (5)	0 (0)	1 (7)	1 (6)	0 (0)
Interest in receiving additional dietary information					
Not interested	1 (3)	0 (0)	1 (7)	0 (0)	0 (0)
Possibly interested	11 (28)	1(100)	5 (34)	3 (17)	2 (33)
Very interested	28 (70)	0 (0)	9 (60)	15 (84)	4 (67)
Consideration of dietary change based on information					
Yes	30 (75)	0 (0)	11 (74)	14 (78)	5 (84)
No	2 (5)	0 (0)	1 (7)	1(6)	0(0)
Unsure	8 (20)	1(100)	3 (20)	3 (17)	1(17)

Figure 1. Percentage of participants following a Western dietary pattern according to BMI category



Overall, overweight and obese participants were more interested in receiving additional dietary advice with 84% and 67% respectively being 'very interested' in receiving this, compared to 60% of healthy weight participants. Obese participants were also more likely to consider changing their current diet based on such information with 84% reporting they would consider it in comparison to 78% of overweight and 74% of healthy weight participants.

Influence of dietary habits and advice according to presence of absence of stoma, and stoma location were recorded, however due to small numbers no reliable conclusions are able to be drawn (data not shown).

Presentation and delivery of additional dietary information—98% of participants would be 'possibly' or 'very' interested in receiving additional dietary advice. Only 5% of participants would not consider making dietary changes based on additional dietary advice, while 75% would consider making changes. Around 20% reported they were 'unsure' as to whether they would consider making dietary changes based on additional advice.

Only 10 % of participants reported they would like the information in the form of a CD or downloadable pdf. In comparison, 90% of participants wanted this information in the form of a pamphlet, 37% wanted this delivered by a doctor or nurse, and 53% wanted this delivered by a hospital dietitian.

Discussion

This exploratory survey, conducted on a convenience sample of patients with colorectal cancer at differing stages of their colorectal cancer journey, aimed to ascertain the dietary patterns of patients, whether they recalled receiving dietary

information and any changes they had made to their diet as a result of their condition or its treatment. A secondary goal was the development and testing of a patient booklet aimed at providing greater information to patients.

Our results indicate that our sample was generally representative of the NZ colorectal cancer population in terms of age and gender, however our sample contained no Māori or Pacific Island patients (representative of the incidence of CRC in the catchment of Southern DHB). We found only 38% of participants fell in the healthy weight range, while 45% were classified as overweight and 15% as obese. This matches the percentage of overweight participants in previous studies examining the relationship between BMI and CRC recurrence risk.[18] Only one participant was classified as underweight.

Despite the strong evidence that obesity and dietary habits are important aetiologic factors in CRC, we found low levels of reported dietary-based intervention. Additionally, whilst 17/40 patients had a current stoma at the time of the survey, few had received dietary advice despite the potential influence of diet on stomal output.

We also found that no obese patients had received dietary information, even those who had resected and potentially cured colorectal cancer. This may indicate that health professionals are not offering appropriate intervention in the presence of obesity, perhaps seeing obesity as unrelated to cancer or as an unimportant patient outcome in the presence of a diagnosed cancer. Results also showed that although obese participants were less likely to feel the need for dietary advice during treatment, they are interested in receiving it after treatment and indicated that they would be responsive to such information. This finding indicates that obese patients may be more receptive to intervention than is currently perceived to be the case.

Our results also show that few patients are currently changing their dietary habits following a diagnosis of cancer, despite the potential for dietary patterns to reduce adenoma rates and despite the association with better cancer-outcomes. This may indicate that clinicians are as yet unaware of the association, or do not believe that the association between diet and cancer outcome is causal and therefore do not recommend change. However it is difficult to consider that obese patients should receive no dietary information, especially in the setting of particularly curative treatment, because of the multitude of concomitant health problems that may result from long-term obesity.

Our findings may reflect that colorectal cancer clinicians do not see it as their role to promote the role of dietary intervention in maintaining or improving health.

We note that the number of patients making dietary changes as a result of CRC is higher than the number receiving dietary advice, and that 60% of patients feel the level of dietary information they have received since diagnosis is too little to meet their needs. No participants felt the level of dietary information they had received was too much. Thus survivors of CRC feel there is currently a shortfall in the dietary information available. This is consistent with research which has found 80% of cancer patients (lung, colon or breast cancer) feel they need nutritional counselling, though only 17% currently receive this.[19]

Overall, 50% of participants indicated their current dietary pattern was high in Western dietary pattern index foods; a pattern associated with a higher rate of CRC

recurrence.[13] As research has shown that nutritional counselling in cancer survivors can improve dietary patterns,[20] additional dietary advice could therefore positively influence CRC survivors' dietary patterns by reducing intake of a Western dietary pattern.

Our findings are consistent with previous research which shows that approximately 30% of colorectal cancer survivors make dietary changes, and 45% begin taking new supplements without professional advice.[19] In light of these findings it seems the availability of an accessible source of additional dietary information for CRC survivors is necessary and would be of benefit to patients.

All participants with an ileostomy reported they had made dietary changes because of their treatment, but only two thirds had received dietary advice. All participants with an ileostomy felt the level of dietary information received did not meet their needs. This is supported by research showing patients with an ileostomy feel confusion and frustration in relation to making dietary alterations and the amount of advice they receive.[21]

Our study has several limitations. Firstly, it was an opportunistic sample taken from patients available to the researchers during the time of an elective project. Therefore the sample was relatively small and included patients with completely resected as well as metastatic disease; these patients may have differing motivations and will clearly have different treatment goals.

The study also relied on patient recollections of dietary information given, rather than recording dietary habits as part of a prospective behavioural change programme. Therefore there is potential for recall bias. However if a patient who was given advice does not recall receiving this it may be that the information was given at a time which was not appropriate for that patient.

The challenge for practitioners is therefore to deliver advice in a manner that is sufficiently memorable and meaningful to be able to promote long-term healthy eating goals. Our study classified patients broadly into Western and prudent categories according to a non-validated tool, and caloric content was not considered. Use of a more comprehensive and validated tool would be valuable in a larger project.

Obesity, diabetes and metabolic syndrome[22, 23] have also been associated with the development of CRC and poorer outcomes following a diagnosis. An unhealthy western dietary pattern, low in fruits and vegetables has also been attributed to the onset of these conditions. Whilst there is an association between dietary patterns and risk of colorectal cancer recurrence, it is not yet established that dietary manipulation can attenuate risk of recurrence. However the relationship is biologically plausible and consistent across cohort studies.

The USPPT also shows that compliance with a prudent-style diet can reduce the development of further polyps, so there remains an opportunity for effective intervention to prevent subsequent carcinogenesis even at a later stage in life. This lends biologic plausibility.

There are numerous studies assessing the effectiveness of dietary intervention in achieving behavioural change; the challenge remains to demonstrate that this results in improved cancer-related outcomes. In the absence of a formal structured dietary

intervention, there is a burden on the clinician to interpret the available evidence, and offer useful and practical advice.

Our study demonstrates that CRC patients are relatively unaware of the extent to which diet can influence CRC recurrence risk although they are motivated to receive dietary information as currently many do not feel they have received enough dietary information. Patients with stomas feel their needs for dietary information are not met. In light of these findings, two dietary resources have been developed for the SDHB.

Competing interests: None declared.

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Copies of the Dietary Resource developed in conjunction with this project can be found at http://www.southerncancernetwork.org.nz/file/fileid/36309

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Dietary patterns and information needs of colorectal cancer patients post-surgery in Auckland

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Abstract

Aim To test the feasibility of collecting dietary data from colorectal cancer (CRC) patients in Auckland, New Zealand and to investigate their dietary information needs post-surgery, in terms of current information sources and satisfaction.

Methods A food frequency questionnaire was used to collect information on the dietary intake and patterns of patients who had undergone surgical resection of CRC in the Auckland region. Dietary intakes were compared to the Ministry of Health Food and Nutrition Guidelines for Adult New Zealanders (FNG–MoH) along with other publications of dietary patterns in patients with CRC. Participants were also asked to report on what dietary information they received and their satisfaction with this information.

Results Thirty participants completed the survey. Sixty-seven percent and 50% of participants met the recommended daily servings of fruit and vegetables respectively in the FNG-MoH. Four distinct dietary patterns were described for the study population. Over 50% of participants indicated that they did not receive any dietary information after surgery.

Conclusion We were able to collect dietary information from this patient group, and this demonstrated that a significant proportion of the study population did not meet the FNG-MoH guidelines for recommended daily fruit and vegetable servings, and that there is an unmet information need in this patient group.

Colorectal cancer (CRC) is the third most common cancer worldwide.[1] The incidence varies greatly from one country to another with the highest rates present in North America, Australia, New Zealand, Western Europe and Japan.[2]

In New Zealand, it is the second most common cancer in non-Maori and the fourth most common cancer in Maori people.[3] Despite the fact that CRC incidence and mortality within the New Zealand population is generally decreasing, the disease is still highly prevalent and a cause of substantial morbidity to many New Zealanders.[3]

There are many studies that have explored the relationship between diet and the development of CRC.[4] Studies have suggested that a "Western diet," characterised by high meat, fat and refined grains intake, is associated with a significantly increased risk of colon cancer, while a "prudent diet," characterised by high fruit, vegetable and fish intake is non-significantly associated with a reduced risk of developing colon cancer.[5,6]

Patients diagnosed with cancer are often eager to find out about their diet, dietary supplement use and nutritional complementary therapies, and they are motivated to adjust their dietary patterns accordingly.[1,7]

The relationship between dietary factors and development of colon cancer is strong worldwide, particularly relating to meat consumption.[8] Whereas the global average consumption of meat and poultry contribute 9% to the total energy of diet, in New Zealand meat and poultry provide around 20% of the total energy,[9] indicating that NZ diet favours meat. This could in part account for the on-going high incidence of colon cancer in New Zealand.[9]

It has recently been suggested that diet not only influences CRC incidence, but also re-occurrence rates and survival post treatment.[10] A prospective study of 1009 patients with stage III CRC treated with surgery and adjuvant chemotherapy demonstrated that people with a high intake of a Western-type diet had worse disease-free survival at 5 years.[10]

Diet can affect gut mucosa either directly from the luminal side or indirectly through whole-body metabolism,[11] and food-derived compounds can shift the cellular balance towards harmful outcomes via genetic and/or epigenetic changes.[11] Thus diet may not only affect the development of CRC but also patient outcomes post diagnosis. It is therefore very important that appropriate, accurate and easy to access dietary information is available for CRC patients.

Along with these potential effects on patient outcomes, accurate and accessible dietary information is inherently important to this patient group due to the symptoms of the disease and the side-effects of treatment, and the impacts of these on quality of life. A previous survey investigating overall patient satisfaction in CRC patients from the Auckland region suggested that this patient group felt that they had unmet information needs regarding dietary advice (M Murray, personal communication).

Another study in the CRC patient population of Southern DHB (SDHB) also found that information needs were not being met, leading to the development of a dietary guide for optimising health after treatment for colorectal cancer called, “Healthy Eating after Colorectal Cancer” (Pullar, Chisholm and Jackson, University of Otago, see article in the same issue of the *NZMJ*).

The aim of this study was to pilot collection of data to describe the dietary intakes and dietary patterns of CRC patients in the Auckland region, and to investigate what the current information resources are for CRC patients in the Auckland region, and patient satisfaction with these resources.

Methods

Participants were recruited from the three district health boards in Auckland regions: Waitemata District Health Board (WDHB), Auckland District Health Board (ADHB) and Counties Manukau District Health Board (CMDHB). Eligible criteria included any patient with a diagnosis of CRC who had received surgical resection (with curative intent) of their tumour in the last 1-4 months.

Patients with stage I tumours removed by polypectomy or who had received palliative treatment (including palliative surgery such as ileostomy formation) were excluded. Eligible participants were identified and approached by local clinicians, registrars, clinical nurse specialists and patient navigators within the surgical and medical oncology departments of the Co-Investigators at each DHB. Participants either provided written or verbal consent form to allow their name and address details to be given to the researchers.

A study information sheet, consent form, decline participation form, questionnaire and a reply-paid envelope were posted to each of the patients whose details have been provided to the researchers. The questionnaire was a modified version of the qualitative food frequency questionnaire (FFQ) used by the New Zealand Ministry of Health in the National Nutritional Survey 1997. [12] Demographics such as gender, age and ethnicity were collected. The FFQ consisted of questions on both dietary habits and food frequency consumption.

The dietary habits questions were based on the frequency of consumption of the MoH core food groups (fruit and vegetables, dairy products, breads and cereals and meat). The remainder of the questionnaire included 168 food items and inquired about average frequency of consumption of these foods.

Participants were asked to complete these questions based on their normal food intake prior to surgery. There were up to 9 possible responses, which ranged from never to 6 or more times per day. Data on age, weight and height was collected in bands, as per previous questionnaires. Three additional questions regarding vitamin and supplement use and nutritional information needs were added to the questionnaire.

Participants were given 3 weeks to complete the questionnaire. A reminder letter along with another copy of the questionnaire and reply-paid envelope were sent to all participants who had not responded one week prior to the end of the study period. Additional clinical data on participant co-morbidities, the extent of disease (disease stage) and treatment received were obtained from the participants' medical records if specific consent was given. Data from the questionnaires and medical records were anonymised and entered into an Access database.

Demographic and dietary data were interpreted by simple statistics. Dietary patterns were analysed by factor analysis (principal component) of the food frequency questions using the FACTOR PROCEDURE in SAS with a Varimax rotation factor. Ethics approval for this research project was obtained from New Zealand Upper South A Regional Ethics Committee (URA/11/EXP/023).

Results

Forty patients signed the release of information form and were sent the survey. Of these, 6 declined participation and 29 returned signed consent forms with completed surveys. The overall response rate was 35/40 (88%), with 29 people taking part in the study by completing the surveys (73%).

Demographics—Table 1 shows the attributes of the 29 participants. Most of the participants were New Zealand/European (69%). The next most prevalent ethnic group was Maori (10%). The majority of participants were males (69%). The most commonly selected age band selected by participants was 70+. Forty-one percent of participants were ex-smokers and 2 participants (7%) were current smokers. Four participants (14%) did not specify their smoking status. Thirty-one and 48% of participants respectively reported taking either none or less than 5 standard alcoholic drinks per week.

Vitamin and supplement use—Participants were asked if they took any dietary supplements, vitamins, minerals and/or herbal supplements. 11 participants (37%) reported vitamin or supplement use, with the majority reporting daily dosing. The most common supplements were multivitamins or minerals and fish oil (both n=4, 36%).

Information needs—Participants were asked if they had received any information on diet post operatively. Less than half of the participants reported that they had received dietary information after surgery (n=13, 43%). Participants were then asked if they felt that no information, less information, the same amount of information or more information should be available post bowel surgery. Nearly half of the participants

(n=14, 47%) suggested that they would like to have had more information provided to them.

A third of participants were satisfied with the amount of information provided to them (n=10, 33%). The remainder felt that less information that what was provided to them was required (n=6, 20%)

Table 1. Summary of characteristics of the study participants

Variable	Total (n = 29)	
Ethnicity	**N**	**%**
New Zealand/European	20	69
Maori	3	10
Samoan	2	7
Other	2	7
Unknown	2	7
Gender	**N**	**%**
Female	9	31
Male	20	69
Age band most frequently selected by gender	**Age band**	
All	70+	
Female	70+	
Male	70+	
Weight band (in kg) most frequently selected by gender	**Weight band**	
All	60-69	
Female	60-69	
Male	80-89	
Height band (in cm) most frequently selected by gender	**Height band**	
All	170-179	
Female	160-169 and 170-179	
Male	170-179	
Smoking status	**N**	**%**
Current smoker	2	7
Ex-smoker	12	41
Never smoked	11	38
Unknown	4	14
Weekly alcohol intake	**N**	**%**
None	9	31
Less than 5 standard drinks	11	38
Between 6 and 10 standard drinks	3	10
Between 11 and 15 standard drinks	4	14
Between 16 and 20 standard drinks	1	3
21 or more standard drinks	1	3

Dietary characteristics—Participants were asked about their consumption of a variety of foods and drinks, including their self-reported eating pattern pre-operation. Participants were asked whether they included animal products in their diet. Only 1 participant (3%) reported avoiding meats other than fish and chicken.

Specific questions were asked regarding daily fruit, vegetable and bread servings. Sixty-seven percent of participants reported consumption of 2 or more servings of fruit per day (n=20). Fifty percent reported daily vegetable servings of 3 or more per

day (n=15, 50%). The most common type of bread each was wholemeal or wholegrain bread, followed by white bread. Nearly half of participants reported consumption of 1-2 slices of bread per day (n=14; 47%).

Dietary patterns—Participant responses to the food frequency questions were analysed by principal component factor analysis to investigate if any dietary patterns could be described for this patient group. Data was missing for a minimum of one variable of the frequency analysis in 27 of 30 completed surveys (90%).

Participants who had greater than 50% of the data missing for these questions were excluded from the analysis (n=2, 7%). For the remaining participants, missing data was assumed to 'never' for the purposes of analysis. Four dietary patterns were suggested by the principal component factor analysis (Table 2.)

Table 2.The four dietary patterns of patients with CRC in Auckland

Food	Dietary pattern 1	Dietary pattern 2	Dietary pattern 3	Dietary pattern 4
Food types with high weightings	Watercress Puha Breadfruit Grapes Kamo kamo Pear Grape juice Berries Taro leaf Pineapple Stewed juice Melon Mango Grapefruit Paraoa Vegetable juice Decaf. coffee Doughboys Fruit drink Powdered drink Koko Rewena	Courgette Beef mince Bacon Tuna Beans Tomato Parsnip Broccoli Kumara Silver beet Green beans	Lollies Tea Potato Lamb Low-calorie salad dressing Beef Waffle Mayo Ice cream Sweet pies Hogget Chocolate Desserts Sausages Gravy	Yam Corned beef Milk as a drink Pork Shellfish Brie Seafood
Food types with low weightings	None	Coconut cream Fruit bun Taro Milk based hot drinks	Herbal tea	Home-made soup Milk in a hot drink Muffins

Discussion

This was a pilot study to investigate the feasibility of collecting data on the diet and information needs of patients with CRC in Auckland. The food frequency questionnaire, from the National Nutritional Survey of New Zealand in 1997, was used to investigate dietary patterns and dietary intake of these patients. The survey was completed by 75% of patients approached to participate in the study, suggesting that the topic is relevant and of importance to this patient group.

It is notable that only half of the study population met the daily vegetable requirements and two-thirds the daily fruit requirements as in the New Zealand Food and Nutrition Guidelines (FNG –MoH). [13] The fact that a significant proportion of the study population are not meeting these requirements suggests that awareness of the benefits of these food types needs to be improved in this patient group.

In contrast, wholemeal/wholegrain bread was the most popular choice for our participants. This may reflect public awareness of the suggested benefits of wholemeal breads. It has been found that high consumption of whole grain foods, especially hard whole grain rye bread, may reduce the risk of colon cancer. [14] It has also been shown to reduce the risk of other chronic diseases including coronary heart disease, and diabetes. [15]

In this study, 36% of participants reported use of one or more vitamin or dietary supplements. This is the first time vitamin or supplement use has been reported for this patient group in New Zealand. By comparison in America, routine use of vitamin, mineral and other non-vitamin-non-mineral dietary supplements is common among older persons, with an estimated 50% of persons aged 57-85 years old reported as taking a dietary supplement regularly (at least once per week). [16]

This shows that in comparison to the general population of the United States, New Zealand colorectal patients seem to take less vitamins and/or dietary supplements. The association between vitamins and dietary supplements and all-cause mortality (and thus mortality in CRC patients) is not currently known. [17]

The information collected was able to be used to suggest four different dietary patterns present in this patient cohort as per principal component factor analysis. The diets identified are distinct from those identified in an American study on colorectal cancer and diet by Meyerhardt, [10] which is likely to reflect the distinct population of Auckland, being a particularly multicultural city.

As this was a pilot study, the sample size is too small to investigate association between the dietary patterns and specific ethnic groups. These results confirm that this type of dietary assessment is useful and appropriate in this patient population, and that future studies can use this analysis to determine dietary types and their associations with outcomes.

A limitation of this study was the proportion of completed surveys that contained missing data (n = 27, 90%). The survey was 12 pages long and comprised of 23 dietary-related questions that varied in format between single answer, multiple selections, and food frequency counts. Missing data in multiple answer questions tended to be related to the question design which included a yes/no selection relating to consumption of a particular food type, followed by multiple selections of the food frequency consumption examples of the food type if yes was selected.

Several participants did not select yes or no but then selected examples of the food type, and thus were considered to eat the food type. However the most common questions to contain missing data were the food frequency questions.

Despite having the option of selecting “never” many food types were left with no selection. This may have been because the participant might not have known what some of the listed foods were, or found the concept of allocating a frequency of

consumption difficult. In other cases, two ticks had been entered into the same row followed by a blank row, suggesting that the participant had not moved on to the next row down.

There are several suggestions that could improve these issues. Other studies using FFQs have included pictures of the food types to improve understanding. The method most likely to substantially reduce missing data is through interview collection of the survey data. The primary difficulty with conducting surveys via interview is the time required, which was not feasible in this pilot study.

Other limitations of this study include recall bias regarding both recollection of dietary intake prior to surgery, and of information given. Also, the tool used was a qualitative questionnaire that does not collect information on portion size and caloric intake.

Of interest, 5 participants completed all of the demographics questions on the first page of the survey except for their smoking status, which was left blank. This may be due to tobacco "denormalisation" within our society, which influenced social norms, related to tobacco use, targeting tobacco products the tobacco industry and smoking itself.[18]

With increased stigmatization and less acceptance towards smoking, some participants may have been found it uncomfortable to state their smoking status. People might also have found it personal issue, which might have led them to decide that they have the right not to indicate it on the survey.

On the other hand, every participant has specified his or her alcohol consumption. This shows that people may be more willing to openly talk about alcohol than tobacco use.

More than half of the participants in this study reported that they had not received any nutritional information post their surgery. Almost half expressed that they felt more information should be provided. This shows a significant unmet information need in this patient group. The authors would like to suggest the implementation of a nationally standardized nutritional information booklet for CRC patients, such as that developed by Pullar et al. The effect of such an implementation could be quantified in a randomised interventional study assessing both quality of life and survival outcomes in New Zealand CRC patients.

Conclusions

This study has demonstrated that the assessment of dietary intake and patterns using an FFQ in this patient group is possible. Improvements on the current FFQ for future diet-related studies would include more user-friendly surveys and interview administration of surveys.

Currently, not all of the Auckland CRC patient population are meeting the daily recommended servings of fruit and vegetables, which is suggestive of a lack of nutritional knowledge. This is further strengthened by our findings that the information needs with respect to nutritional advice post surgery are not being met for this patient group.

Competing interests: None declared.

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Vitamin D receptor polymorphisms in colorectal cancer in New Zealand: an association study

Robert W Bentley, Dayle A Keown, Richard B Gearry, Vicky A Cameron, Jacqui Keenan, Rebecca L Roberts, Andrew S Day

Abstract

Aim Polymorphisms of the vitamin D receptor (*VDR*) gene may be a risk factor for colorectal cancer (CRC). We investigated the association of three single nucleotide polymorphisms (SNPs) of the *VDR* gene with CRC in age and gender matched patients and controls of European origin in New Zealand.

Method CRC (N=200) and healthy control (N=200) samples were genotyped for the Fok1 (rs2228570), Taq1 (rs731236) and Cdx2 (rs11568820) polymorphisms using Taqman® SNP genotyping assays. Chi-squared analysis was used to test for overall association of *VDR* genotype with disease, and by age and gender subgroups.

Results There were no significant associations of the three *VDR* SNPs with disease either by allelic frequencies (p=0.43–0.73) or genotypic distribution (p=0.15–0.90). Furthermore, no significant differences for allelic frequencies of the three SNPs were revealed in subgroup analysis by age (above/below median age of 72 yrs; p=0.38–0.91), gender (p=0.22–0.88), or age/gender (p=0.33–0.93)

Conclusion: We found no evidence to suggest that the *VDR* SNPs Fok1, Taq1 and Cdx2 influence CRC risk in New Zealand Europeans.

Colorectal cancer (CRC) is the second most commonly diagnosed cancer in New Zealand (NZ), with over 2500 new cases of CRC registered in 2007.[1] The role of vitamin D and its biological effects mediated through the vitamin D receptor (VDR) in the development of CRC is not entirely clear. Some studies have indicated that individuals with CRC have insufficient levels of vitamin D.[2]

Whilst vitamin D may be synthesised as vitamin D3 in the skin following exposure to ultraviolet light, it can also be obtained from dietary sources[3] and it has been shown that vitamin D supplementation or an increase in the intake of foods with high vitamin D levels may play a role in the prevention of CRC.[4,5]

The active form of vitamin D (1, 25-dihydroxyvitamin D3) is bound by the intracellular VDR. This complex binds and interacts with target-cell nuclei (at VDR elements) to produce a variety of biological effects.[6]

Recent research has indicated that vitamin D may play a role as a key regulator of innate immunity in humans.[7–9] Vitamin D is also shown to suppress CRC development and growth by affecting cell proliferation, differentiation, apoptosis, and angiogenesis.[4]

The *VDR* gene maps to a region on chromosome 12[10]. Association studies of single nucleotide polymorphisms (SNPs) in the *VDR* gene suggest that these variants may influence CRC risk.[11–14]

Despite the high rates of CRC in the NZ population and associations of VDR gene polymorphisms with CRC risk reported elsewhere, very little research has been carried out in order to define the frequency of these variants in the general NZ population or in NZ CRC disease cohorts.

The aim of this study was therefore to screen for genetic variation of the three SNPs rs2228570 (also known as rs10735810; Fok1), rs731236 (Taq1), and rs11568820 (Cdx2) of the *VDR* gene in a well-defined population of individuals with CRC and compare their incidence to a healthy control population, in order to determine the contribution of *VDR* polymorphisms to CRC in NZ.

Method

Study participants—DNA from patients who had been diagnosed with CRC (N=200) was obtained from the Christchurch Tissue Bank (New Zealand). DNA was extracted from Whatman FTA Elute Cards (GE Healthcare, UK) using the manufacturers' recommended protocols. Briefly, a 3.0 mm disc from the FTA Elute Card was washed with 500 mcl of sterile H_2O by pulse vortexing and then incubated at 95°C for 20 minutes in 30 mcl sterile H_2O. The eluted DNA was separated from the FTA matrix by centrifugation and stored at -20ºC until analysed.

Control DNA (N=200) was obtained from the Canterbury Healthy Volunteers for the Study of Heart Disease project.[15] Samples were selected by age- and gender-matching to the CRC patients. At the time of recruitment they had no personal history of cancer of any type or self-reported family history of cancer. Median follow-up was 5.9 years (range 0.1–8.7yrs).

Ethical considerations—Each participant provided written, informed consent. Ethical approval for use of these samples was covered by the Upper South A Ethics Committee (Reference CTY/01/05/062, and URA/10/09/068).

Genotyping—Genotyping of SNPs rs11568820 (Cdx2), rs2228570 (aka rs10735810, Fok1) and rs731236 (Taq1) was performed using pre-designed Taqman® SNP genotyping assays (Applied Biosystems, Foster City, CA) in a Lightcycler® 480 II (Hoffmann La Roche, Basel, Switzerland). 384-well plates with 4.8µl reaction volumes (2 µl genomic DNA, 2.8 µl Taqman® master mix) were used.

Cycling conditions for all SNP assays were 10 minutes at 95°C, 40 cycles of 15 sec at 92°C and 1 min at 60ºC, and 30 seconds of cooling at 40°C. Results were analysed using Lightcycler® 480 (version 1.5.0) software. The accuracy of the genotyping assay was confirmed by repeat analysis of 10% of samples. Concordance between original and repeat genotype calls was 99%.

Statistical analysis—A web-based calculator (http://ihg2.helmholtz-muenchen.de/cgi-bin/hw/hwa1.pl) was used to test for deviations from Hardy-Weinberg Equilibrium (HWE) and to perform Chi-squared and odds ratio analyses. Associations were considered significant if $p<0.05$.

Results

Controls and CRC patients were age, gender and ethnicity matched. In the case and control groups, 94 samples (47%) were female. The median age by gender was the same in control and case groups (72 yrs). The average age by gender for case and control groups was 69.5±0.4 yrs. Samples were from New Zealand Caucasians of European origin.

DNA samples from 199 CRC patients, and 191(rs2228570) or 182 (rs731236 and rs11568820) DNA samples from healthy controls were successfully genotyped. Minor allele frequencies are shown in Table 1. Hardy-Weinberg equilibrium was seen for the three SNPs in case and control groups (p=0.14–0.73), indicating that allele and genotype frequencies do not deviate from expectation.

The allelic frequencies (p=0.43–0.73) and genotypic distribution (p=0.15–0.90) of the three VDR SNPs were not significantly associated with disease (Table 1).

Table 1. Genotype and allele frequencies of *VDR* SNPs in CRC patients and healthy controls

VDR SNP	Phenotype	Genotype frequency n (%)			MAF [a]	Allelic P-value	OR [95% CI]
		1,1 [b]	1,2	2,2			
Fok1 rs2228570	CRC	67 (33.7)	103 (51.8)	29 (14.6)	161 (40.5)	0.43	0.89 [0.67–1.19]
	HC	79 (41.4)	80 (41.9)	32 (16.8)	144 (37.7)		
Taq1 rs731236	CRC	34 (17.1)	101 (50.8)	64 (32.2)	169 (42.5)	0.73	1.05 [0.79–1.41]
	HC	32 (17.6)	86 (47.3)	64 (35.2)	150 (41.2)		
Cdx2 rs11568820	CRC	8 (4.0)	71 (35.7)	120 (60.3)	87 (21.9)	0.67	1.08 [0.76–1.53]
	HC	6 (3.3)	63 (34.6)	113 (62.1)	75 (20.6)		

[a]MAF = Minor Allele Frequency.

[b]The alleles constituting the genotype are denoted as 1 or 2.

Furthermore, no significant differences for allelic frequencies of the three SNPs were revealed in subgroup analysis by age (above/below median age of 72 yrs; p=0.38–0.91), gender (p=0.22–0.88), or age/gender (p=0.33–0.93).

Discussion

Association studies of VDR SNPs with different forms of cancer, including CRC, have indicated that they may influence disease risk risk,[11–14] and that the frequency of these SNPs varies with ethnicity.

Little research has been performed in the New Zealand population to determine the distribution and association of VDR SNPs with CRC. The minor allele frequencies (MAFs) of Taq1 (CRC 42.5% and HC 37.7%) and Cdx2 (CRC 21.9% and HC 20.%) in our study were in agreement with the MAFs reported for these SNPs in other studies on populations of European origin.[13, 16]

In contrast, the MAF of Fok1 was higher in our CRC patients (40.5%) and healthy controls (37.7%) than the MAF reported in French (33%)[16] and UK (31%)[17] populations. Reasons for this discordance are unknown, but may be due to subtle population stratification.

The lack of any significant overall or subgroup association of these SNPs of the *VDR* gene with CRC does not indicate a role for these variants in CRC in NZ Caucasians of European origin. However, previous studies have indicated that risk conferred by SNPs of the *VDR* gene may be modified by calcium intake, vitamin D uptake, dietary fat[18–20] and body mass index (BMI).[21] Our CRC samples were sourced from tissue bank samples lacking this supporting information.

Further research in a larger cohort taking these factors into account may clarify the nature of this gene/environment interaction in the NZ population.

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A prospective study of endoscopist-blinded colonoscopy withdrawal times and polyp detection rates in a tertiary hospital

Gary Lim, Sharon K Viney, Bruce A Chapman, Frank A Frizelle, Richard B Gearry

Abstract

Background Studies have suggested that a colonoscopy withdrawal time of at least 6 minutes is associated with an increased adenoma detection rate in patients undergoing colorectal cancer screening.

Aims We aimed to determine colonoscopy withdrawal time and rate of polyp detection in a blinded study—conducted at Christchurch Hospital (Christchurch, New Zealand)—to determine if there was a relationship.

Methods All 16 consultant endoscopists performing colonoscopy in a tertiary hospital had their withdrawal time from the caecum prospectively timed over 208 consecutive procedures between 11 April 2007 and 19 May 2007. The following data was collected: indication for procedure, final diagnosis, polypectomy rate, procedures performed and withdrawal time were recorded. Histology results were reviewed for all patients.

Results 111 (53%) of colonoscopies were performed for symptom assessment and 97 (47%) for surveillance. There was significant heterogeneity between colonoscopists' withdrawal times ($p<0.001$). Polyps were diagnosed in 65 of all colonoscopies (31.3%). Of the screening colonoscopies polyps were found in 38 (39.1%) of which 14 were adenomas (adenoma detection rate of 14%). The median colonoscopy withdrawal time was 3 minutes 16 seconds when no polyps were found (range 5 seconds to 11 minutes 50 seconds). The median colonoscopy time when polyps were found was 8 minutes 31 seconds which included time taken for procedures (range 2 minutes 7 seconds to 35 minutes 40 seconds), $p<0.001$.

Conclusions This study confirms that more adenomas were found by those endoscopists who had slower withdrawal times. Also colonoscopy withdrawal times are inherently much faster than recommended and highlights the importance of regular adenoma detection rate and withdrawal time auditing.

Colonoscopy is widely regarded as the best test for lower gastrointestinal investigation for colorectal cancer.[1,2] Whilst there is a clear benefit from colonoscopy in preventing left-sided tumours, colonoscopy has been shown to be less effective in preventing right-sided cancers.[3–5]

Adenoma detection rate (ADR) is an accepted method of measuring colonoscopy efficacy and as it has shown in the screening situation that for an individual endoscopist an ADR rate below 20.0% was significantly associated with an increased risk of interval colorectal cancer.[6] Many factors have been shown to affect ADR such as quality of bowel preparation, insertion to caecum and technique[7] It is well known

that ADR's vary between endoscopists and there is a significant association between ADR and colonoscopy withdrawal time.[8]

A United States Multi-Society Task Force in 2002 recommended that colonoscopy withdrawal time should average at least 6–10 minutes[9]. These recommendations were developed following a tandem colonoscopy study examining adenoma miss rates. The miss rates were 17 and 48% for the two endoscopists. The endoscopist with the lower miss rate had a significantly higher score on 4 quality criteria (examining the proximal sides of flexures, folds and valves; cleaning and suctioning; adequacy of distension; adequacy of time spent viewing) as well as a significantly longer withdrawal time (median of 8 minutes 55 seconds versus 6 minutes 41 seconds).[7]

Subsequent studies have confirmed these findings, with a significant difference in adenoma detection in screening colonoscopy shown in gastroenterologists with mean withdrawal times of less than 6 minutes compared to those with mean withdrawal times of 6 minutes or more.[8,10]

Given the above recommendations, we aimed to evaluate the withdrawal times in our hospital. Christchurch Hospital is a tertiary hospital located in the South Island of New Zealand. It is the largest tertiary, teaching hospital in the South Island with 650 beds. The Endoscopy Unit performs approximately 5000 colonoscopies annually for diagnostic, therapeutic and surveillance purposes.

Methods

Study design—All patients undergoing colonoscopy (regardless of the indication) were included in the study. Sixteen consultant endoscopists (seven gastroenterologists and nine surgeons) were included. Procedures where the caecum was not reached were excluded. Three endoscopists were aware that the study was taking place while all other endoscopists were unaware that their withdrawal times were being recorded.

Once the caecum or terminal ileum had been reached, a nurse used a stop watch to record the withdrawal time which ceased when the colonoscope was removed from the rectum. The stop watch was not paused at any stage during the withdrawal phase for any procedures performed, All patients received conscious sedation with a combination of intravenous midazalom and/or fentanyl. Patients received oral sodium picosulfate with bisacodyl as bowel preparation. Procedures took place with or without registrars. The study took place from 11 April 2007 to 19 May 2007 over 208 consecutive procedures.

Withdrawal time was recorded, as were indication for the procedure, diagnosis and procedures performed. The withdrawal time included time taken to perform procedures such as biopsies or polypectomy. Colonoscopy data was gathered from the Endoscribe v2.25.09 database as entered by the endoscopist including patient gender, inpatient status, endoscopist, registrar if present, bowel preparation quality, biopsies, polypectomy, size of polyps, location and number of polypectomies. Subsequent histology was later reviewed using a separate electronic database.

Statistical analysis—Statistical analysis was performed using R. v2.11.2010-07-27 (R Foundation for Statistical Computing, Vienna, Austria). Chi-squared or Fisher's exact test were used for categorical variables and Wilcoxen rank sum test for continuous variables.

Results

208 colonoscopies were performed during the study period. 111 (53%) were for symptom assessment and 97 (47%) were for screening. The mean age was 53 years and 43% were male (Table 1). Altogether, polyps were found in 66 patients (31%), of which 21 were adenomas (10%).

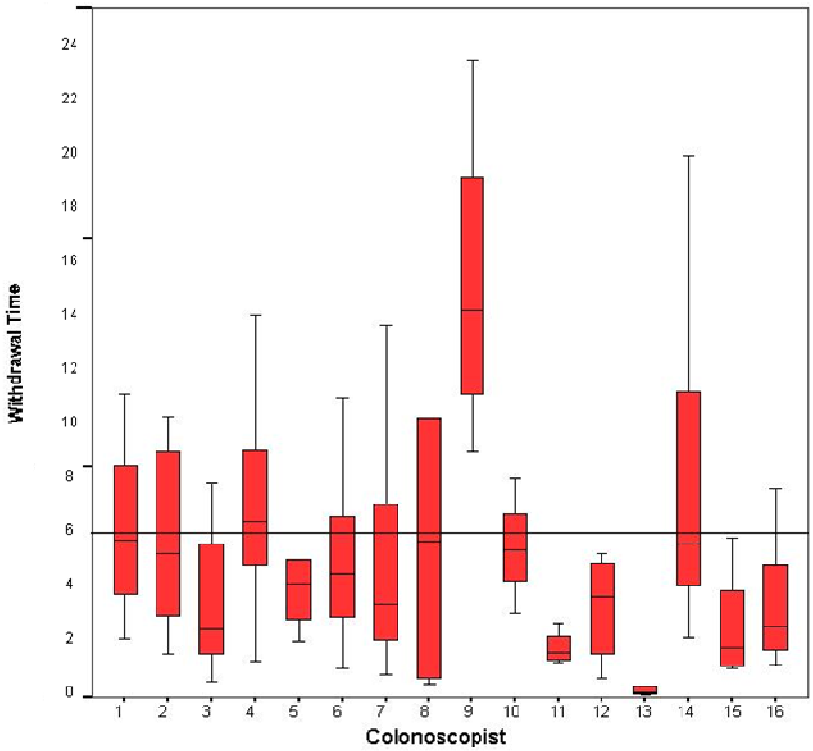
Table 1. Patient demographics

Variables	N (%)
Age (years), mean (SD)	53 (18–92)
Male sex (%)	87 (43%)
Outpatient	185 (89%)
Indication	
–Screening	97 (47%)
–Symptoms	111 (53%)

In the 97 colonoscopies which were performed for screening purposes, polyps were found in 38 (39.1%), of which 14 were adenomas (14%). There was one low rectal cancer found which occurred in a 59-year-old male undergoing colonoscopy for rectal bleeding on a background of longstanding Crohn's colitis. Registrars were involved in 17 (8%) of the total colonoscopies.

There was significant heterogeneity between colonoscopists' withdrawal times (Figure 1) ($p<0.001$). The median colonoscopy time was 3 minutes 16 seconds when no polyps were found (range 5 seconds to 11 minutes 50 seconds). The median colonoscopy time when polyps were found was 8 minutes 31 seconds (range 2 minutes 7 seconds to 35 minutes 40 seconds) $p<0.001$.

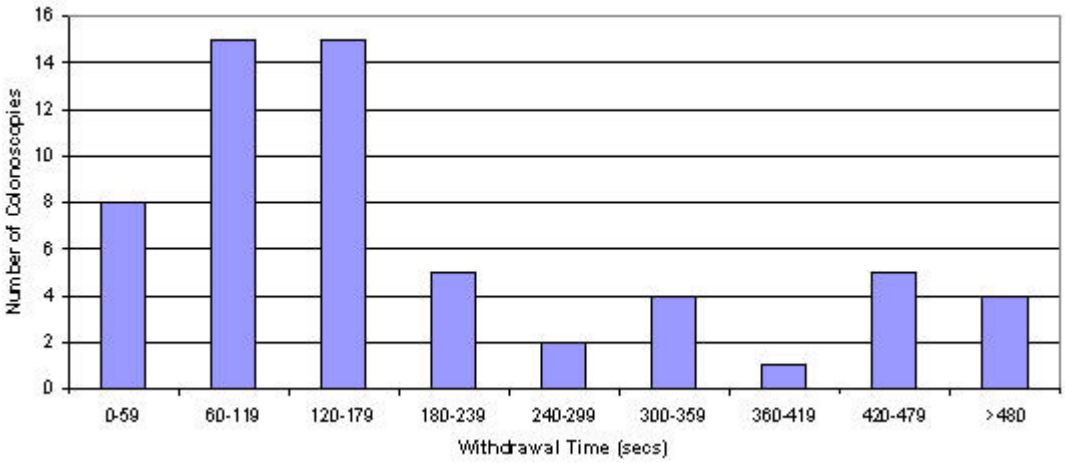
Figure 1. Colonoscopy withdrawal times



Fourteen out of 16 endoscopists had median withdrawal times less than 6 minutes. The quickest median withdrawal time was 12 seconds (Endoscopist 13 over 6 procedures).

Overall, 12 colonoscopies were performed with withdrawal times less than 1 minute. Another 27 colonoscopies were performed with withdrawal times of 1-2 minutes. In the screening only group when no polyps were found, 49 out of 59 colonoscopies (83%) had withdrawal times less than 6 minutes (Figure 2).

Figure 2. Withdrawal times (surveillance group without polypectomy)



Screening-only group—Endoscopists performed 0-16 screening colonoscopies. Individual ADR was 0-40% (Table 2). 45% of polyps removed were < 5mm in size. 47% of polyps were 5-10mm in size and 8% greater than 10mm in size.

Two trainees (registrars) performed 7 of the 97 surveillance colonoscopies with individual ADR of 33% and 50%. Withdrawal times when no polyps were found were 6 minutes 37 second for one trainee and 2 minutes 35 seconds for the second trainee. The presence of a registrar made no significant difference to the supervising endoscopist's withdrawal time or ADR

Gastroenterologists performed 64 (66%) of the surveillance colonoscopies and the surgeons performed 33 (34%). ADR for the gastroenterologists was 15.6%, compared to 12% for the surgeons (p=0.65). When colonoscopies plus procedures were excluded, the gastroenterologists performed 30 colonoscopies with a mean withdrawal time of 190 seconds.

The surgeons performed 17 colonoscopies with a mean withdrawal time of 127 seconds (p=0.007). 41% of these cases performed by the surgeons had previous colonic resection compared to 20% for the gastroenterologists.

Table 2. Polyp detection rate and adenoma detection rate (surveillance group only)

Endoscopist	Number of procedures	Polyp detection rate	Adenoma detection rate
1	8	75%	25%
2	3	100%	33%
3	16	12%	6%
4	10	60%	40%
5	5	0%	0%
6	13	31%	8%
7	9	33%	11%
8	2	50%	0%
9	7	71%	0%
10	0	No surveillance	No surveillance
11	1	0%	0%
12	2	0%	0%
13	5	0%	0%
14	5	80%	40%
15	4	0%	0%
16	7	57%	29%

Discussion

Colonoscopy has been shown to decrease the incidence of colorectal cancer but the effectiveness of colonoscopy depends upon finding and removing adenomatous polyps. Polyp detection rates, more particularly adenoma detection rates, are an accepted means of assessing the quality of colonoscopy.[6] In 2006 the ASGE published several factors shown to affect the quality of a colonoscopy procedure[11]. These include preprocedure, intraprocedure and postprocedure measures.

Intraprocedure measures included caecal intubation rate, detection of adenomas in asymptomatic individuals, withdrawal times, biopsy specimens in chronic diarrhoea, biopsy samples in UC/IBD and endoscopic resection of polyps <2 cm. Other factors include the proceduralist—non-gastroenterologists are more likely than gastroenterologists to miss cancer[12] although out local data would suggest otherwise [13]. Other factors suggested to influence the ADR are the role of fatigue and time of day[14], place on the list and timing of the endoscopy list have also been implicated[15,16].

This study demonstrates that more adenomas were found when colonoscopy took longer. Also that when proceduralists are not aware that they are being timed, colonoscopy withdrawal times are significantly faster than recommended. Furthermore, for colonoscopies where polypectomy was not performed, only 17% of withdrawal times were greater than 6 minutes. This would imply that a possible reason why longer withdrawal times (greater than 6 minutes) have been associated with increased adenoma pick up rate may at least in part, be the self fulfilling way some studies have been undertaken, namely that the withdrawal time includes the time to remove polyps [17]. However our study is still consistent with previous data showing increased adenoma detection with withdrawal times of greater than 6 minutes.[8, 10, 18]

The adenoma detection rate varied from 0 to 40% between proceduralists. This may not be a good reflection of individual performance, due to the low numbers of procedures performed by several endoscopists. However, it does demonstrate marked heterogeneity and, overall, too rapid a withdrawal time for most procedures. The overall adenoma detection rate in the surveillance group of 14% is lower than most studies[8,19,]. Reasons for this may include the small number of patients in the study, but may also be a reflection of the fast withdrawal times.

In the present study there was a slightly higher proportion of females, who have a lower prevalence of adenomatous polyps. Due to the lack of a primary screening colonoscopy program in New Zealand[20] and limited resources, our Unit can only offer surveillance to high risk groups - patients with previous polyps, strong family of colorectal cancer and possible hereditary non-polyposis colorectal cancer families. However one would have expected that surveillance of a group with higher than average risk of colorectal cancer would have even higher adenoma detection rates than average risk patients.

This was a baseline quality assurance/withdrawal time study performed in our department prior to any intervention. Most importantly, it was blinded, giving a true reflection of withdrawal times rather than having artificially lengthened withdrawal times when colonoscopists are aware they are being timed. Other studies have shown a non-significant increase in polyp detection when clinicians are informed that withdrawal time is being monitored,[21] as well as increased inspection time and improved technique when blinded video assessment becomes unblinded.[22]

The weakness of this study includes the small numbers of colonoscopies, (especially when looked at per endoscopist) and the short time period over which the study was undertaken. Also the fact that the polyp removal time was included in the withdrawal time , therefore creating an time bias in the study i.e. if you had an adenoma then your colonoscopy would take longer as it had to be removed or biopsied.

Christchurch Hospital has now been chosen as a pilot site in New Zealand for the Endoscopy Global Rating Scale (GRS). This is a web-based self assessment tool that provides a standard for accreditation and framework for service improvement. Factors monitored include clinical quality, patient experience, workforce and training.[23] Hopefully the introduction of this will lead to improved colonoscopy throughout New Zealand

In conclusion, our study confirms that colonoscopy withdrawal times prior to any intervention are much faster than recommended. Auditing of adenoma detection and colonoscopy withdrawal times should take place at regular intervals in all Units performing colonoscopy.

Competing interests: None declared.

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Computed tomographic colonography (CTC): a retrospective analysis of a single site experience and a review of the literature on the status of CTC

Marcus Ghuman, Ngaire Bates, Helen Moore

Abstract

Aim To review local CT colonography (CTC) data with regard to demographics, and both colonic and extracolonic findings. To improve performance by identifying any deficiencies that need to be addressed, in relation to a literature review of the current status of CTC.

Method A retrospective observational analysis was conducted of all the patients undergoing CTC for the 3-year period from 9 August 2007–12 August 2010 (n=302) conducted at a single site: Greenlane Hospital (ADHB outpatients).

Results In total, 12 of the 302 patients (4%) were found to have cancer, 24 polyps (8%), and 111 diverticular disease (37%). 21 patients (7%) were referred on for optical colonoscopy following their CTC, and 34 patients (11%) had follow-up recommendations resulting from extracolonic findings, including 24 recommendations for further imaging. A trend towards under-representation of both Māori and Pacific Island groups undergoing CTC, and over-representation of Asians was identified.

Conclusion This study has reported on the experience of CT colonography at Greenlane Hospital over a 3-year period. It has provided important local data on rates of detection of colonic pathology. Māori and Pacific Islanders need encouragement from primary health practitioners to present for bowel examination.

Colorectal cancer (CRC) is the second most common cause of cancer death in New Zealand,[1] and we have amongst the highest age-standardised rates of the disease in the world. Barium enema and colonoscopy have been the traditional investigations used in the work up of patients presenting with symptoms suggestive of CRC.[2] Increasingly, computed tomographic colonography (CTC) is displacing barium enema as a non-invasive rapid imaging technique to investigate these patients, which can be cost effective, and as accurate as colonoscopy for colorectal cancer detection.[3]

While it is evident that the sensitivity of CTC for detection of polyps over 10mm is generally equivalent to that of colonoscopy, as seen in local[4] and international clinical trials,[5–8] areas requiring consensus remain. These areas particularly include the reporting, management, and follow up smaller polyps; and also issues surrounding extracolonic findings. Radiation exposure issues will also be discussed.

Methods

Study design—This observational study was conducted as a retrospective analysis using as a population all the patients undergoing CT colonography (CTC) for the 3-year period from 9 August 2007–12 August 2010 conducted at a single site; Greenlane Hospital, which is the outpatient hospital

for Auckland District Health Board (ADHB), and currently the only ADHB site performing CTC in public.

These patients were identified through Picture Archiving and Communication System (PACS) coding, along with their corresponding National Health Index (NHI) numbers. This dataset also included the date of referral and performance of examination, and the referral source. Each patient's CTC report was obtained from the Auckland District Health Board software package "Concerto", where demographic data (sex, ethnicity, age), symptoms leading to referral, findings of the examination (intra and extracolonic), and recommended follow-up were extracted.

Each CTC study was performed on a Phillips 16-slice CT scanner typically using standard full bowel preparation (LoSo Prep, E-Z-M), although some more frail patients had reduced preparation or only fecal tagging. All had fecal tagging (Tagitol) and iv Buscopan unless contraindicated. Supine and prone scans, and occasional supplementary decubitus scans were performed at 120kvP or 90kvp, and mAs 50-150. Colonic distension was primarily using CO2 insufflation (ProtoCO2l, Bracco Diagnostics), or occasionally manual air insufflation.

The CTC reports were coded according to the CT Colonography Reporting and Data System (CRADS), as defined by the Working Group for Virtual Colonoscopy, 2005.[9] The vast majority of the scans in this study were reviewed by two consultant radiologists with considerable experience in CT colonography reporting, suggesting that the reporting in this sample was robust.

Statistical analysis—Categorical data were presented as frequency (percentage) and continuous data were presented as mean (standard deviation). Categorical variables were compared using a Chi-squared test or Fisher's exact test as appropriate. Continuous data were compared using the t-test and the one-way Anova test. All p values reported were two-tailed and a p value <0.05 was considered significant. SAS (version 9.1) statistical software was used for statistical analysis.

Results

This study identified 302 patients undergoing CT colonography (CTC), of whom 184 were female (61%). The mean age of patients in the study population was 66 years (range 16–91 years). New Zealand European (59%), Asian (17%), and Other Europeans (10%) made up the majority of the study population. The demographic data of the study population are recorded in Table 1.

Table 1. Demographic data of the study population

Variables	Total number of patients (%)	Age (years)
Sex		
Male	118 (39.1)	
Female	184 (60.9)	
Age (mean)		65.9
Ethnicity		
Asian	50 (17.0)	
Indian	12 (4.1)	
Māori	15 (5.1)	
NZ European	173 (58.8)	
Other	1 (0.3)	
Other European	30 (10.2)	
Pacific Islander	12 (4.1)	

Nearly all of the referrals for CTC came from four sources: General Practice (121 referrals), Gastroenterology (103 referrals), General Surgery (60 referrals), and General Medicine (9 referrals); 57 patients, which accounted for 19% of the study population, were referred for CTC following a failed optical colonoscopy (OC).

The average time from referral to performance of the scan was 43 days, with patients referred from General Medicine and those referred following a failed OC showing a trend toward shorter referral time, though these findings did not reach significance.

During the study period there was no formal priority criteria used to stratify the referrals, however they consisted of symptomatic patients, mostly of low to medium risk category. These findings are summarised in Table 2.

Table 2. Referral base and referral times by referrer for CT colonography

Variables	Number of patients (%)	Mean referral time (days)	P value
Total	302	42.7	
Referral source			0.3066
Gastroenterology	103 (34.1)	43.3	
General medicine	9 (3.0)	27.0	
General surgery	60 (19.9)	38.1	
General practice	121 (40.1)	46.2	
Referred following failed OC			0.1814
Yes	57 (18.9)	38.5	
No	245 (81.1)	43.7	

NB: OC is optical colonoscopy; referral time refers to the time from referral for CT colonography to performance of the scan.

CT colonography identified 12 patients as having colorectal cancer (4% of the total study population), 24 as having polyps over 5 mm (8%), and 111 with diverticular disease (37%).

The majority of patients identified as having cancer were of New Zealand European ethnicity, a statistically significant finding (p=0.017). Though there was a trend toward more females than males having cancer, and a higher average age for the cancer cohort as compared to the study population, these findings did not reach significance.

Of the 24 patients identified as having polyps, 13 were male and 11 female. The majority of the polyp patients were also of New Zealand European ethnicity (p=0.0002).

More females than males were found to have diverticular disease (p=0.013), and again patients of New Zealand European ethnicity dominated this cohort (p=0.0001). Table 3 summarises the cancer, polyp, and diverticular disease findings.

Follow-up recommendations in the formal CTC reports of patients discovered to have colorectal cancer varied from no follow-up advice, to recommendation for referral to colorectal multidisciplinary meeting (MDM) and direct visualisation and biopsy via optical colonoscopy.

Follow-up recommendations for patients with polyps varied, but included repeat CTC (with interval duration ranging from 1–5 years) and/or optical colonoscopy.

In total 21 patients (7% of the study population) were referred for optical colonoscopy due to the detection of malignancy, polyps, or for other reasons including poor quality

of study, following their CT colonography. In total, 3 patients (1% of the study population) had inadequate bowel imaging at their CTC, as indicated by the C0 notation.

Table 3. Cancer, polyp, and diverticular disease findings

Variables	Cancer	P value	Polyp	P value	Diverticular disease	P value
Number of patients, n (%)	12 (4.0)		24 (8.0)		111 (36.9)	
Mean age (years)	75.8		70.2		72.1	
Sex, n (%)		0.1460		0.8388		0.0132
Female	9 (75)		11 (45.8)		69 (62.2)	
Male	3 (25)		13 (54.2)		42 (37.8)	
Ethnicity, n (%)		0.0117		0.0002		0.0001
Asian	1 (8.3)		4 (16.7)		2 (1.8)	
Indian	0 (0)		2 (8.3)		1 (0.9)	
Māori	0 (0)		2 (8.3)		3 (2.7)	
NZ European	10 (83.3)		12 (50)		80 (72.1)	
Other	0 (0)		0 (0)		0 (0)	
Other European	0 (0)		2 (8.3)		17 (15.3)	
Pacific Islander	0 (0)		0 (0)		5 (4.5)	

NB: One of the patients identified as having cancer did not have ethnicity recorded.

Of the 57 patients who were referred for CTC following a failed optical colonoscopy, two were found to have cancer, two had polyps over 5 mm, and 25 had diverticular disease.

Although approximately 50% of patients in the study population had some mention of extracolonic findings in their formal CTC report, most were benign incidentals, and only 34 patients (11% of the study population) had a recommendation made in their CTC report for further imaging as a result of the extra-colonic findings. The number of patients who actually went on for further imaging may well be less than this.

Nine patients (3%) were coded as E4 (potentially important extracolonic finding) and were made up of three abdominal aortic aneurysms, three pulmonary lesions suggestive of malignancy, two patients with evidence of disseminated metastatic malignancy, and one porcelain gallbladder.

A further 54 patients (17.8% of the study population) were coded as E3 (likely unimportant extracolonic finding, incompletely characterised, therefore possibly requiring further investigation). These were a heterogeneous collection of pathologies, with some of the more common being renal stones and cysts, small pulmonary nodules, and pelvic/gynaecological cysts.

Of the follow-up recommendations, 3 were for GP follow-up, 7 for specialist follow-up, and 24 for further imaging (comprising 16 USS, 7 CT scans, and 1 MRI scan).

Discussion

This observational study suggests that, for the patient population undergoing CT colonography, Europeans and Māori were proportionately under-represented, while Asians were over-represented, as compared to Auckland population demographics.

The average time from referral for CT colonography to performance of the exam was just over 6 weeks. This is within acceptable guidelines for the current Northern Cancer Network Regional Prioritisation criteria for priority 2, 3, or surveillance patients.[10]

This study found that patients of New Zealand European ethnicity had higher rates of colorectal cancer (p=0.0117) and polyp detection (p=0.0002) as compared to other ethnic groups, both significant findings. This finding is consistent with data from the New Zealand Cancer Registry.[11]

Diverticular disease was shown to be more common in females than males (p=0.0132), and in patients of New Zealand European ethnicity (0.0001). These findings are well established in the literature.[8] The prevalence of colorectal cancer in this symptomatic group, at around 4%, is similar to reported rates from other CTC studies in New Zealand.[12]

A limitation of this study is the lack of formal comparison of CTC findings with those who had colonoscopic assessment; and further work is being undertaken in this regard. Interestingly there is quite limited data available on the verified performance characteristics of both CTC and Optical Colonoscopy for detection of colorectal cancer in NZ. Two studies from Canterbury, assessing the miss rate of Colonoscopy and CTC using the NZ National Cancer Registry as a reference, showed equivalent miss rates of around 5-6%.[2,12] The follow-up advice in patients with intermediate sized polyps (6mm–9mm) varied, with the most common advice being repeat CT colonography or direct visualisation via optical colonoscopy. The recommended interval length varied from 1 to 5 years, with a tendency to shorter intervals for larger polyps.

This highlights one of the discussion topics with CT colonography—specifically what size polyp should be referred for OC and polypectomy and/or followed with repeat CTC. Although polyp natural history is complex and not perfectly understood, there is a large amount of evidence from pathological and colonoscopy-based studies showing that apart from actual histology showing the presence of significant dysplasia or villous change, the most dominant predictor of behaviour is polyp size.[12]

A recent colonoscopic study of 1468 patients found that of 414 polyps smaller than 10mm, only 41 (9.9%) were advanced adenomas, and 1.7% were high-grade neoplasia. None were frankly malignant. Polyp size was the only identified risk factor for the presence of advanced adenoma.13 There is general consensus that patients with polyps greater than 10 mm should be referred for colonoscopy, while the vast majority of diminutive polyps (those 5 mm and smaller) are hyperplastic and do not require compulsory removal. The rate of advanced histology in the diminutive polyp group is particularly low, with high grade neoplasia or malignancy being extremely rare reported from zero to 0.06%.[15]

Thus the most controversy remains regarding what should be done with small to medium sized (6–9 mm) polyps and how they should be followed up, as there is a lack of consensus across the expert groups involved (gastroenterological, surgical and radiological) regarding decision making in this area.[16] The radiologist authors utilised the CRADS consensus, which gives the option of endoscopic polypectomy or follow-up CTC for patients with these polyps of indeterminate size. It also recommends consultation and adaptation in regard to local standards of practice and patient preference.

In our opinion, this approach allows common sense to prevail for individual patient circumstances, and existing data suggest this risk is manageable.[15,17] For example an 8mm polyp in a younger or fit person would be actively dealt with compared to a similar polyp in an elderly or frail individual with other comorbidities. Unnecessary polypectomies have repercussions in economic terms and on patient morbidity and mortality.[17]

Only 7% of patients undergoing CT colonography were referred on for optical colonoscopy in the study, which is similar to rates found elsewhere.[3,15] It is important to note that the higher the rate of on-referral to colonoscopy, then the higher the cost of a CT colonography diagnostic approach. Conversely the cost of a primary optical colonoscopy approach is increased by its "fail" rate, with subsequent CTC necessary.

With reference to incidental extracolonic findings discovered at CTC, a key consideration is the need to weigh the benefit of an earlier diagnosis of a potentially important finding against the increased patient anxiety and possible morbidity that necessarily results from a finding, and the cost of further workup.

Although there was some mention of extracolonic findings in close to 50% of the reports, only a minority of patients had potentially important extracolonic findings, and only 34 patients (11% of the study population) had recommendation for some form of follow up for their extracolonic findings, including 24 follow-up scans. Of those 24 recommended follow-up scans, two-thirds of these were for USS, a safe and comparatively cheap investigation. The number of patients who actually went on for further imaging may well be less than the number for whom it was recommended. These results compare favourably with those found elsewhere, with rates of suggested follow-up for extracolonic findings of CT colonography ranging from 11–20%.[18,19]

Although this study has not generated any data on radiation exposure from CT colonography, this remains an important consideration when considering this investigation as an alternative to optical colonoscopy. Due to technical factors, individual radiation exposure could not be determined in this audit, with only generic data being supplied by the particular CT machine.

Studies attempting to find a correlation between radiation exposure and subsequent cancer risk in later life have relied on modelling rather than direct observation,[6] and thus there is no direct data relevant to CT colonography in this area. However, most CT colonography protocols deliver about 3–8 millisieverts of radiation—which is a relatively low dose, and usually less than half that used in a standard CT abdomen.[8] The risk from this radiation dose is negligible in a symptomatic adult, relative to their background risk of cancer which is at least 30% lifetime risk.[20]

The safety profile of CTC is excellent, with no perforations or other complications in this cohort.

This observational study has reported on the experience of CT colonography at Greenlane Hospital over a 3-year period. Though no attempt at direct comparison with optical colonoscopy in regards to efficacy and safety have been made, it has provided important local data on rates of detection of colonic pathology. Key issues such as follow-up advice for small–medium sized polyps, and investigation of extracolonic findings have been discussed.

One of the most important findings for primary care practitioners is the under-representation of Māori and Pacific Island patients referred for bowel symptoms.

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Computed tomographic colonography: colonic and extracolonic findings in an Auckland population

Helen Moore, Nicholas Dodd

Abstract

Aim To determine the nature and prevalence of colonic and extracolonic findings in our population.

Methods All patients who underwent computed tomographic colonography (CTC) in the 72-month period from 1 January 2004 to 1 January 2010 were included in the analysis. Demographic data and CTC findings were recorded, according to the CT colonography reporting and data system (CRADS).

Results There were 2152 consecutive CTC patients; comprising 52.6% female, average age of 60 years; range 19–87. Approximately 84% were symptomatic. CRADS: Colonic findings: 99/2152 patients (4.6%) were C2 category (had 1 or 2 polyps of 6–9 mm). 77/2152 (3.6%) patients were C3 category (>9 mm polyp or >2 polyps of 6–9 mm). 55/2152 (2.5%) were C4 category (possible cancer). This comprises a total potential colonoscopy/surgery referral rate of 10.7%. Extracolonic findings: The majority were normal or clinically unimportant findings. 178/2152 (8.3%) had potentially significant extracolonic findings.

Conclusion Our CTC population is largely symptomatic, and there is a referral rate from CTC to colonoscopy, surgery or surveillance of 10.7%. This is similar to other NZ data and international studies. The 8.3% rate of potentially significant extracolonic findings is at the lower end of the reported range.

Computed tomographic (CT) colonography is used to identify individuals with polyps or cancers, in order to triage the appropriate patients to colonoscopy and/or surgery. CT colonography is an established screening technique for colorectal cancer, and in many centres has effectively replaced barium enema as a first-line investigation in the patient with symptoms suggestive of bowel cancer.

It may also detect other causes for the patient's symptoms, either related to the bowel (such as appendicitis or diverticulitis), or non-bowel-related "extracolonic" problems such as lymphoma. Up to 10% of extracolonic findings (ECF) are potentially the cause of the symptoms that lead to the CTC investigation.[1]

There is a large quantity of data available internationally regarding the distribution of colonic and extracolonic findings, but limited data as yet from New Zealand. This information is important in relation to quality assurance and workflow planning in our local environment.

Methods

All patients who underwent CTC in the 72-month period from 1 January 2004 to 1 January 2010 were included in the analysis. CTC was performed on either a 16 slice or 64 slice CT (GE Lightspeed series), after standard bowel preparation with LoSo Prep (E-Z-EM).

A supine and prone (and/or occasionally a supplementary decubitus scan) was performed for each patient. Standard technique factors were 40–50 mAs, 120 kVp or 100 kVp (latter if less than 75 kg weight), and either manual air insufflation prior to 2009, or subsequently CO2 insufflation (ProtoCO_2l, Bracco Diagnostics).

Demographic data and CTC findings were recorded, according to the CT Colonography Reporting and Data System (CRADS).[2] The CRADS code was prospectively reported from mid 2008, and coding was retrospectively applied to the other reports from 2004–2008 for the purpose of this study; after assessment of the report by two experienced CTC radiologists. A group of six CTC accredited radiologists reported the studies.

Results

2152 consecutive CTC patients were available for study. The group was 52.6% female, with an average age of 59.4 years; range 19–87 years. Indication data was unable to retrieved in 605 of the earliest patients; (28%). Of the remainder, approximately 84% were symptomatic. The most common indication was “change of bowel habit”, usually not otherwise specified. 16% were asymptomatic (which included some higher risk patients also; comprising 6 failed colonoscopy patients, 5 FOBT positive patients and 17 surveillance patients following colorectal cancer resection). Diverticular disease was mentioned in 880/2152 reports; a prevalence of 41%. Of these approximately 360 (also 41%) were reported as mild-trivial.

Table 1. Colonic findings, CRADS: CT colonography reporting and data system

C0 – non diagnostic study	5/2152	0.23%
C1 – normal, or polyp less than 5 mm	1918/2152	89.1%
C2 – 1 or2 polyps 6-9 mm	99/2152	4.6%
C3 – >9 mm polyp or >2 6–9 mm polyps	77/2152	3.6%
C4 – Mass/stricture, possible Cancer	53/2152	2.5%

Colonic findings: The C2–C4 group comprises a total potential referral rate to surveillance, colonoscopy or surgery, of 10.7%. For extracolonic findings, the majority were normal or findings of no major importance. The E3 and E4 group together comprise the total of potentially significant extracolonic findings; of 8.3%.

Figure 1. Virtual dissection mode—view of a cancer indrawing the wall of the ascending colon

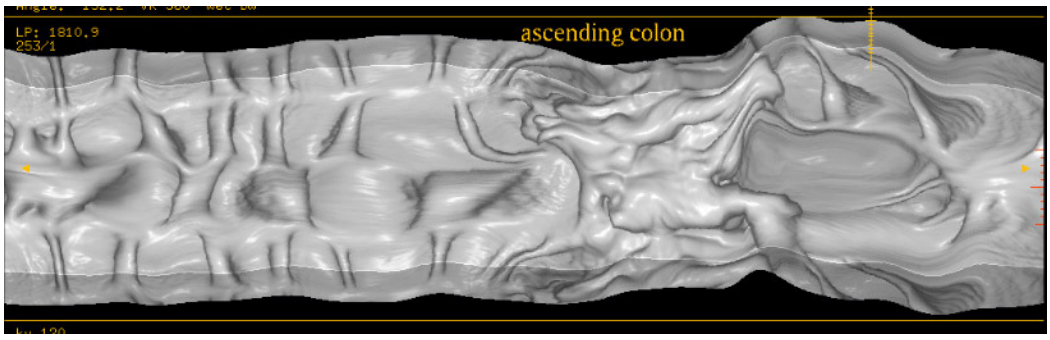

Figure 2. Volume-rendered "barium enema" type view—the image demonstrates multiple sigmoid colon diverticula, as well as a rectal polyp

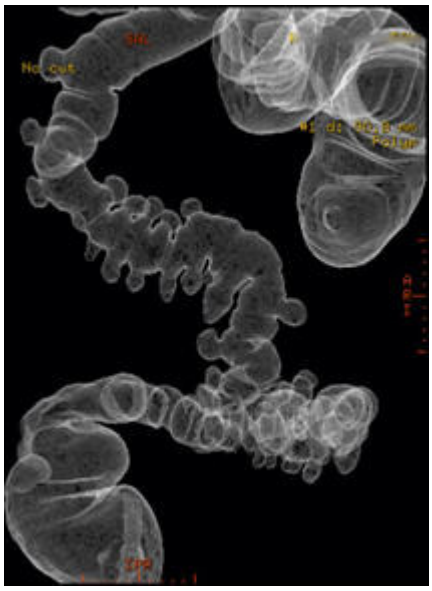

Table 2. Extracolonic findings

E1 – normal/variant	1102/2152	51.2%
E2 – benign/low clinical importance	872/2152	40.5%
E3 – probably low importance; but needs further work-up	112/2152	5.2%
E4 – clinically important, needs work up	66/2152	3.1%

Figure 3. Coronal view of abdomen—common extracolonic findings of a tortuous but not aneurysmal aorta with calcified atheroma, and a hiatus hernia

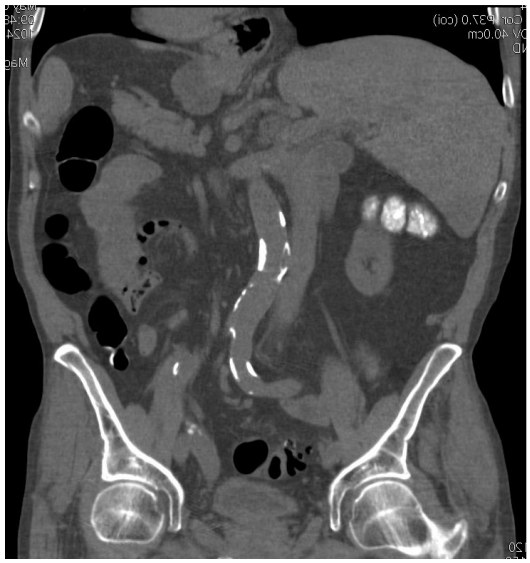

Table 3. Description of potentially significant extracolonic findings

Type of E3 lesion – probably low importance; but needs further work-up	**Number**	**Type of E4 lesion** – clinically important, needs work up	**Number**
Liver lesion, possibly just a cyst	18	Possible malignancy e.g. lung or solid organ mass, lymphadenopathy	39
Abdominal aortic aneurysm <5 cm	19	Abdominal aortic aneurysm >5 cm	11
Ovarian lesion, possibly just a cyst	23	Diverticulitis with abscess or perforation	4
Lung nodule	15	Bone fracture	1
Renal lesion, possibly just a cyst	24	Adrenal hemorrhage	1
Hydronephrosis likely chronic PUJ	1	Appendix mucinous tumour	2
Mesenteric panniculitis	1	Appendicitis	2
Dense liver, possibly increased iron	2	Pneumonia	1
Psoas asymmetry	1	Bone lesion	1
Pleural effusion likely cardiogenic	1	Hydronephrosis	2
Pancreas cysts	2	Severe porcelain gallbladder	1
Bile ducts possibly dilated	1	–	–
Small kidney possible renal artery stenosis	1	–	–
Small pericardial effusion	1	–	–
Possible small bowel polyp	1	–	–
Mild porcelain gallbladder	1	–	–

PUJ=pel-veoureteral junction.

Discussion

There has been much debate in the literature as to whether detecting extracolonic abnormalities is an "asset or liability";[3] and there are valid issues on both sides. The anxiety and possible physical complications provoked by undergoing work-up of an incidental finding is not to be underestimated, and it is difficult to measure this effectively; particularly in economic terms. The potential financial and patient harm implications of extra testing generated from CTC are a concern.

The impact of these issues can be tempered by having good quality information regarding the prevalence and type of ECFs, and by having guidelines/agreements in place as to how to categorise them and how to deal with them. There is heterogeneity in how different studies have reported ECFs, and particularly in relation to the definition of "significant", or "major" or "important" findings. These fall into two main groups; findings of direct clinical importance e.g. a probable cancer, or any finding that generates an extra investigation.

The Working Group for Virtual Colonoscopy has provided a sound base for addressing this with the publication of the CT Colonography Reporting and Data System (CRADS) in 2005,[2] which although developed for a screening population, have been applied to and adapted for use in symptomatic patients also. [4,5] The more recent "CT Colonography Standards, an International Collaboration," [6] published in 2010, has also contributed significantly to this process.

Our study is aligned along the CRADs definitions, although there may well be debate regarding specific categoratisation within each group. In the future, clearer guidelines may be available but this is a tricky area; because local practices may differ, availability of certain tests may differ, and patient "culture" in regard to acceptance of surveillance or active investigation may differ. Development of local guidelines may be a useful endeavour.

Data from multiple centres around the World has shown that extracolonic findings are present in at least half of the patients, and that there is an increased frequency in older patients,[7] and in studies using intravenous contrast and higher radiation dose techniques.[8] Symptomatic patients and females have also reported to have more ECFs.[9] Despite the heterogeneity of study designs, the rates of "significant" extracolonic findings that require further work up or alter management are generally in the range of 6-16%, although it has been reported at up to 25%, in a study using intravenous contrast. [10]

A recent Australian study of 258 symptomatic patients found significant ECFs in 8.9%. [11] An asymptomatic Australian cohort reported a rate of significant ECF in 7.4%. [12] These are both similar to our rate of 8.3%.

The majority of our E3 Group (probably benign but needs further work-up) were renal or hepatic or ovarian cysts that could not be clearly categorized as benign on the low dose CT, requiring only ultrasound follow up. However, a limitation of this study is that the cost estimates of these subsequent investigations has not been performed.

A recent USA study in a screening population of 2277 patients found a significant ECF rate of 11%, which generated extra cost of approximately $50 per patient. They detected 6 cases of colorectal cancer, and 6 cases of extracolonic malignancy. [13]

Our extracolonic potential malignancy detection rate of 1.8% (39/2152) is close to our colonic potential malignancy detection (C4) rate of 2.36%; particularly as we know that some of these are false positive due to pathology such as diverticular strictures, or the occasional polypoid mass that is benign. Further follow up work will be required to ascertain the true rate of extracolonic malignancy and the false positive C4 colon cancer rate in our cohort.

A study from the Netherlands looked a group of 398 symptomatic patients, and applied the CRADs classification.[5] They reported a rate of 7.5% of patients with C3-4 classification; i.e. with suspected colorectal cancer, polyps >10 mm or >2 polyps 6-9 mm. 8.3% were C2 (1-2 polyps 6–9 mm); for a total potential referral rate to OC of 15.8%. This may be due to the increased prevalence of disease in their entirely symptomatic cohort. They had a significant ECF rate of 15.6%.

An American study in a screening population reported 62/454 patients or 13.6% with at least one polyp >5 mm.[7]

In comparison to these studies, our polyp frequency is lower. This is of uncertain significance; potentially due to different population characteristics, or our detection rate may be lower. Comparison with other national data is awaited, and reassuringly our miss rate for colorectal cancer is well within the reported range, at 5.1%.[14]

This study is limited by its retrospective, descriptive nature; but it provides useful local data.

Conclusion

Our CTC population is largely symptomatic, and there is an acceptable referral rate from CTC to colonoscopy, surgery or surveillance of 10.7%. The 8.3% rate of potentially significant extracolonic findings is at the lower end of the reported international ranges, although in line with Australian data. Ongoing work will be required to assess the performance of CTC in our population.

Competing interests: None declared.

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Exploring Maori health worker perspectives on colorectal screening

Suzanne Pitama, Tami Cave, Tania Huria, Cameron Lacey, Jessica Cuddy, Frank Frizelle

Abstract

Aim To explore Maori health worker perspectives on colorectal screening and identify factors that may influence Maori participation in a colorectal screening programme.

Method Thirty Maori health workers were interviewed to explore their experience with screening programmes, knowledge of colorectal cancer and their perspective on a potential colorectal screening programme. Health workers shared their perspective informed by both their own whanau and whanau they encountered professionally through their health work.

Results Participants were largely positive about potential colorectal screening; however, various access barriers were identified. These included patient-clinician engagement and communication, lack of provision for patient's privacy during screening and patients feeling discouraged to take part in screening. Factors enabling screening included having an established relationship with their General Practitioner, screening clinicians taking time to build rapport, answer questions and share information, screening practices that were inclusive of Maori cultural norms and possessing high health literacy.

Conclusions Evidence points to growing disparity between the colorectal cancer incidence rates of Maori and non-Maori; disparities in colorectal cancer survival rates are already marked. Participants in the current pilot could provide valuable information to help ensure that the health education, promotion, and clinical practice surrounding a national colorectal screening programme are effective for Maori in reducing disparity and improving health outcomes.

In October 2011 Waitemata District Health Board launched a 4-year pilot colorectal screening programme using 2-yearly immunological faecal occult blood tests (FOBTi) followed by colonoscopy for positive results.

Approximately 2500 New Zealanders develop colorectal cancer and 1100 die from the disease each year,[1] making it one of our most deadly cancers. Historically, Maori have experienced lower incidence rates of colorectal cancer than non-Maori, however, the recent

CancerTrends report[2] shows rates for Maori are increasing, whilst those for non-Maori are trending downwards. Recent research has also broken down the 'survival gap' between Maori and non-Maori diagnosed with colorectal cancer.

Although Maori have been less likely to be diagnosed with colorectal cancer than non-Maori, Maori are significantly more likely to die from colon cancer than non-

Maori.[3,4] This 'survival gap' has usually been explained away to later stage of diagnosis, but a recent study by Hill et al[5] has shown patient comorbidity and markers of health-care access and quality to be each responsible for around one third of this 'survival gap'.

Maori access to screening programmes remains a concern, with significantly lower participation rates in breast and cervical screening than non-Maori as well as the national participation targets.[6] For national screening programmes to succeed, participation must be clearly linked to improved health outcomes. However, for Maori the screening programme must prove itself not only beneficial, but also appropriate and accessible.

Despite inequitable participation rates in the national breast and cervical cancer screening programmes, there has been little research specifically focussed on identifying participation barriers for Maori. Two qualitative studies have identified issues of inappropriate exposure as contributing to lower cervical screening rates for Maori.[6,7] In a similar vein, a recent study of cervical cancer health provider views [8] found that despite improvements in Maori cervical cancer outcomes, a dislike and lower level of acceptability of screening procedures were still influential deterrents to participation.

Crengle et al[9] reported on a successful drive by a local health provider to improve breast-screening uptake amongst Maori women. Increasing the local providers' personal involvement in enrolling women, assistance with transport and increased community engagement with the screening programme dramatically improved screening coverage.

In a study of anxiety before, during and after mammography, Brunton et al[10] found that Maori (and Pacific) women experienced significantly more anxiety about being diagnosed with breast cancer; a factor that may or may not affect screening participation.

This research provides a starting point for further research and discussion into factors both discouraging and enabling Maori participation in a potential national colorectal screening programme.

This qualitative study sought to explore Maori health worker perspectives on current screening programmes and identify factors that may affect access to colorectal screening.

Method

This study is part of a wider study ('Modeling of Disease and Cancer Outcomes in New Zealand') funded by the Health Research Council of New Zealand and approved by the Multi-regional Ethics Committee. This study focused on a solely Maori cohort, and their perspectives concerning screening, whereas a recently published arm of the wider study[11] reported on a solely European-origin cohort of New Zealanders.

Following consultation with Maori health providers the research team decided to utilise a snowballing technique[12] to recruit employees of Maori health providers as participants.

The community identified that Maori health workers could offer a broad commentary on both the screening pathway and the various barriers to participating in screening. Participants were asked to share their experience of screening programmes so far and to offer their thoughts about a potential colorectal screening programme. Participants were encouraged to discuss their own experiences as well as that of other Maori they had encountered in their role as health worker.

The interview process was inclusive of Kaupapa Maori research methodologies[13] by seeking to validate Maori experiences, beliefs and values. This process included the use of a Maori interviewer, appropriate cultural protocols of engagement, use of the Maori language[14] and asking affirming Maori-centric questions (i.e. from a non-deficit perspective).

A semi-structured interview schedule (the same was used with the Maori and non-Maori cohorts) guided interviews and covered: participants' perceptions of current screening programmes, their knowledge of colorectal cancer, their knowledge and opinions concerning colorectal screening processes, ideas around population screening and potential barriers to participating in colorectal screening.

All interviews were conducted face-to-face by a Maori researcher. Interviews were audio-taped and transcribed verbatim in their entirety. Interview duration was 30-60 minutes. Participants received a petrol voucher in recognition of their contribution. All participants gave their informed consent to participate. Qualitative data from the transcripts was analysed using content analysis.[15] This involved multiple readings of transcripts in order to identify and code emergent themes.

Results

Thirty participants were recruited from Auckland, Wellington, Christchurch and New Plymouth. Twenty-four participants were female and six were male. The age range was 40–66 years (which was reflective of the health worker cohort). All participants self-identified as Maori. None of the participants had been diagnosed with colorectal cancer although 9 had whanau who had been.

The analysis identified three core themes:

- Lessons learnt from other screening programmes,
- Experiences of colorectal screening, and
- The importance of cultural appropriateness along the colorectal screening pathway.

Lessons learnt from other screening programmes

Participants shared both their own screening experiences as well as those of their own whanau and whanau encountered professionally.

These experiences can be dichotomised into (1) barriers to participating in screening and/or to a positive screening experience and (2) factors increasing the likelihood of participating in screening and/or screening being a more positive experience.

The four key barriers are described below.

- The importance of an appropriate level of engagement between clinician and patient: Participants discussed the need for screening clinicians to develop a meaningful relationship with the patient before engaging in the screening protocols. This included understanding the person's journey through the health system (including negative experiences), their fears about the outcome of the screening and providing the person with relevant information about themselves (including their qualifications and experience within the screening service).
- The impact of quality communication within the consultation: Whanau had raised concerns with Maori health workers about being rushed during screening consultations which led to feeling disempowered and not fully

informed about screening protocols and result dissemination. The screening environment also became negative if clinical staff used the time to lecture the patient on other health matters.

> "…and a lot of our Maori are frightened to ask questions…so they sit and they hear all these flash words and it can be quite intimidating…they fear that if they ask a question it will be considered a dumb question…So a lot of our people do sit there in a real whakama state [withdrawn] about even, you know, asking simple questions."
>
> (P29, male, age 48)

- Failure to preserve modesty and respond to patient discomfort within the screening environment: Participants commented that in the Maori communities they serviced patients were concerned about the expectation that they should feel comfortable naked (or partially) without adequate discussion or provision for some measure of modesty.

> "…they're quite invasive…it's kind of like delivering a baby to a certain extent …your modesty goes out the window. You're kind of all exposed…there's that amount of vulnerability around screening."
>
> (P2, female, age 43)

- Barriers to accessing a referral: Whanau also discussed with Maori health workers incidences where they had known they qualified for a screening programme, but were discouraged by a health professional from accessing it. This had led them to feel they were denied access to services on the basis of their ethnicity. This comment from a participant with a strong family history of cancer, including colorectal cancer, requested screening illustrates this barrier:

> "…he checked the records and checked what it says about screening, and said, "Oh, I don't think that you would actually qualify for this."
>
> (P12, female, age 69)

Key factors in ensuring screening access included the following:

- An established relationship with their primary care clinician (doctor, nurse or other clinician): Overwhelmingly the stories/experiences of participants and the wider Maori community included that if they trusted and had a positive relationship with their general practitioner, and they asked them to be part of a screening programme that they would participate. Participant comments revealed that general practitioners, as the trusted health advocate of their patient, had the ability to reduce patient anxiety. When asked whether they would participate in colorectal screening if asked by their GP, the following comment is illustrative of the importance of a positive relationship:

> "…the GP that I used to have, no, I'd say no straight out, but this GP that I have now, she's excellent 'cause I feel she cares."
>
> (P3, female, age 41)

- The importance of including cultural norms within the screening environment: Participants noted that many patients (and their whanau) were impressed when they attended a screening clinic to find Maori beliefs and values were intrinsic to service delivery; they were treated with respect, Maori staff were present, a blanket or sheet (for covering themselves) was offered and that staff appeared

relaxed and not in a hurry. These experiences occurred in mainstream and Maori-specific services.

> "…they'd offer a Maori cloak for women that are whakama [withdrawn]… so that when I go and have my mammogram screening that just makes me feel a little bit more comfortable."
>
> (P18, female, age 54)

One participant discussed attending the same Maori health provider for screening as her whanau and friends and the reasons that they feel satisfied with this provider, and return there for regular screening:

> "I suppose it's private, you know, you're in the room, as Maori, as we do, we talk over a cup of tea, coffee, kai, you know…It's just the whole accommodating as us, how we're used to, how we are laid-back, relaxed, that kind of environment…So no, it's really good, and getting to know the people who work there, and also it's after hours."
>
> (P27, female, age 42)

- Empowerment of client encouraged: Experiences where clinicians had built an appropriate rapport with the patient, explained the procedure (without jargon) and sought a discussion with the patient made patients feel that there was an equal power sharing opportunity. In this environment Maori patients felt more confident to ask questions that were of concern to them in regards to both the procedure and the next steps in the process.

  > "I have found that with the support of our GP the process [breast screening] has been very, very good…with the cervical screening, it's something that my GP's nurse actually does and she does it very well. She makes me feel comfortable and so I have no qualms about going back…"
  >
  > (P10, female, age 54)

- Health literacy skills: Maori health workers discussed that because they were familiar with the health system it allowed them navigate a health consultation, and in turn use skills to support their clients/whanau through health services. In the quotation below, a participant talks about the important role that health workers can play in supporting Maori in unfamiliar health situations:

  > "…and whanau's great [to provide support], but sometimes it needs to be someone that's actually a bit clinical or…a health person…so that they can awhi [support] the person, but then talk to the clinical if required."
  >
  > (P11, female, age 46)

  However, there was concern from participants that in their absence, many patients (and their whanau) who may not have yet developed these skills would not feel comfortable advocating for themselves. They perceived health literacy as not just having the right information, but the ability to use that information to advocate for health services.

  > "…when you go to them…the doctor, specialist or something, a lot of it has to do with the ability to actually interact with them before you go, and have the ability to ask the right questions…that you get the right answers and the right information."
  >
  > (P17, male, age 58)

Participants' experiences along the colorectal screening pathway

Nine participants had experiences of their whanau members being diagnosed with colorectal cancer and two others had experience of the colonoscopy procedure. The participant group also noted that some of their former patients had undergone colorectal screening or had been diagnosed with colorectal cancer.

Stories of feeling disempowered through the immodesty of the procedure (and its lack of reorganisation to be patient-centred), disappointment that medical jargon reinforced unequal power relationships and inability to access screening when initially requested were again echoed by participants (on behalf of themselves, their patients and their whanau). These feelings seem to mirror those experienced within other screening programmes.

> "They're not going to talk to you in a language that you understand. Like up on the wards…and the doctors say, "Well, you've got blah blah blah," double speak medical jargon, blah blah blah. And I've watched the Maori patients and their families, they're, "Oh yeah, cool, yeah, that's good." As soon as they've gone, I'll go back and I'll say, "Did you understand that?" "No."
>
> (P18, female, age 54)

Maori health workers expressed feeling frustrated at the lack of available health promotion/education material on colorectal cancer, its symptoms, epidemiology and incident rates among Maori. They reported having to resort to seeking information via internet search engines at times. They noted that if they were to advocate for colorectal screening they would need appropriate health literature so they could support whanau to understand not only the screening process but also the potential outcomes (including the requirement for further clinical investigations) and prognosis.

> "I kick around in the Maori health area a lot and I haven't actually seen anything…like any pamphlets or any information at…it's not there in your face like other stuff…"
>
> (P14, male, age 60)

Whanau experiences presented a range of concerns for participants, because some whanau were unaware that their presenting symptoms were related to colorectal cancer, whilst others had no apparent symptoms but were later diagnosed with colorectal cancer. Participants advocated for the differing pathways to both detection and treatment of colorectal cancer to be clarified through health education and promotion. Participants noted that a being presented with a range of patient experiences with colorectal cancer might better help the Maori community understand its varying presentations and impacts.

There was concern amongst the participants that they would also need to develop a specific Maori male approach to assist this cohort, who has had less exposure to screening programmes. The lack of familiarity and positive experiences of other screening programmes was seen as potential barrier for Maori males in addition to reluctance to engage with health services.

> "My wife…talks about health issues. She talks about the wellbeing of our mokopuna [grandchildren]. It's just easy, whereas men, we just don't, that's not part of our conversation that we have."
>
> (P29, male, age 55)

The need for a culturally appropriate approach

Participants identified that often within their own, their whanau and their patients' interactions with the health system it was difficult at times to differentiate between barriers of cultural difference and communication (and those situations in which both barriers existed).

Participants were unequivocal that there was a need for screening clinicians to develop cultural competence specific to working with Maori. This could involve learning culturally appropriate engagement protocols, understanding how to use Maori concepts (tapu/noa) and language within a consultation, as well as learning how to create an environment that reduces power inequalities and in doing so fosters more meaningful interaction between patients and clinicians in a setting where patients are able to feel more at ease. Participants felt that developing this competence would result in higher levels of satisfaction between the Maori community and screening clinicians.

> "Getting them back for repeats [screening] might be quite difficult…it will depend on how well the service provider makes people feel comfortable and understands what they're doing and looks after them well, and they come out of there thinking, "Well I just had a really horrible thing done, but I'm okay and I feel good about it."
>
> (P9, female, age 45)

Specifically when the procedures involved in colorectal screening were explained, including the need for a patient to collect their own faeces sample for a FOBT, participants anticipated that Maori would feel generally comfortable with the process. They expected that because this screening procedure could take place in one's own home, it would reduce the number of access barriers for Maori.

> "Simple to do it yourself, I like that…you know, just being Maori, we seem to focus on that, if we can do it ourselves, we'll do it. I'd rather that than let somebody else do it."
>
> (P23, female, age 49)

Discussion

This research highlights four specific points that may be usefully applied to the Waitemata District Heath Board's colorectal screening pilot and national screening programme that may follow.

Firstly, the role of primary health care providers is pivotal in engaging Maori in the colorectal screening programme. Two key factors will influence programme uptake:

- Primary care clinicians need to have a positive relationship with their Maori patients (which seemed to be defined by participants as when they demonstrated competence in working with Maori), and
- Primary care clinicians see value in the screening programme (given that clinicians had deterred some participants and people known to participants from engaging in other diagnostic procedures/screening programmes).

Secondly, training should be undertaken with screening staff to increase their competencies in working alongside Maori.

The findings also identify the need for screening clinics to ensure:

- Appropriate time is allocated to each patient to reduce anxieties,
- Patients are provided opportunities for further discussion, and
- Patients are supported and feel valued within the screening environment.

It is interesting to note that participants were clear about what improvements needed to be made to current screening programmes; improvements which could be usefully applied to colorectal screening. This would include culturally appropriate engagement strategies,[16] use of te reo,[17] ability to deconstruct power relationships and the inclusion of a sheet/blanket during screening.

Thirdly, the dearth of colorectal cancer health promotion and health education information is a barrier to both the Maori health providers and clients/whanau in engaging in a colorectal screening programme. This finding is consistent with other research which has explored barriers to screening uptake.[18]

The participants' commentaries about their lack of knowledge about colorectal cancer and screening are particularly noteworthy given that these participants worked in health settings. It would seem a targeted health education and promotion campaign would be required to put colorectal cancer on the Maori health map. Attempts to implement screening prior to successful awareness raising may lead to false conclusions that the Maori community isn't interested in colorectal screening, where perhaps the reality will be that it has not yet been established as a health priority for Maori.

Lastly, there is already a role within the Maori community for Maori health workers as screening advocates. Their experience with other screening programmes could be used in developing health education and promotion materials for the colorectal screening programme. The support role that Maori health workers could play for Maori taking part in colorectal screening could benefit people directly by making them more comfortable in the screening environment, but could also be an avenue for generating feedback to further improve screening accessibility generally.

This research has two main limitations. Firstly, the cohort were actively engaged in the health system, and therefore although they offered a broader narrative than their own experiences, further concerns may have been raised by those who do not access current health services and/or screening programmes. However, the ability of the participants to draw on collective experiences from their community is also a strength in this study, as it allowed for a more in depth discussion of the range of opinions within the wider Maori community based on their experiences as whanau members and then as health workers.

Secondly, no one within this participant cohort had experienced colorectal cancer themselves (although nine had whanau who had been affected). Therefore there is an opportunity for the Waitemata pilot screening programme to explore from a qualitative perspective the experiences of Maori (and non-Maori) who participate in the screening programme to determine whether their experiences of this programme match the perceptions of this participant cohort.

Conclusion

Recent evidence[5] identifies that any future colorectal screening programme needs to ensure equitable access to screening and follow-up treatment for Maori. This research suggests that with specific targeted engagement by general practitioners, and with increased clarity on how screening clinicians can work with Maori participants to promote a positive screening environment it is likely that Maori communities will benefit from colorectal screening. However, it is important that the pilot programme takes the opportunity to test materials with and explore the perspectives of Maori who take part in the pilot.

The valuable feedback of Maori participants may help to further refine the screening programme before it is rolled out nationally. There is a significant risk that failure to tailor screening promotion, processes and materials will negatively impact Maori access to screening and in doing so negatively impact on health outcomes and whanau ora.

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Colonoscopy requirements of population screening for colorectal cancer in New Zealand

Terri Green, Ann Richardson, Susan Parry

Abstract

Aim To estimate the colonoscopy burden of introducing population screening for colorectal cancer in New Zealand.

Methods Screening for colorectal cancer using biennial immunochemical faecal occult blood tests offered to people aged 50–74 years of age was modelled using population estimates from Statistics New Zealand for 2011–2031. Modelling to determine colonoscopy requirements was based on participation and test positivity rates from published results of screening programmes. Estimates of the number of procedures required for ongoing adenoma surveillance were calculated using screening literature results of adenoma yield, and New Zealand Guidelines for Adenoma Surveillance. Sensitivity analysis was undertaken on key parameters.

Results For a test positivity of 6.4%, biennial screening using immunochemical faecal occult blood testing with a 60% participation rate, would require 18,000 colonoscopies nationally, increasing to 28,000 by 2031. The majority of procedures are direct referrals from a positive FOBT, with surveillance colonoscopy numbers building over time.

Conclusion Colonoscopy requirements for immunochemical faecal occult blood based population screening for colorectal cancer are high. Significant expansion of services is required and careful management of surveillance procedures to ensure timely delivery of initial colonoscopies whilst maintaining symptomatic services. A model re-run informed by data from the screening pilot will allow improved estimates for the New Zealand setting.

Colorectal cancer is the second most common cause of cancer registration (2,801 registrations in 2008, accounting for 14% of all cancer registrations) and the second most common cause of cancer death (1280 deaths in 2008, accounting for 15% of all deaths from cancer) in New Zealand. Age-standardised colorectal cancer incidence rates are lower for Māori than for non-Māori, and for females than for males.[1]

The risk of colorectal cancer increases with age, and 90% of all cases diagnosed are in people aged 50 years or over.[1] Although colorectal cancer (CRC) incidence overall is forecast to decline in New Zealand, the absolute number of people with CRC is expected to increase, because the effects of growth and ageing of the population will more than offset the decline in incidence.[2]

CRC mortality rates overall have also been declining, and this decline is forecast to continue[2] but Māori CRC mortality rates have increased between 1980 and 1999[3] so that Māori and non-Māori rates are comparable currently. If these trends continue,

CRC mortality rates among Māori will exceed non-Māori rates, with disparities increasing over time.[4]

CRC Mortality is higher in New Zealand than Australia and most other countries.[5,6] It is suggested that this is partly due to the higher incidence of CRC in New Zealand but that it may also reflect poorer survival after diagnosis in NZ than Australia.[5]

Most colorectal cancers begin as adenomatous polyps, with progression to cancer taking at least 5–10 years. This means that detection at an early stage is possible. Treatment at an early stage is associated with a better prognosis than treatment at a later stage, but this is dependent on health services being able to offer timely and appropriate treatment.[7-9]

Screening for CRC involves testing asymptomatic people to identify those likely to have CRC. The most commonly used screening test is the faecal occult blood test (FOBT), which requires people to put stool samples on a card and send it to a laboratory to be tested for the presence of blood.

People with positive tests are offered colonoscopy to see if they have CRC. Screening with a particular type of FOBT, guaiac FOBT, has been shown in randomised controlled trials (RCTs) to reduce CRC mortality by about 15%.[10,11]

In 1997 the New Zealand National Health Committee convened a working party to consider population screening for CRC in New Zealand. This working party did not recommend population screening because of "the modest potential benefit, the considerable commitment of health sector resources, and the small but real potential for harm".[12,13]

In 2005 the National Screening Unit of the Ministry of Health convened an advisory group to revisit the issue of CRC screening, since it had been several years since the previous report. There were also new results from pilot programmes in the United Kingdom and Australia, and papers reporting longer follow up from the randomised controlled trials of CRC screening.

The advisory group recommended that a feasibility study of CRC screening using immunochemical faecal occult blood tests (FOBTi) be considered and planning initiated.[14]

The FOBTi test is not definitive and those with a positive test result need to be referred for colonoscopy for a confirmatory diagnosis. There is an ethical obligation to deliver this initial colonoscopy in a timely manner.

The advisory group regarded a feasibility study as an essential pre-requisite to any decision about screening in New Zealand in part because existing colonoscopy capacity was insufficient to consistently deliver, across the country, timely diagnostic colonoscopy for those with symptoms, or timely surveillance procedures for those at increased risk of CRC. This was in the absence of the additional demand that would be generated by a screening programme. Concern about colonoscopy capacity has continued to be raised.[15,16]

A pilot bowel screening programme was launched in the Waitemata District Health Board region, in October 2011. The pilot programme offers two-yearly FOBTi to eligible people aged 50–74 years, and will run for 4 years. This paper focuses on the

requirements for colonoscopy, should a national screening programme be introduced, with FOBTi as the screening test. It includes both the initial 'referral' colonoscopy following a positive FOBTi test, and surveillance colonoscopy arising from adenomas found at the initial colonoscopy.

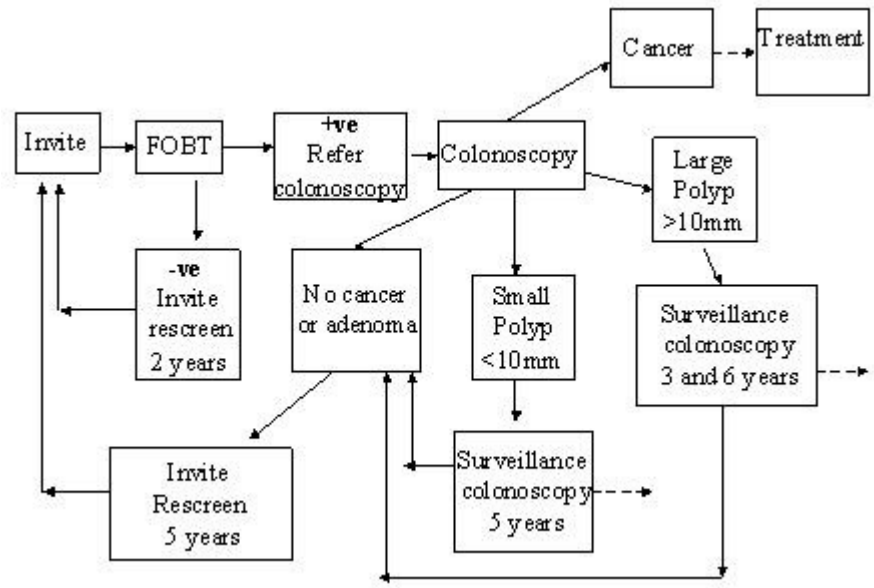
Methods

Study design—Estimates of the New Zealand Population, base 2006, were obtained for the years 2011 to 2031. [17] Series 5 population projections, based on medium fertility and life expectancy, was used in the modelling. The estimated population aged 50–74 was 1.118 million in 2011 and 1.435 million in 2031.

FOBTi-based biennial screening of those aged 50–74 years, excluding those assumed to have already been diagnosed with colorectal cancer, was modelled following a Markov process. This involves patients moving from one 'stage' (e.g. being invited to screen) to another 'stage' (e.g. participating in screening) according to various probabilities. For example it was assumed that 60% of people would 'move' from being invited to being screened.

The stages included: the invitation to screen, the initial screen, referral to colonoscopy, uptake of colonoscopy, outcome of colonoscopy, adenoma surveillance and invitation to rescreen with FOBTi after 2 years, or after 5 years for those who had had a colonoscopy but no cancer or adenoma had been found (see Figure 1). This process was started in 2011 and stopped after 2031.

Figure 1. Faecal occult blood tests (FOBT) screening diagram



The model assumed that the initial screening would be spread over the first 2 years of the programme. Thus half the population aged 50-74 were eligible for screening in year 1; the remainder became eligible in year 2 except for those who had 'aged out' (became 75) or had died. Those who had 'aged into' the eligible age range (turned 50) in year 2 also became eligible for screening. For subsequent years the model allowed for 'aging in' and 'aging out'.

Surveillance colonoscopy of large adenomas (>10mm) was at 3 and 6 years, and was at 5 years for small adenomas. Surveillance beyond this was not modelled. The 2004 NZ Guidelines on which these surveillance parameters were initially based, recommended the first surveillance colonoscopy be

performed at 3 years for those with adenomas size >10 mm and those with greater than three adenomas.

The next surveillance procedure was recommended at 3–5 years if the colonoscopy was negative.[18] It was recognised that in practice a proportion of patients with large adenomas would have the second surveillance procedure at 5 years rather than 3 years, but on the other hand others following removal of a large adenoma with advanced histology, would have surveillance colonoscopy performed at one and 3 years, as had been recommended in the recently released NZ Guidelines.

To model surveillance procedures at 3 and 6 years following detection of a large adenoma, and to not model for surveillance beyond 6 years (which would certainly be required for a significant proportion) was considered to best reflect the range of surveillance scenarios that could result from the detection of large adenomas at the initial colonoscopy. Those undergoing surveillance were returned to FOBTi screening 5 years after their last normal colonoscopy.

The numbers of colonoscopies required each year, in total and separately for the initial referral and for adenoma surveillance, were calculated.

Base case scenario—For the base case, FOBTi test positivity was assumed to be 6.4% for the initial screen based on the Calvados, France FOBTi trial, [19] which screened people aged 50–74. Positivity for re-screening was not available and was estimated at 4.8% by assuming the same proportion of initial screen positivity (75%), as occurred in the Italian (Florence) FOBTi trial. [20] [The positivities in that trial for first and repeat screens were 4.4% and 3.3%.]

Uptake of FOBTi screening was assumed to be 60% based on the Nottingham RCT for guiac based FOBT[10] and uptake of referral colonoscopy was taken at 85%,[19] and was assumed to be 100% for surveillance. Yield of large adenomas (over 10mm) at colonoscopy was assumed to be 24%, and 20% for small adenomas.[19]

Alternative scenarios—The model was also run with 4% and 8% FOBTi positivity rates, and 70% FOBTi screening participation rate. A further model run was undertaken for the base case scenario, but with 90% participation in surveillance colonoscopy.

Results

For a FOBTi positivity rate of 6.4%, in the first year of a programme (2011), a total of 18000 colonoscopies are required, building up to 27000 by year 7, and reaching 28000 after 20 years (year 2031) (see Figure 2).

As expected, there will be a high need for colonoscopy in the first 2 years, for the prevalence round, following the first screen (18,000 in year 1 and over 19,000 in year 2).

Figure 2. Total colonoscopies for biennial FOBTi screening 2011-2031

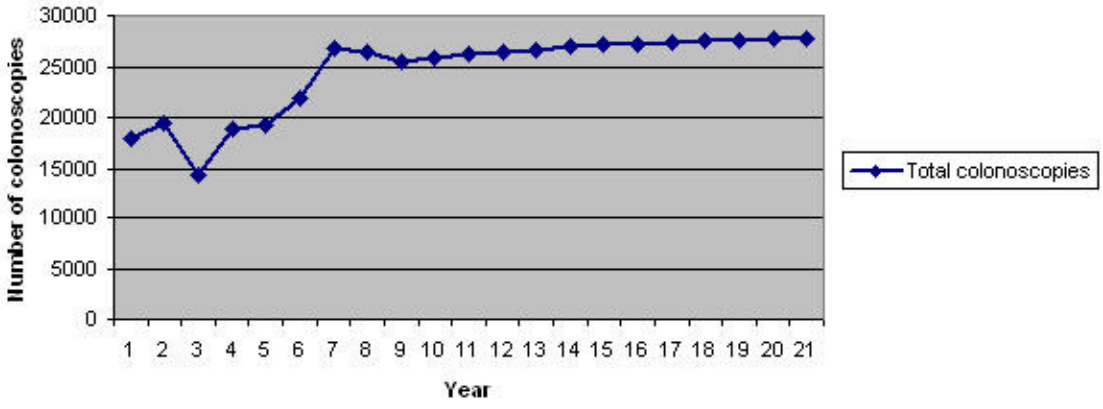
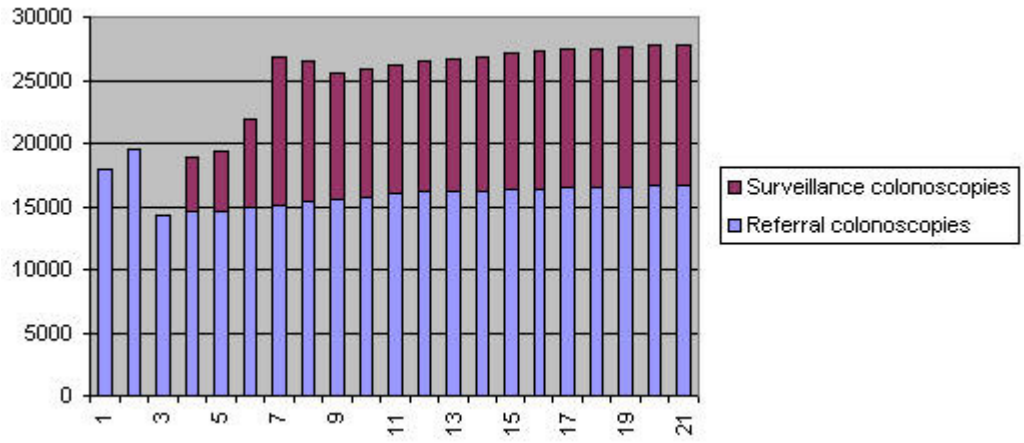
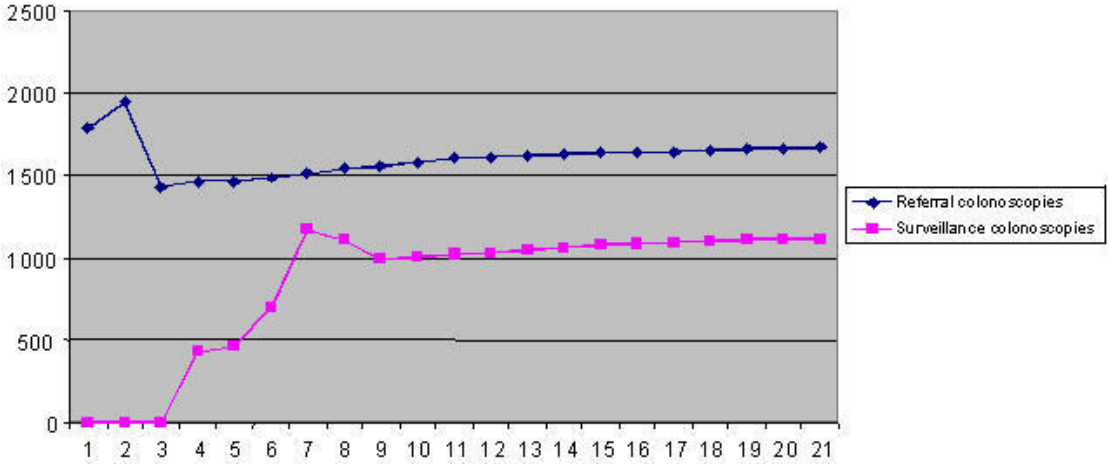


Figure 3. FOBTi screening: referral and surveillance colonoscopy 2011-2031



Total colonoscopies are made up of 'referral colonoscopies' (the first colonoscopy following a positive FOBTi) and surveillance colonoscopies to follow up adenomas found (see Figure 3). Once the prevalence round has passed, 'referral' colonoscopies, drop to 14000 and then show steady growth tracking the increase in the population, reaching 17000 after 20 years (see Figure 4).

Figure 4. FOBTi screening: Build up of referral and surveillance colonoscopy 2011-2031

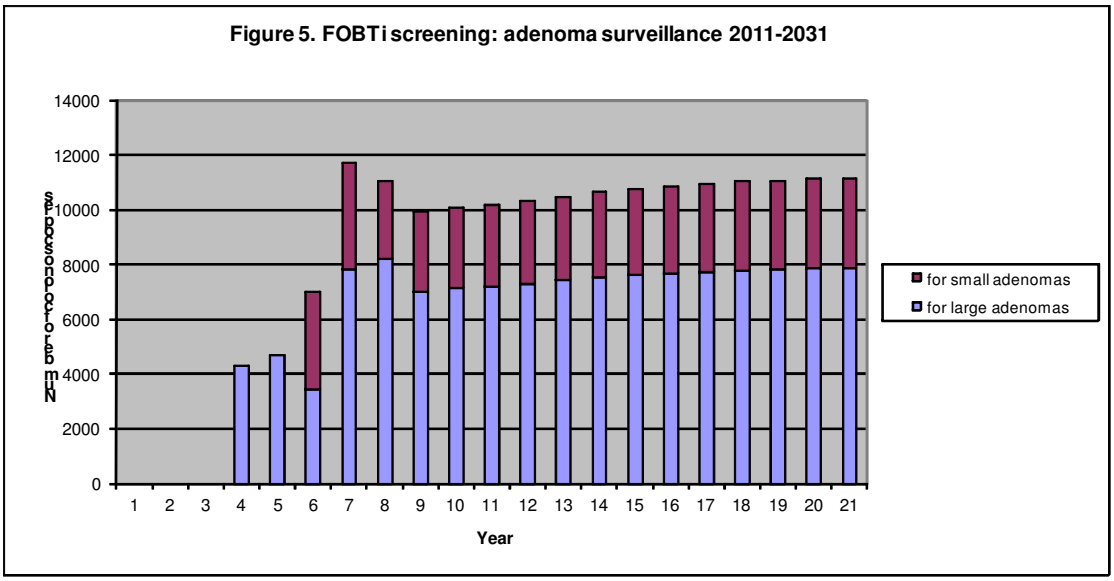


There were four outcomes of the referral colonoscopy: firstly those people found to have cancer, who were not modelled further; secondly and thirdly those with large or small adenomas, who were followed up with surveillance colonoscopy; fourthly those who had neither adenomas nor cancer, who were returned to be re-screened after 5

years. Just over half of the referral colonoscopies (i.e. 9000) would find neither adenomas nor cancer.

Adenomas were found in approximately 7000 people each year; 55% would have large adenomas and 45% small adenomas. Those with adenomas were referred for surveillance colonoscopy. Surveillance starts at year 4 of the programme requiring 4000 colonoscopies, and builds up to over 11,000 colonoscopies each year, by year 7 (Figure 4); 71% of these are for surveillance of large adenomas, with the remainder for small adenomas (see Figure 5).

Figure 5. FOBTi screening: colonoscopy for surveillance of large and small adenomas



Sensitivity analysis—Table 1 shows results for different values of the FOBTi positivity rate, and screening participation. The number of colonoscopies is shown for year 1 of the programme and for year 7 (corresponding to years 2011 to 2017). This spans the period corresponding to the sharp rise in demand for colonoscopy services, which must be planned for. After year 7, yearly demand increases, but at a much lower rate.

The most important parameter is the positivity of the FOBTi test, since this determines the volume of referral colonoscopies. Reducing positivity for the first screen to 4%, and 3% for subsequent screens, resulted in 11,000 colonoscopies in year 1 increasing to 17,000 by year 7. Increasing the positivity to 8% and 6% respectively for first and subsequent screens, increased these values to 22,000 in year 1, and 33,000 in year 7.

The positivity rate determines both the number of cancers and adenomas found. Higher positivity brings greater benefit, but increases the number of colonoscopies required.

If participation in the FOBTi screening test increased from 60% to 70%, and assuming other parameters were as for the base case scenario (including FOBTi test positivity of 6.4%) the number of colonoscopies required in year 7 would be 31,000.

All values in Table 1 assume 85% compliance with the referral colonoscopy, following a positive FOBTi, and 100% compliance with surveillance colonoscopy. If participation in surveillance colonoscopy is reduced to 90%, and assuming all other parameters are as for the base case scenario, then total colonoscopies in year 7 reduce to 25,600. This includes 10,500 for surveillance.

Table 1. Sensitivity analysis - Colonoscopy requirements (year 1 and year 7)

Variables	**4% positivity**		**6.4% positivity**		**8% positivity**	
60% participation	**year 1**	**year 7**	**year 1**	**year 7**	**year 1**	**year 7**
Referral colonoscopy	11,000	10,000	18,000	15,000	22,000	19,000
Surveillance – large adenomas	0	5000	0	8000	0	10,000
Surveillance – small adenomas	0	2000	0	4000	0	5000
Total	**11,000**	**17,000**	**18,000**	**27,000**	**22,000**	**33,000**
70% participation	**year 1**	**year 7**	**year 1**	**year 7**	**year 1**	**year 7**
Referral colonoscopy	13,000	11,000	21,000	18,000	26,000	22,000
Surveillance – large adenomas	0	6000	0	9000	0	11,000
Surveillance – small adenomas	0	3000	0	5000	0	6000
Total	**13,000**	**20,000**	**21,000**	**31,000**	**26,000**	**39,000**

Discussion

The benefit of a national screening programme for colorectal cancer are achieved by detecting early stage CRC at colonoscopy performed as follow-up to a positive FOBTi. However, at the initial referral colonoscopy over 40% of people will be found to have adenomas, which, according to current NZ guidelines, require ongoing colonoscopic surveillance. There is an ethical obligation for the initial confirmatory procedure and subsequent surveillance procedures to be delivered in a timely manner.

The results show that the requirement for colonoscopy following the introduction of a national screening programme is substantial. In the first few years of a programme, most of the requirement for colonoscopy is for the initial referral after a positive FOBTi, but by year 7, surveillance colonoscopies will have built up and are estimated to account for 44% of the total. Approximately 70% of this adenoma surveillance would be for large adenomas, and 30% for small adenomas.

Colonoscopy capacity needs to expand to meet this demand. A survey[21] commissioned for the 2006 Advisory group found that capacity had increased since the 1998 working group report, but was still insufficient to consistently deliver, across the country, timely diagnostic colonoscopy for those with symptoms or timely surveillance procedures for those at increased risk of CRC. This was in the absence of the additional demand that would be generated by a screening programme. The estimates in this paper provide information on requirements under various scenarios, to support capacity planning.

There are a number of limitations to our study. The rates of adenoma yield were assumed constant over the screening age band (50–74 years). Yet adenoma prevalence increases with age (leading to a higher yield for older people screened.[22,23] On the other hand, participation, which may decline with age, was also assumed constant. Thus there may be some compensating effect of these two assumptions. Moreover the parameters used in the modelling were themselves averages across age bands, and therefore appropriate to generate total colonoscopies for the age band screened.

An important issue is the appropriateness of using parameters based on overseas populations, when modelling the New Zealand population. This applies to participation in screening, including for gender and ethnicity subgroups. At present there is no information on the uptake of FOBTi screening in New Zealand. It is anticipated that 60% of eligible people will participate in the Waitemata pilot bowel screening programme. This pilot programme started in October 2011.

Adenoma yield in New Zealand may also differ from that of overseas populations. A study of 2,842 people undergoing colonoscopy in Auckland, excluding those with indications associated with high or low adenoma prevalence[24] found that the prevalence of histologically proven adenomas among 40–59 year olds was 8.7% for Maori and 16.7% for non-Maori.

Surveillance of large adenomas after 6 years was not included in the modelling. To model surveillance procedures at three and 6 years following detection of a large adenoma, and to not model for surveillance beyond 6 years, was considered to best reflect the range of surveillance scenarios (as described in the methods section) that could result from the detection of large adenomas at the initial colonoscopy. However, discovery of further adenomas (at 3 or 6 years) would initiate a further sequence of surveillance for a proportion of individuals and thus the results presented here could potentially be conservative.

But this underestimation may compensate for the overestimation due to the assumption of 100% compliance in surveillance assumed for the base case scenario, when in fact compliance with surveillance colonoscopy may decline with age as a consequence of comorbid health conditions. Reducing participation in surveillance colonoscopy to 90% provides a further estimate of the colonoscopy burden, with surveillance procedures now 41% of the total.

This modelling has used parameter values from overseas studies. The actual number of colonoscopies required for a national screening programme in New Zealand, will depend on the participation for the initial screen and then compliance with the first colonoscopy and subsequent surveillance colonoscopy. The sensitivity analysis provides some estimates of possible colonoscopy volumes with various parameter values.

The pilot bowel screening programme in Waitemata DHB region should provide New Zealand specific information on many of the parameters assumed for this modelling, and the model could be run again to generate new estimates.

The number of colonoscopies also depends on adenoma surveillance protocols and practice. The modelling was consistent with existent NZ guidelines on adenoma surveillance but updated guidelines have recently been released advocating an additional surveillance procedure at a year for individuals with high risk adenomas.[18]

This would further add to the surveillance burden. Current practice may also vary around these guidelines with a consequent effect on total surveillance colonoscopies.

Lack of adequate colonoscopy capacity to meet both the (new) demand from a screening programme and the (existing) demand for people with symptoms or at high risk runs the risk of compromising both demand streams. Concern about meeting demand for colonoscopy has been expressed in other countries, in Ireland which is planning the introduction of a screening programme, [25] and in England, which established a pilot study in 2000 and began national roll-out in 2006.

Research on the second round of screening in the English pilot study reported, in relation to staff in endoscopy units, that "managing screening-generated surveillance colonoscopies in a timely manner while meeting diagnostic work (both Pilot and non-Pilot) was challenging". [26]

Planning for a national screening programme in New Zealand needs to take account of capacity requirements for surveillance colonoscopy, as well as for the initial referral colonoscopy.

Surveillance colonoscopy need to be carefully managed and guidelines for surveillance of low risk adenomas scrutinised to ensure that the burden of colonoscopic surveillance following detection of adenomas does not lead to unacceptable waiting times for the initial referral colonoscopy or for procedures required for people with symptoms.

Conclusion

Realising the benefits of a national screening programme for colorectal cancer, using the immunochemical faecal occult blood based screening test (FOBTi) requires provision of timely colonoscopy, for a confirmatory diagnosis of CRC.

Total colonoscopy requirements of a screening programme, including for adenoma surveillance are high and expansion of colonoscopy services is required to meet this demand without compromising services for people with symptoms. The demand depends on the positivity setting of the test. Higher positivity will give a higher cancer yield but will require more referral colonoscopies to detect CRC and for subsequent adenoma surveillance.

Surveillance following adenoma detection accounts for a significant proportion of screening colonoscopies and needs to be carefully managed so that it does not compromise the delivery of timely diagnostic colonoscopy for people with symptoms or timely initial colonoscopy following a positive FOBTi as part of a population CRC screening programme.

Colonoscopy volumes also depend on screening participation rates and adenoma yield. When data becomes available from the pilot study, the model can be rerun to give estimates more representative of the New Zealand setting and population.

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THE NEW ZEALAND MEDICAL JOURNAL
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Anal pain: think about foreign body in the rectum

Samad Shams Vahdati, Saeed Alizadeh Shahri, Paria Habibollahi, Sepideh Lotfi Sadigh

Clinical—A 69-year-old man—whose chief complaints were weakness, anxiety and anal pain—came to the Emergency Department of Sina Hospital in Iran. While the attending doctor was taking the history of the patient, the patient mentioned that he had slipped in the bathroom. In the physical examination there was distension in the hypogastric region of the abdomen and during deep palpation a rigid and blunt-shaped body was noticed.

Because of pain in the anal area, a rectal examination was performed and a firm foreign body was found 5 cm inside the rectum. Significant discharge without bleeding was detected; a radiologic evaluation using X-rays revealed radiolucent material in the rectum facing the anterior abdominal wall (Figure 1 and Figure 2).

Figure 1. Anteroposterior view of abdominal X-ray in erect position

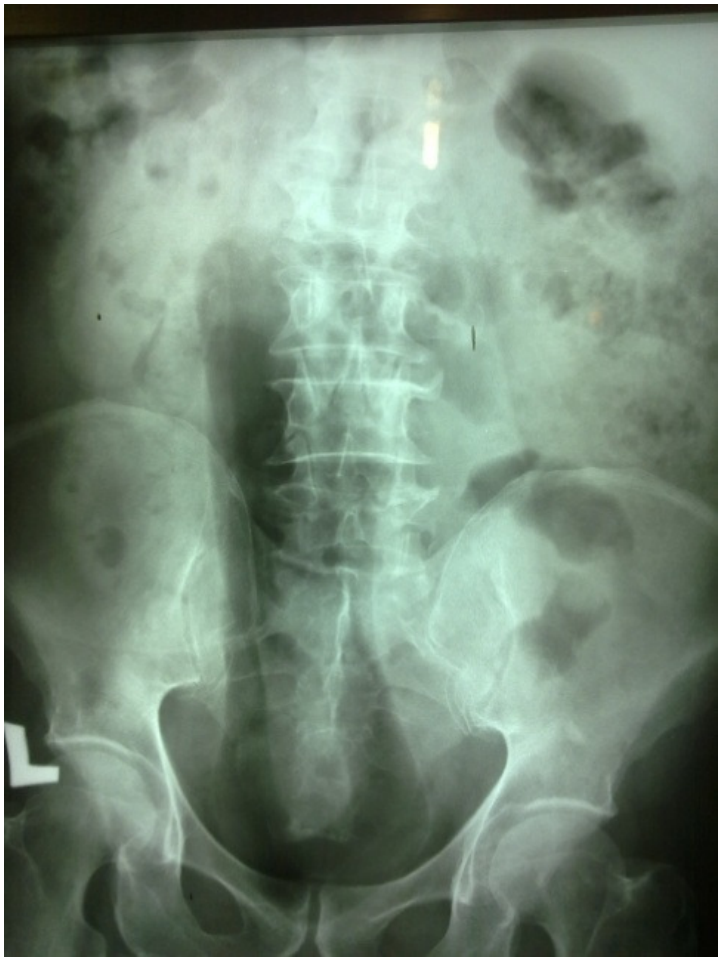
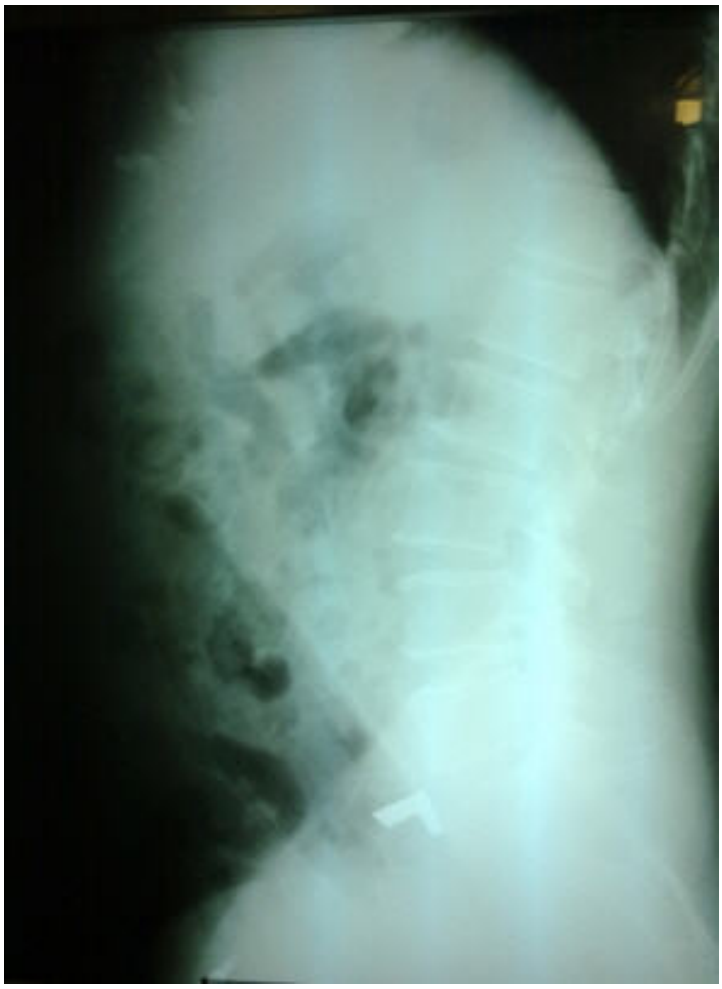


Figure 2. Lateral view of abdominal X ray in erect position

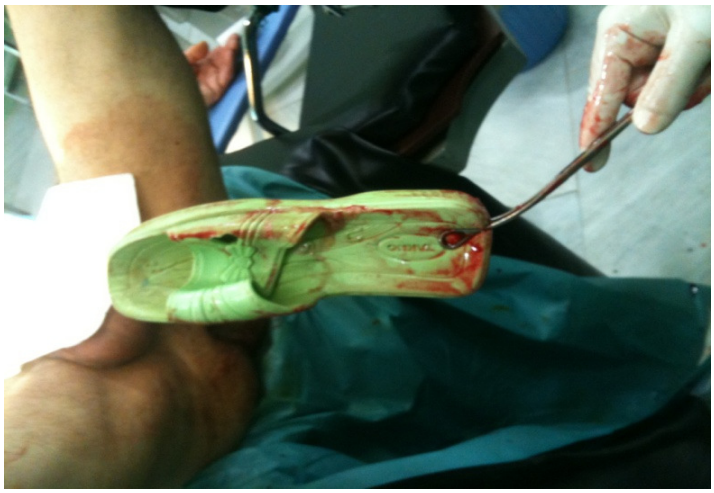


After sedation the foreign body was removed with manoeuvres using a speculum and Magill forcep.

The foreign body was a foam slipper; because it was saturated and bloated, it was very difficult to remove (Figure 3).

No procedure-related complications occurred and the patient was discharged 24 hours after his operation.

Figure 3. Foam slipper following its removal from the rectum



Discussion—Reports of patients with anorectal foreign bodies reveal a wide range of ages, occupations, and socioeconomic situations but the majority of patients are men in their 30s and 40s.[1,2]

Patient are admitted into emergency departments with anorectal foreign bodies of various shapes and sizes such as a teacup, bottle, stone, bone, or vibrator,[3–5] The majority of these patients are homosexual men in their 30s and 40s,[5] but in this case the patient is an elderly man.

Generally, anorectal foreign bodies are shaped similar to the rectal space; they are mostly of cylindrical shape for sexual or medical purposes[3] but in this case the shape of the foreign body suggests it was not for sexual satisfaction.

In previous reports[5] the foreign bodies were mostly radio-opaque but in this case the radiological evaluation revealed radiolucent material in the rectum. One more similar case has been reported.[3]

Presentation with anorectal foreign body is usually delayed because of the patient's embarrassment. The keys to sufficient care for these patients are respect for their privacy as well as evaluation of the type and location of the foreign body using rectal examination.

Foreign body removal can be performed in the emergency department with procedural anaesthesia.

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THE NEW ZEALAND MEDICAL JOURNAL
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No smoking here (please)

A few years ago, the Smokefree Coalition suggested an end to tobacco in New Zealand by 2020. Others took up this 'endgame' idea, which became a focus of the Māori select committee inquiry into the tobacco industry. The Government responded by signing up to a smokefree 2025 goal thereby providing a stimulus and focus for a wide range of activities to help achieve this aim. The international community is watching how New Zealand achieves this world-first outcome.

Twenty years ago, even 10, most people would have thought this impossible. They would have suggested that it wouldn't work, would drive tobacco underground, and turn smokers into criminals. The tobacco industry would still like us to believe this, and have rehearsed this tired litany of 'arguments' as part of their opposition to plain packaging of all tobacco materials.

But, both the views of 20 years ago and the tobacco industry are almost certainly wrong, and we will achieve a tobacco-free New Zealand, mainly because the vast majority of current smokers support it. Most smokers wish they had never started smoking, and are desperate to stop, and increasingly, realise they have been sold down the line by Big Tobacco. In the 13 years between now and 2025, 600,000 smokers need to quit and we must offer them every support possible to achieve that end because without their support 2025 will remain a dream and Big Tobacco will be proved right.

One of the approaches to reducing the visibility of smoking, discussed recently in a forum sponsored by the Cancer Society,[1] is the requirement for a growing number of public places to be designated smokefree, especially those where children are likely to be in attendance—public parks for example. This requires both local and national initiatives. While many local authorities have already taken these steps others may need evidence of public support before passing appropriate policies and erecting the requisite no smoking signs.

But here's the rub—almost none of the current 'no smoking' signs up and down the country, in fact, almost anywhere in the world, provide any information or help to a smoker who sees them. This is a huge missed opportunity, all the more so in New Zealand, because we have amongst the best quit services in the world, led by the Quitline. We should be providing at the very least their contact details at every opportunity, and encouraging smokers to use them.

Quitting smoking is tough and every encouragement helps (the philosophy behind the current ABC programme). Developing smokefree outdoor spaces is an important strategy towards the 2025 goal, but we should use it to help smokers. A phone number, web address or QR code (these are smart phone readable bar codes that contain information such as web site addresses) costs almost nothing to add to a sign that is being made, or can be added to an existing sign.

To all those who have responsibility for implementing smokefree areas and the associated signage, help smokers to help you, and help us all achieve a smokeless New Zealand by 2025.

Below is the QR code for the Quitline's web address.

Julian Crane[1]; Brent Caldwell[1]; Marie Ditchburn[1]; Stephen Vega[2]; George Thomson[1]; Janet Hoek[3] (members of the Aspire 2025 group www.aspire2025.org.nz)

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One billion fewer cigarettes, 100,000 fewer smokers

In early 2013, 100,000 smokers could successfully quit cigarettes if Parliament adopts a proposal from leading tobacco control experts and organisations to increase tobacco excise by 40% on 1 January 2013.

Strong submissions from the health sector are required to change the Draft Bill from 10% annual increases to a 40% increase on 1 January, then 20% annually thereafter.

The Excise Bill Budget has proposed 10% increases in excise during 2013–16, beginning 1 January 2013, and the Bill[1] is available online at Parliament's website for the Finance and Expenditure Committee. **Submissions close 22 June 2012.**

Aim

To explain the issues facing the Government Finance and Expenditure Committee as it hears submissions on the Customs and Excise Amendment Bill.

Method

(1) The Bill's Regulatory Impact statement (RIS) was examined and its price-excise ratio estimates adopted.[2]

(2) Cigarette prices were derived from consumer price indices.[3]

(3) Tobacco manufacturers returns provided annual sales data back to 1996.[4]

(4) Price elasticity was based on 2010–11 prices and sales.

(5) Half of reduced cigarette sales were attributed to fewer smoking and half to smokers smoking fewer per day.

(6) Income per capita were examined but for 2011 varied less than 0.5% from 2010.

(7) Various tax increases were modelled out to 2025.

(8) Estimates were based on standard cigarettes (factory-made under 0.8 g, or hand-rolled estimated to contain 0.7 g tobacco).

Results

Price elasticity or responsiveness—In 1984–91, price elasticity[3,5] for cigarettes and tobacco was -0.44.

During 2003–10, price elasticity was -1.73 in response to the Smokefree law.

During 2010–11, price sensitivity was -0.96.[4]

This is the elasticity we used below:

Baseline for trajectories—An estimated 584,000 smokers, 16.5% of adults smoked an mean estimated 12 cigarettes daily in 2012; an estimated 756 cigarettes were smoked annually per adult, smoker or not.

The target—The 2025 Smokefree Nation goal[6] is achieved when smoking prevalence is <5%, and cigarette sales per adult are 95% reduced below the 2012 estimate.

Options and trajectories—*Option A*. The 2012 Budget estimates on tobacco[2] forecast revenue of $528 million by 2016 whereas our calculations predict $139 million—a $389 million shortfall.

Treasury used a traditional price elasticity (responsiveness) measure of -0.5, implying that 10% increase in cigarette price would lower sales 5%. Also Treasury relied on tax revenue data[5] which were subject to large trade fluctuations obscuring the steady sales trends at retail level.

Ten percent annual increases as drafted into the Bill would, if adopted by Government, be most unlikely to achieve the Government's 2025 Smokefree Goal by 2025—though it might perhaps by around 2050.

Applying the -0.96 price elasticity to the 10% excise increases proposed in Budget 2012 and extended thereafter, the trajectory would be so gradual that the 2025 Smokefree Nation goal[6] of under 5% would not be achieved on time. New Zealand would trail behind other countries, including Australia. By 2016 the 10% excise increases in the Bill would achieve only 20% of the distance to reduce smoking prevalence to under 5%.

Options B and C. Option B (25% annual increases) and Option C (40% increase in 2013 then 20% annually) would both by 2016 reduce cigarette sales by over 60% and reduce smoking prevalence by 36%. Option B would increase revenue *$42 million* and Option C would decrease $87 million.

Conclusions

A 40% increase in tobacco excise in 2013 would reduce cigarettes sold by 1 billion during 2013, over a one-third decrease below estimated 2012 cigarette sales.

From early 2012, 100,000 smokers would be expected to successfully quit.

Heart attack hospital admissions would be expected to noticeably decrease from early 2013 onwards.

Quitting smoking halves the excess risk of early death from coronary heart disease within 1 year, and 10 to 15 years without smoking abolishes the excess all-cause mortality compared to never-smokers of the same age.[7]

First, the Bill must be changed. As drafted, the Bill does not put New Zealand on track to achieve the Government's own 2025 Smokefree Nation goal, developed in response to the Māori Affairs Select Committee Tobacco Inquiry.

The 2013–16 tax trajectory set by this Bill will almost certainly determine whether or not the 2025 goal is achieved on time.

The 40% excise increase in 2013 will ensure that 100,000 smokers successfully quit smoking making for a healthier workforce, and preventing half of these persisting smokers from dying many years early from smoking.

The high price sensitivity of smokers since the smokefree law of 2003 means that further increases in excise taxes will usually generate some revenue though less than expected. Smokers can no longer be relied on to provide large revenues.

Conversely the potential public health gains and reductions in smoking from increases in tobacco tax are now much higher than in the 20th Century.

Indeed, tobacco taxation is now much more a health issue than a revenue issue.

Conflict of interest: None declared.

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(*This figure was corrected on 11 June 2012 after the author's notification)

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Tobacco smoke pollution associated with Irish pubs in New Zealand: fine particulate ($PM_{2.5}$) air sampling

New Zealand has made progress over recent decades with reducing air pollution from tobacco smoke, especially in indoor environments.[1] Nevertheless, there are no national laws that attempt to prevent smoke attributed to outdoor smoking from drifting indoors.

Previous New Zealand work on urban pubs[1,2] and rural pubs,[3] has found evidence for such drift from "outdoor smoking areas" to indoor areas (via open windows and doors). Other studies overseas have found air quality of indoor areas adjacent to outdoor smoking areas compromised,[4] with similar levels of secondhand smoke (SHS) exposure in hallways and near outdoor main entrances where smoking is permitted,[5] such as entrances to office buildings.[6]

A study measuring airborne nicotine concentrations to monitor SHS in different locations of a hospital before and after a smoking ban showed the smallest reduction at the hospital main entrance and hallway compared with all other areas.[7]

Drifting SHS is likely to have health implications, and be an irritant and nuisance to workers (especially hospitality workers). This impact will be particularly felt by patrons using outdoor dining areas (as per Australian work[8]). Work in the United States indicates significant increases in markers for tobacco smoke absorption by non-smokers (salivary cotinine and a urinary marker [NNAL]) following outdoor SHS exposure in the bar and restaurant settings.[9]

In this current study we aimed to measure the drift of SHS from outdoor areas to indoor smokefree areas by focusing specifically on more "typical" pubs than in previous New Zealand work (which has generally involved purposeful selection of urban pubs with highly enclosed smoking areas).

Other advantages of studying Irish pubs were that there was comparable international data on air quality in such pubs,[10] and they provide opportunities to study air quality on relatively high use occasions (i.e. St Patrick's Day).

Methods—We took a convenience sample of three Irish pubs in the central business district of a large New Zealand urban area which we visited on two successive Saturdays in March 2012 (see Table 1).

Data were obtained from three different positions:

(i) The outdoor smoking area/s;

(ii) Within the pub (but within 2 metres of the door to the outdoor smoking area); and

(iii) As far as possible within the pub away from the door to the outdoor smoking area. The order of these positions was predetermined by random number selection, and each area was sampled for at least 15 minutes. To

avoid affecting occupants' behaviour, the observers behaved discretely and as typical customers (i.e. purchased drinks).

In all the settings we discretely looked for evidence of smoking behaviour (actual observable smoking, the presence of ash trays and discarded cigarette butts). The investigators also counted the number of pub customers who were smoking at two time points: when entering the specific area for monitoring and at the mid-point of the 15-minute time in each area.

The use of the air quality monitor followed a protocol modified from one developed for a global air quality monitoring project[11] and which has been used in other New Zealand studies.[1,2,12] In the sampling, fine particulates were measured ($PM_{2.5}$, i.e., particulate matter ≤2.5 µm in diameter) using a portable real-time airborne particle monitor (i.e., the TSI *SidePak* AM510 Personal Aerosol Monitor, TSI Inc, St Paul, USA). The air monitor was carried hidden in a bag on the back of one of the observers to sample the ambient air close to the breathing zone.

A calibration factor (0.32) for SHS based on empirical validation studies with the *SidePak* monitor[13] was applied (i.e. adjusted in the monitor's internal settings). The monitor was zero-calibrated prior to each day of field work, was fitted with a 2.5 µm impactor, had an air flow rate of 1.7 L/min and had a logging period of 30 seconds.

A length of Tygon™ tubing was attached to the inlet of the monitor, with the other end left protruding slightly outside the bag it was carried in. Ethical approval for the study was obtained through the University of Otago (Category B ethics approval process) and the researchers were cognisant of the ethical issues involved in this type of research.[14]

Results and Discussion—There was no clear gradient found in mean fine particulate levels between the three types of settings, but maximum levels were several times higher in outdoor smoking areas compared to the two indoor settings (see Table 1). For all mean estimates, the air in and around pubs had higher particulate levels than the ambient air monitored while walking between pubs. This is consistent with the drift of tobacco smoke from outside to indoors of the pubs. Indeed, these results are also consistent with the researchers recording smelling tobacco smoke indoors (in two of the three pubs on both nights), and having eye and throat irritation symptoms at the end of both evenings.

While fine particulate levels in the outdoor smoking areas reached high maximums, the mean values were not particularly high, possibly because of smoke dispersal from the wind in the relatively exposed outdoor smoking areas (see Table 1 footnotes). Wind flow could also have been lowering indoor levels near doors (as all the doors in the three pubs and windows in two pubs were continuously open during the sampling periods).

The results also indicate higher particulate levels for all three settings on St Patrick's Day compared to the previous Saturday (e.g., 15.5 vs 7.2 $\mu g/m^3$ for designated open air smoking areas, see Table 1). This was also the pattern for the ambient outdoor air monitored while walking between the pubs (i.e. 7.4 vs 5.4 $\mu g/m^3$). These results were all consistent with our observation of there being more people and more smokers (Table 1), at the pubs on St Patrick's Day.

Table: Results of air quality monitoring (fine particulates, $PM_{2.5}$) in three Irish pubs on two separate occasions, including a relatively busy occasion, St Patricks Day (sampling times 15 minutes per site*)

Setting	Saturday preceding St Patrick's Day (1650h to 2055h)				St Patrick's Day (a Saturday) (1650h to 2115h)			
	Mean $PM_{2.5}$ ($\mu g/m^3$)	Minimum $PM_{2.5}$ ($\mu g/m^3$)	Maximum $PM_{2.5}$ ($\mu g/m^3$)	Patrons seen smoking (N)	Mean $PM_{2.5}$ ($\mu g/m^3$)	Minimum $PM_{2.5}$ ($\mu g/m^3$)	Maximum $PM_{2.5}$ ($\mu g/m^3$)	Patrons seen smoking (N)
Smoking area								
Irish Pub A (on footpath)	2.6	2.0	4.0	0	11.0	3.0	29.0	4
Irish Pub A (on balcony)***	12.4	2.0	145.0	2.5	14.0	4.0	55.0	5
Irish Pub B (on footpath)	4.0	3.0	14.0	1	12.2	3.0	107.0	4
Irish Pub C (on balcony)	11.6	5.0	26.0	2	24.6	9.0	108.0	2.5
All three (mean of all results)	***7.2***	***2.0***	***145.0***	***5.5***	***15.5***	***3.0***	***108.0***	***11.5***
Indoors (but within 2 metres of the door connecting to the outdoor smoking area)								
Irish Pub A (near footpath)	4.3	3.0	7.0	(1.5)**	10.1	5.0	18.0	(4)**
Irish Pub B	7.2	4.0	17.0	(1.5)**	24.2	5.0	49.0	(1)**
Irish Pub C	17.4	15.0	20.0	(2)**	17.8	13.0	25.0	–
All three (mean of all results)	***9.7***	***3.0***	***20.0***	***(5)****	***17.5***	***5.0***	***49.0***	***(5)****
Indoors (but as far as possible away from the door to the outdoor smoking area i.e., at >8 metres)								
Irish Pub A	4.5	4.0	6.0	–	11.6	6.0	21.0	–
Irish Pub B	15.5	4.0	34.0	2	7.4	4.0	14.0	–
Irish Pub C	14.0	10.0	23.0	–	18.0	11.0	34.0	–
All three (mean of all results)	***11.3***	***4.0***	***34.0***	***–***	***12.4***	***4.0***	***34.0***	–
Ambient outdoor air								
While walking between pubs#	5.4	1.0	23	–	7.4	2.0	52	–

Notes:

* If the time period of sampling slightly exceeded 15 minutes, we took the most central 15 minute segment of the recording period. All outdoor smoking areas had building walls on only one side, but at one site on St Patrick's Day there was also some wind protection from canvas tenting on one side and for another venue, some wire mesh may have slowed the wind flow. For all venues on both occasions there were continuously open doors between the smoking area and the indoor area; and similarly for windows (except Pub C where windows were closed on both occasions).

** These are smokers who were outdoors and seen via windows and open doors by the researchers when positioned indoors and near the smoking area. No smoking inside was observed in any of the pubs. The results are averaged between the two researchers doing the counting.

*** The observation period had to be truncated at the mid-point due to a within-pub event starting and forcing relocation of all patrons.

47.5 minutes on the Saturday preceding St Patrick's Day, and 42.5 minutes on St Patrick's Day.

As with previous New Zealand work,[1–3] there was complete compliance with the smokefree law for the inside areas of these three pubs. There was also no evidence of indoor ash trays, though one cigarette butt was noticed in a wall crevice in an interior area deep inside one pub.

The mean level of fine particulates in this study for all indoor measurements was 12.9 µg/m^3 (all three pubs, both indoor settings, both nights), which compares to 329 µg/m^3 for 87 Irish pubs internationally that permitted indoor smoking and 23µg/m^3 for those 41 Irish pubs which were smokefree.[10] This again highlights the benefits of indoor smokefree hospitality settings in New Zealand.

Of note is that this study has various methodological limitations, particularly the convenience sample, and the small sample size. In one pub hot food was also served and so there is some potential for measurements being increased by fine particulates from the cooking.[15]

Future studies could collect data from a wider range of Irish pubs—including from multiple New Zealand cities. Nevertheless, the apparent smoke drift/particulate accumulation found in indoor areas in this study occurred in the context of complete compliance with current smokefree legislation.

Therefore to maximise the health protection of pub workers and patrons, there is a case for upgrading the relevant legislation (the Smoke-free Environments Amendment Act 2003) to do one or more of the following:

(i) Partially or completely restricting outdoor smoking from occurring near to indoor areas;

(ii) Having regulations requiring the shutting of windows and doors that connect to outdoor smoking areas; and

(iii) Ban smoking entirely from busy city streets.

Indeed, smokefree street policies have now started to appear in some other parts of New Zealand,[16,17] and smokefree street laws are used in a number of jurisdictions internationally.[18–20]

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Competing interests: Although we do not consider it a competing interest, for the sake of full transparency we note that all but one of the authors (LC), has had previous funding support from health sector organisations working for tobacco control.

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THE NEW ZEALAND MEDICAL JOURNAL
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Recertification of generalists

Dear Sir

The introduction of the recertification process for those doctors not in vocational-training programmes has been a public relations fiasco. It has alienated many of those involved who would have accepted a properly reasoned explanation.

What we have had from the two protagonists, the Medical Council and bpac^{nz} (Best Practice Advocacy Centre), has been limited. What has been offered is simply a welter of rhetoric which goes nowhere near allaying the concerns of the 2500 doctors involved.

It seems it is now too late to stop the juggernaut. Nevertheless, if the two major players wish the support and cooperation from those afflicted they need to give credible answers to these questions:

1. Why is it necessary to introduce the programme when the much vaunted review in 2010 said that 73% of patients interviewed were very confident in the skills and knowledge of the last doctor they saw?
2. What is wrong, in the general practice setting, with the present system of collegial supervision and reporting?
3. Has the collegial supervisory system ever been monitored by Council for its accuracy in determining a doctor's ability and safety to practise?
4. Can either Council or bpac^{nz} justify the application of the same programme over a wide range of practitioners, from newly qualified overseas graduates to those with a long experience in their discipline?

   In their initial programme guide, bpac^{nz} state they reserve the right to review the annual fee, presently set at $1200. So the final question is:

5. Have Council overriding control of the annual fee-setting process?

There is support for the need for continuing education. What is proposed, and the manner of its introduction, seems an unnecessarily convoluted and expensive way of providing it.

Humphrey B Rainey
Upper Hutt

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Epitome of Current Medical Literature: JAMA

Published in NZMJ 1911 May;10(38):32.

The elaborate experiments which were carried out by Winslow and Phelps on the purification of the sewage. of Boston led to the conclusion that the septic tank treatment affords no particular advantage. On the contrary they say: Since November, 1906, when the distribution system was put in order, crude sewage has been treated on one of our trickling beds with perfect success. The effluent from this filter was less frequently putrescible than that from the bed which received septic effluent. On the whole, then, it may be said that apart from the advantages that may also be obtained by simple sedimentation (four hours or less), the septic tank has little to recommend it. The slightly increased digestion of sludge is in a large degree counterbalanced by the added difficulty of treating the septic effluent. The prevailing opinion among students of the sewage disposal problem is that there is no substantial gain from retaining sewage in tanks until decomposition has set it, but that on the contrary the practice is often distinctly disadvantageous as compared with mechanical sedimentation for a brief period.—JOURNAL OF THE A. M. A.

THE NEW ZEALAND MEDICAL JOURNAL
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Coffee drinking and mortality

There are reasons why coffee drinking might be harmful. Caffeine is a stimulant and there are studies that show an association with increased LDL-cholesterol levels and short-term increases in blood pressure.

This paper reports on a study from the National Institutes of Health in the USA. Over 400,000 adults, none of whom had cancer, heart disease or stroke, were followed over 13 years and their coffee consumption evaluated with respect to their mortality.

The researchers conclude that inverse associations were observed for deaths due to heart disease, respiratory disease, stroke, injuries and accidents, diabetes, and infections, but not for deaths due to cancer. However, they also observe that "whether this was a causal or associational finding cannot be determined from our data."

N Engl J Med 2012;366:1891–904.

Atrial fibrillation and stroke in rheumatoid arthritis

Rheumatoid patients are known to have increased risks of cardiovascular disease but the association with atrial fibrillation and stroke is less well documented. This study from Denmark included the entire Danish population(!) over the age of 15 years. The study period was 1997 to 2009 and over this time 18,247 people developed rheumatoid arthritis. They report that rheumatoid arthritis was associated with a 40% increase in risk of atrial fibrillation (8.2 cases per 1000 person years compared with 6.0 cases per 1000 person years in age and sex matched controls); the risk of stroke was also significant greater that in the general population.

They recommend that an annual cardiovascular risk assessment would be appropriate for rheumatoid arthritis.

BMJ 2012;344:e1257.

Influence of sex on treatment and outcome in chronic heart failure

The authors of this paper note that in chronic heart failure, there is a significant difference between their sexes in aetiology, ventricular function, comorbidities, and exercise capacity. While in men, ischaemic heart disease is the main cause of heart failure, it is hypertensive heart disease in women.

Based on these and other points they speculate on the possibility that different drugs or combinations may have different outcomes in the management of chronic heart failure in men and women. Their comprehensive review includes consideration of ACE-inhibitors, beta-blockers, angiotensin receptor blockers, and aldosterone antagonists. They note that there are reports noting that these agents may have differential gender outcomes but overall evidence both from randomised trials, and registry data from hospital- and community-treated patients, do not support the idea

that women obtain less benefit from any of the current major anti-failure drugs than men.

Cardiovascular Therapeutics 2012;30:182–92.

Low dose aspirin for preventing the recurrence of venous thromboembolism

About 20% of patients with venous thrombosis or embolism but no defined risk factors have a recurrence within the first 2 years after stopping anticoagulation therapy.

Continuing anticoagulants for longer than 2 years is an option but is inconvenient because of monitoring requirements and the risk of haemmorrhage. This study evaluates the role of the low dose aspirin. 403 patients were randomly assigned to aspirin 100 mg daily or placebo after they had completed 6–18 months anticoagulant treatment. At 2 years the thromboembolism rate was nearly halved in the aspirin treated patients (6.6% vs 11.2% per year). Adverse events were similar in the two groups, one patient in each group suffering a major bleeding episode.

N Engl J Med 2012;366:1959–67.

Treatment of type 2 diabetes mellitus—guidelines from the American College of Physicians (ACP)

The ACP guideline authors note that over 25 million people in the USA have type 2 diabetes so treatment guidelines are important. After a systematic review of the literature they recommend that clinicians should prescribe oral medications for such patients when lifestyle modifications, including diet, exercise, and weight loss, have failed to adequately improve hyperglycaemia.

Metformin is their first choice as they believe it is the most effective agent and has fewer adverse effects than the sulfonyureas. If this is inadequate they recommend adding a second oral agent. They found no evidence to support any one class of agent as the preferred second drug.

And finally, patients with persistent hyperglycaemia despite oral agents and lifestyle interventions may need insulin therapy.

Ann Intern Med 2012;156:218–31.

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Medical Benevolent Fund

NZMA Members, and families of deceased Members, may apply for aid when in situations of financial hardship or distress.

Applications should be directed through the NZMA:

Central Office
P O Box 156
Wellington
Tel: 0800 656161

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University of Otago Faculty of Medicine Freemasons Postgraduate Fellowships in Paediatrics and Child Health for 2013

The above Fellowships or Scholarships are open to University graduates who intend long term to pursue work in Paediatrics or Child Health within New Zealand. The Fellowships include full-time salary for one year with provision for a further year.

Applications close on **13 July 2012** with the Department Manager, Department of Women's & Children's Health, Dunedin School of Medicine, PO Box 913, Dunedin 9054, from whom further details may be obtained (wch.admin@otago.ac.nz)