Improving early detection of colorectal cancer in Aotearoa New Zealand: how do the direct access criteria perform?

Rhys A John, Holly Wang, Valentyna Sylevych, James D Falvey

ABSTRACT

AIM: Colorectal cancer (CRC) is a common malignancy in New Zealand, and there is increasing pressure on investigative resources for diagnosis. The national direct access referral guidelines from the Ministry of Health (MoH) guide who should be referred for investigation, but their performance in detecting CRC and other significant diseases has not been reported previously. This paper describes the yield, by direct access criterion, of all referrals through the direct access pathway to the Canterbury District Health Board (CDHB) during 2018.

METHODS: First referrals received through the direct access colonoscopy/computed tomography colonography (CTC) pathway for 2018 were audited. Patients were assigned to symptom groups corresponding to the MoH direct access criteria, and demographic data were captured. Diagnostic outcomes were collected through analysis of all endoscopy, CT colonography and histology reports in the 18 months following referral for primary analysis, with further follow-up through to May 2021 to detect missed pathology.

RESULTS: Three thousand two hundred referrals were analysed, and 88.5% underwent colorectal investigation. 128 CRC were diagnosed, 176 advanced polyps, 49 cases of inflammatory bowel disease (IBD) and there were 56 other significant findings. The yield by category for the direct access criteria varied between 0–15.0%, and one urgent criterion had a CRC yield lower than two semi-urgent categories. For patients whose symptoms met at least one of the criteria, excluding those referred with suspected IBD, the combined CRC yield was 4.9%, compared with 1.8% in those who did not meet criteria. The sensitivity and specificity of the criteria for CRC (excluding IBD) was 90% and 23% respectively. There were no CRC detected during the extended follow-up period.

CONCLUSION: In this referred population, the MoH direct access colonoscopy/CTC criteria varied significantly in their CRC yield, with an arbitrary distinction between urgent and semi-urgent categories. The low specificity of the criteria means the number needed to investigate to detect one CRC was one in 22. Improved diagnostic algorithms are urgently required to improve both the sensitivity and specificity, thereby more appropriately allocating finite resources to those patients who are most in need of investigation.

Colorectal cancer (CRC) is the third most common cancer in New Zealand, and the second most common cause of cancer-related death.\(^1,2\) While progress has been made in improving CRC survival,\(^3\) outcomes in New Zealand are poor in comparison to other developed countries.\(^4,5\) In the pre-screening era, 20% of bowel cancers were diagnosed following emergency presentation, commonly with later stage disease, and with correspondingly poorer outcomes.\(^6\) Improving diagnostic pathways for patients with colorectal symptoms, and population-based screening for asymptomatic disease, are valid strategies for improving early detection and survival from CRC. Symptom-based criteria for accessing colorectal investigation are, however, limited by low specificity of alarm symptoms for CRC,\(^7,8\) and a significant non-malignant symptom burden in the general population.\(^9\) The New Zealand National Bowel Screening Programme (NBSP), which has been successful in capturing 18% of incident CRC,\(^6\) has also exacerbated waiting list delays for endoscopic procedures.\(^10,11\)

Currently, the New Zealand Ministry of Health (MoH) Direct Access Outpatient Colonoscopy or Computed Tomography Colonography (CTC) guidelines (hereafter the direct access criteria) determine which patients should undergo colorectal investigation based on their age, and the presence of rectal bleeding (RB), altered bowel habit (ABH) or iron deficiency anaemia (IDA).\(^12\) The criteria largely reflect the UK National Institute for Health and Care Excellence (NICE) guidance published in 2005,\(^13\) but also accept younger symptomatic patients with a significant family history of CRC, and those with both IDA and RB irrespective of age. Since 2005, NICE guidance on the appropriate referral and investigation of patients with symptoms suggestive of CRC have undergone several revisions, leading to improved...
sensitivity but with a disproportionate increase in investigative burden. While colonoscopy remains the gold standard colorectal investigation, it is invasive, associated with risk for significant harm and costly. Improving the New Zealand direct access criteria to increase sensitivity for CRC must be done with care to limit the number of patients investigated who have no significant finding.

One strategy that may improve the diagnostic pathway would be to combine the existing direct access criteria with an objective measure of colorectal cancer risk, such as the faecal immunochemical test (FIT) for faecal haemoglobin. To develop this concept safely it is necessary to know the rate of CRC according to common clinical presentations (i.e., the prior risk of CRC).

In Canterbury District Health Board (CDHB), general practitioners (GPs) are guided regarding the referral of patients with colorectal symptoms by a pathway based on the direct access criteria. Referral is made via an online referral form (ERMS), which includes a free-text field for clinical history, in addition to tick boxes that summarise the symptoms with respect to the direct access criteria. All direct access referrals are triaged by a gastroenterology consultant and directed by them to the most appropriate investigation, or declined, given the referral history, electronic case note review (where required) and with knowledge of local resource availability. This study sought to use this routinely collected clinical information to determine the diagnostic yield of significant colorectal disease, particularly CRC, for common presentations as per the direct access criteria.

Methods

After institutional and local ethical approval, all referrals from primary care using the ERMS colonoscopy/CTC form in 2018 were identified. Only first referrals for each patient were included. Patients with pre-existing inflammatory bowel disease (IBD) or known active CRC were excluded.

Tick-box information, as completed by the referring general practitioner, was used to categorise referrals according to the direct access criteria. Two additional categories were created for cases referred on clinical grounds but whose symptoms did not meet the criteria. These were “rectal bleeding under age 50 years” (reflecting a local pathway to investigate these cases through the Canterbury Charity Hospital), and “all other referrals not meeting direct access criteria”. If a referral was eligible for inclusion into more than one group, it was assigned to the highest risk category, with two-week categories presumed the highest risk for CRC. Free-text information accompanying 100 referrals was reviewed to check for concordance with the tick boxes to ensure patients were assigned to the correct referral category.

The CDHB data warehouse and endoscopy database were accessed to identify all colonoscopy, flexible sigmoidoscopy, CT colonography and histology reports for the 18 months following the initial referral, with further follow-up for all cases until May 2021 to allow detection of missed pathology. Where no colorectal investigations were identified by this strategy, individual electronic records were searched. Privately performed radiology and histology can be found within the electronic record at CDHB allowing significant outcomes to be detected for the whole group. Database data were initially assigned diagnostic outcomes electronically, by natural language processing, and then checked manually. Where cases underwent more than one colorectal investigation during the initial follow-up period, or where histology and endoscopic results were available, outcome data were summarised. For neoplasia, only the most advanced lesion was reported for any individual in the following order: cancer, advanced polyp (histologically proven adenoma with villous or tubulovillous architecture, high grade dysplasia, or sessile serrated polyp with dysplasia, or CTC identified polyp ≥10mm), simple polyp (tubular adenoma with low grade dysplasia or sessile serrated polyp without dysplasia or CTC identified polyp <10mm) or hyperplastic polyp. Due to the limitations of electronic data gathering, we were unable to determine the size of resected polyps. The 18-month cut-off for primary analysis was chosen as an arbitrary time point to allow linkage between the initial referral and diagnostic outcomes.

Statistical analysis was performed within SPSS v28.0.1.1. Categorical variables were compared using X²; Fisher’s exact test was used for variables with low numbers (<5). Continuous variables were first checked for normality, then were compared using ANOVA for more than two groups. The significance value was set at 0.05.

Results

A total of 3,201 new referrals were identified. One case was excluded as investigation revealed metastatic malignancy of unknown primary. Con-
of the investigated group, 4.9% (114/2,315), compared with 1.8% (12/671) a suspicion of IBD, the combined CRC yield was

88 years). No additional cases of CRC or IBD were
detected during the extended follow-up period.

122 were diagnosed or confirmed endoscopically,
and 5 cases were diagnosed on CTC alone (median
age age for all referrals was 63.6 years; 65.7 years
for those within accepted criteria, and 55.6 years
for those not meeting referral criteria. NZ Europeans
were significantly older than all other ethnic
groups (one-way ANOVA p=<0.001, Games-Howell
post hoc tests p=<0.001-0.013). There was no
significant difference in the CRC detection rate
between ethnicities (Fisher’s exact test, p=0.23).
When considering all referrals, there was a statisti-
cally significant difference in the rate of investiga-
tion between ethnicities (X² p=<0.02), with Māori
and Other ethnicities investigated least often.
When those who were referred outside of clinical
criteria were excluded this difference was no lon-
ger significant (X² p=0.12).

One hundred and twenty-eight (4.0%) cases of
CRC, 176 (5.5%) advanced polyps, and 49 (1.5%)
cases of IBD were detected among the referred pop-
ulation, shown in Table 2. Of the 128 cases of CRC,
122 were diagnosed or confirmed endoscopically,
and 5 cases were diagnosed on CTC alone (median
age 85 years). One patient who was accepted for
investigation had locally advanced CRC diagnosed
on contrast CT abdomen two months after referral
and underwent neither CTC nor endoscopy. Eight
cases of advanced polyp were made on CT criteria
alone and did not undergo endoscopy (median age
88 years). No additional cases of CRC or IBD were
detected during the extended follow-up period.

The diagnostic yields according to direct access
category are shown in Table 2.

For patients who met at least one of the direct
access criteria, excluding those referred with
a suspicion of IBD, the combined CRC yield was
4.9% (114/2,315), compared with 1.8% (12/671)
in those who did not meet direct access criteria.

The sensitivity and specificity of the direct access
criteria for CRC (excluding those referred with
a suspicion of IBD) was 0.90 (114/126), and 0.23
(659/2,860) respectively.

Twenty cases of IBD were detected in 214
patients, referred with suspicion of IBD (yield of
9.3%). Other significant findings were detected
in 1.8% of referrals and are detailed in Table 2.
In addition, anal fissure or haemorrhoids were
found in 197 (7.0%), and diverticular disease in
1,028 (36.3%).

CRC detection rate by age and individual symp-
tom are shown in Table 3.

Discussion
This is the first report of the diagnostic yield
of the New Zealand MoH direct access criteria.
We found the sensitivity and specificity of these
criteria among a primary care referral popula-
tion to be 90% and 23% respectively, while the
rate of detection of CRC varied from 0–15.0%. For
patients whose symptoms met at least one crite-
riion (excluding those referred with a suspicion of IBD) the combined CRC yield following inves-
tigation was 4.9%, compared with 1.8% for those
who were referred on clinical grounds who did
not meet criteria. At least 88.5% of referred cases
were declined investigation, while 1 in 25 of those
referred, and 1 in 22 of those completing investiga-
tions was found to have CRC.

Our data show that there is a high rate of col-
orectal investigation in patients referred by pri-
mary care, whether or not they meet the direct
access criteria, but 9% of those referred within
criteria were not investigated. Due to the limita-
tions of the dataset, we were unable to determine
whether this last group were declined investiga-
tion or non-attendance. Local data report
the non-attendance rate for scheduled endo-
sic procedures to be between 1.6–3.8%,19 with
those referrals originating from non-gastroenter-
ologists more likely to miss investigations.20 We
have not investigated whether a similar effect is
present in the current cohort. Regarding the high
rate of investigation of those outside criteria, we
believe this reflects two factors; concern that
symptoms cannot accurately distinguish benign
from malignant disease, and a well-established
mechanism for gastroenterologist triage of refer-
als to a community CTC pathway.

When considering all referrals, we found a
significant difference in the rate of investigation
Figure 1: Inclusion and diagnostic pathway for referred patients.

Table 1: Comparison between ethnic groups.

<table>
<thead>
<tr>
<th></th>
<th>Total n=3,200</th>
<th>NZ European n=2,804</th>
<th>Māori n=186</th>
<th>Asian n=110</th>
<th>Other n=63</th>
<th>Pacific peoples n=37</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>63.6 (15)</td>
<td>64.6 (15)</td>
<td>56.8 (14)</td>
<td>53.8 (12)</td>
<td>58.8 (14)</td>
<td>54.6 (14)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Cancer (%)</td>
<td>128 (4.0)</td>
<td>120 (4.3)</td>
<td>3 (1.6)</td>
<td>3 (2.7)</td>
<td>2 (3.2)</td>
<td>0 (0)</td>
<td>.23</td>
</tr>
<tr>
<td>% investigated</td>
<td>88</td>
<td>89</td>
<td>83</td>
<td>84</td>
<td>83</td>
<td>92</td>
<td>0.016</td>
</tr>
<tr>
<td>% of referrals meeting access criteria</td>
<td>79</td>
<td>79</td>
<td>75</td>
<td>73</td>
<td>81</td>
<td>81</td>
<td>0.26</td>
</tr>
<tr>
<td>% investigated if meeting access criteria</td>
<td>91</td>
<td>91</td>
<td>86</td>
<td>86</td>
<td>86</td>
<td>93</td>
<td>0.12</td>
</tr>
</tbody>
</table>
Table 2: Diagnostic yield of the MoH direct access criteria.12

<table>
<thead>
<tr>
<th>Definition</th>
<th>Referred</th>
<th>Investigated</th>
<th>Average age (SD)</th>
<th>Colorectal cancer</th>
<th>Advanced polyp</th>
<th>Simple polyp</th>
<th>IBD</th>
<th>Other significant finding*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspected CRC (palpable, or visible on rectal examination)†</td>
<td>88</td>
<td>82 (93%)</td>
<td>63.9 (17)</td>
<td>9 (10.2%)</td>
<td>2 (2.3%)</td>
<td>23 (26.1%)</td>
<td>1 (1.1%)</td>
<td>5 (5.7%)</td>
</tr>
<tr>
<td>Unexplained RB (benign anal causes treated or excluded) with IDA (haemoglobin below the local reference range)†</td>
<td>100</td>
<td>90 (90%)</td>
<td>68.2 (14)</td>
<td>15 (15.0%)</td>
<td>6 (6.0%)</td>
<td>19 (19.0%)</td>
<td>2 (2.0%)</td>
<td>2 (2.0%)</td>
</tr>
<tr>
<td>ABH (looser and/or more frequent) &gt;6 week’s duration plus unexplained RB (benign anal causes treated or excluded) aged ≥50†</td>
<td>350</td>
<td>335 (96%)</td>
<td>65.6 (9)</td>
<td>18 (5.1%)</td>
<td>34 (9.7%)</td>
<td>84 (24.0%)</td>
<td>4 (1.1%)</td>
<td>7 (2.0%)</td>
</tr>
<tr>
<td>ABH (looser and/or more frequent) &gt;6 week’s duration, aged ≥50†</td>
<td>1,061</td>
<td>960 (90%)</td>
<td>69.4 (11)</td>
<td>28 (2.6%)</td>
<td>50 (4.7%)</td>
<td>217 (20.5%)</td>
<td>7 (0.7%)</td>
<td>20 (1.9%)</td>
</tr>
<tr>
<td>ABH (looser and/or more frequent) &gt;6 week’s duration plus unexplained RB (benign anal causes treated or excluded), aged 40–50†</td>
<td>66</td>
<td>61 (92%)</td>
<td>45.7 (3)</td>
<td>2 (3.0%)</td>
<td>4 (6.1%)</td>
<td>32 (48.5%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Unexplained RB (benign anal causes treated or excluded) aged ≥50†</td>
<td>334</td>
<td>312 (93%)</td>
<td>65.8 (10)</td>
<td>21 (6.3%)</td>
<td>29 (8.7%)</td>
<td>92 (27.5%)</td>
<td>8 (2.4%)</td>
<td>5 (1.5%)</td>
</tr>
<tr>
<td>Unexplained IDA (haemoglobin below local reference range)†</td>
<td>289</td>
<td>247 (85%)</td>
<td>69.5 (13)</td>
<td>21 (7.3%)</td>
<td>14 (4.8%)</td>
<td>42 (14.5%)</td>
<td>1 (0.3%)</td>
<td>7 (2.4%)</td>
</tr>
<tr>
<td>NZGG Category 2 family history plus one or more of ABH (looser and/or more frequent) &gt; 6 week’s duration plus unexplained RB (benign anal causes treated or excluded), aged ≥40†</td>
<td>11</td>
<td>11 (100%)</td>
<td>48.7 (10)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>3 (27.3%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>NZGG Category 3 family history plus one or more of ABH (looser and/or more frequent) &gt;6 week’s duration plus unexplained RB (benign anal causes treated or excluded), aged ≥25†</td>
<td>16</td>
<td>16 (100%)</td>
<td>41.5 (11)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>6 (37.5%)</td>
<td>1 (6.3%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Suspected/assessment IBD</td>
<td>214</td>
<td>183 (86%)</td>
<td>50.6 (17)</td>
<td>2 (0.9%)</td>
<td>11 (5.1%)</td>
<td>48 (22.4%)</td>
<td>20 (9.3%)</td>
<td>4 (1.9%)</td>
</tr>
<tr>
<td>Rectal bleeding, aged &lt;50!</td>
<td>144</td>
<td>111 (77%)</td>
<td>37.7 (8)</td>
<td>1 (0.7%)</td>
<td>9 (6.3%)</td>
<td>38 (26.4%)</td>
<td>4 (2.8%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>All other referrals not meeting direct access criteria!</td>
<td>527</td>
<td>424 (80%)</td>
<td>60.6 (16)</td>
<td>11 (2.1%)</td>
<td>17 (3.2%)</td>
<td>92 (17.5%)</td>
<td>1 (0.2%)</td>
<td>6 (1.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>3,200</td>
<td>2,831 (88%)</td>
<td>63.6 (15)</td>
<td>128 (4.0%)</td>
<td>176 (5.5%)</td>
<td>696 (21.8%)</td>
<td>49 (1.5%)</td>
<td>56 (1.8%)</td>
</tr>
</tbody>
</table>

*Other significant findings: 1 colo-colonic fistula, 5 neuroendocrine tumours, 1 lymphoma, 9 colonic ischaemia, 11 strictures, 14 angiodysplasia, 12 microscopic colitis, 3 radiation proctitis.
†Direct access criteria recommend investigation within 2 weeks.
‡Direct access criteria recommend investigation within 6 weeks.
Outside direct access criteria.
**Table 3**: Single symptom predictive values for CRC. Patients referred with more than one symptom could be assigned to multiple groups.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Age</th>
<th>n referred</th>
<th>% with CRC (PPV)</th>
<th>OR univariate (95% CI)</th>
<th>OR multivariate (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All referrals</strong></td>
<td>All</td>
<td>3200</td>
<td>4.0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>&lt;50</td>
<td>572</td>
<td>1.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>50–&lt;60</td>
<td>668</td>
<td>2.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>60–&lt;70</td>
<td>773</td>
<td>3.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>70–&lt;80</td>
<td>753</td>
<td>5.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>&gt;80</td>
<td>434</td>
<td>12.8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Palpable rectal mass</strong></td>
<td>All</td>
<td>89</td>
<td>10.1</td>
<td>2.82 (1.39–5.77)</td>
<td>3.02 (1.41–6.49)</td>
</tr>
<tr>
<td></td>
<td>&lt;50</td>
<td>20</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>50–&lt;60</td>
<td>16</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>60–&lt;70</td>
<td>18</td>
<td>11.1</td>
<td>4.16 (0.90–19.23)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>70–&lt;80</td>
<td>18</td>
<td>11.1</td>
<td>2.29 (.51–10.34)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥80</td>
<td>17</td>
<td>29.4</td>
<td>4.04 (1.35–12.06)</td>
<td></td>
</tr>
<tr>
<td><strong>Iron deficiency anaemia</strong></td>
<td>All</td>
<td>504</td>
<td>9.5</td>
<td>3.44 (2.37–4.99)</td>
<td>3.31 (2.19–5.02)</td>
</tr>
<tr>
<td></td>
<td>&lt;50</td>
<td>60</td>
<td>3.3</td>
<td>4.38 (0.78–24.43)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50–&lt;60</td>
<td>63</td>
<td>1.6</td>
<td>0.73 (0.09–5.71)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60–&lt;70</td>
<td>114</td>
<td>5.3</td>
<td>1.98 (0.77–5.10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>70–&lt;80</td>
<td>150</td>
<td>8.7</td>
<td>2.02 (1.02–4.03)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥80</td>
<td>117</td>
<td>22.2</td>
<td>4.75 (2.49–9.05)</td>
<td></td>
</tr>
</tbody>
</table>
Table 3 (continued): Single symptom predictive values for CRC. Patients referred with more than one symptom could be assigned to multiple groups.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Age</th>
<th>n referred</th>
<th>% with CRC (PPV)</th>
<th>OR univariate (95% CI)</th>
<th>OR multivariate (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectal bleeding</td>
<td>&lt;50</td>
<td>298</td>
<td>1.0</td>
<td>0.92 (0.18–4.59)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50–&lt;60</td>
<td>267</td>
<td>4.1</td>
<td>5.70 (1.58–20.63)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60–&lt;70</td>
<td>258</td>
<td>4.7</td>
<td>2.04 (0.91–4.62)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>70–&lt;80</td>
<td>205</td>
<td>8.8</td>
<td>2.30 (1.21–4.39)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥80</td>
<td>94</td>
<td>19.1</td>
<td>2.86 (1.49–5.49)</td>
<td></td>
</tr>
<tr>
<td>Altered bowel habit (looser/more frequent);</td>
<td>All</td>
<td>2,108</td>
<td>3.5</td>
<td>0.68 (0.47–0.97)</td>
<td>1.06 (0.72–1.57)</td>
</tr>
<tr>
<td>any duration</td>
<td>&lt;50</td>
<td>386</td>
<td>1.6</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50–&lt;60</td>
<td>444</td>
<td>1.6</td>
<td>0.50 (0.17–1.43)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60–&lt;70</td>
<td>519</td>
<td>2.5</td>
<td>0.57 (0.25–1.29)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>70–&lt;80</td>
<td>498</td>
<td>5.6</td>
<td>1.21 (0.60–2.41)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥80</td>
<td>261</td>
<td>7.3</td>
<td>0.64 (0.25–0.87)</td>
<td></td>
</tr>
</tbody>
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Multivariate analysis variables = age brackets, ethnicity, home deprivation quintiles, sex, palpable rectal mass, IDA, RB, weight loss, ABH (any duration).
between ethnicities. This difference was driven largely by the proportion of patients in each group who were referred outside criteria, as these patients were less likely to be investigated. When considering only those patients referred within criteria, no significant difference was found. It is noteworthy, however, that referral numbers among minority groups were low. Only 5.8% of the referred group identified as Māori, while the 2018 Census indicates that Māori comprise 9.4% of the local population.21 This discrepancy may be accounted for by the younger average age of Māori in Canterbury, but also by the age parameters specified in the direct access criteria, which do not take into consideration that Māori have a peak incidence of CRC 10 years younger than NZ Europeans.22 Furthermore, Māori are known to be less likely to access primary care.23 Overall, Māori have a 29% lower age standardised rate of colorectal cancer, but despite the significantly younger age at diagnosis, there is only a slightly lower mortality, driven by poorer survival once diagnosed; the difference is largely attributable to the stage of disease at diagnosis.24 Introducing ethnicity-specific age thresholds within the direct access criteria could be one way of addressing this inequity, as has recently been announced for the NBSF.25 On review of our dataset, if the age of eligibility for Māori was dropped by 10 years across all categories, an additional 14 Māori patients would meet criteria (30% of those previously outside criteria); likely an underestimate of the unmet need, as patients may not have been referred due to being deemed ineligible.

Stratifying cases as per the direct access criteria found the highest rate of CRC detection to be in those with IDA and RB at any age (15%), followed by in those referred with a palpable rectal mass (10%). Thereafter, the rate of colorectal cancer in the final urgent category, ABH and RB aged ≥50 years, was lower than in two semi-urgent categories (5.1%, compared with 6.3% for RB ≥50 years, and 7.3% for IDA), indicating that the distinction between urgent and non-urgent categories within the criteria is somewhat arbitrary. It is notable that the rate of CRC diagnosis in cases aged ≥50 years presenting with altered bowel habit as the only symptom, while the most frequent category accounting for 33% of referrals yielded CRC in only 2.6% of cases. This yield is below the symptom threshold value of 3%, which underpins the NICE guidance13 on which the New Zealand direct access criteria are based, arguably leading to excessive allocation of finite resources to a low-risk group.

Regarding individual symptoms, multivariate analysis found IDA to be the strongest independent predictor of CRC (OR 3.31), followed by palpable rectal mass (OR 3.02), then RB (OR 2.73), while ABH was not found to be discriminative. These results are highly concordant with a recent analysis of referrals for colorectal investigation made to the Waikato DHB.26 What is more, the raw rates of CRC by individual symptom reported here are highly consistent with those reported from an earlier study in the Canterbury population (11.3% for anaemia, 6.0% for RB, and 4.3% for ABH in the earlier study, compared with 9.5%, 5.5% and 3.5% respectively, reported here).27

There are some limitations to the dataset. Despite the large number of referrals, the small number of outcomes with respect to any given criteria, symptom or age group limits statistical power. In addition, although there was a high level of concordance between clinical free-text and tick-box data, this did not reach 100%. Although all significant colorectal diagnoses are likely to have been captured in this study, it is possible that a small number of patients without significant disease were investigated in a unit not linked to the CDHB electronic record. As reports from the largest private endoscopy unit are automatically uploaded to the electronic record, the effect of these missing investigations is not thought to be significant. Finally, because not all cases underwent further investigation, and some were investigated with only CTC or flexible sigmoidoscopy, the rate of polyp detection is underestimated; however, the median follow-up of 33 months means that CRC is likely to have been captured.

Altering diagnostic algorithms for patients with bowel symptoms to detect more CRC (more sensitive), while simultaneously reducing the number needed to investigate to detect one cancer (more specific), and also ensuring patients with significant non-malignant disease are not excluded, is an immediate priority for colorectal services in New Zealand. This will likely be met by incorporating existing biomarkers, such as FIT and calprotectin into diagnostic algorithms, as has just been recommended nationally in the UK.28 This is the only paper reporting the diagnostic yield of the New Zealand direct access criteria. The data are highly comparable with prior studies from the same region, reflect consistent referral practice for colorectal examination from primary care and can now be used to help develop more sensitive and specific access criteria for patients with symptoms suggestive of CRC in New Zealand.
COMPETING INTERESTS
Nil.

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