

Health service use by people with colorectal cancer in Aotearoa New Zealand, prior to diagnosis (2018–2021)

Technical Report

July 2023

Planning, Funding and Outcomes

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Technical Reports are developed for the health sector and may be of interest to a wider audience.

Health New Zealand | Te Whatu Ora. 2024.
Health service use by people with colorectal cancer in Aotearoa New Zealand, prior to diagnosis (2018–2021). Wellington.
 Health New Zealand | Te Whatu Ora

Report completed in July 2023 by
 Health New Zealand | Te Whatu Ora
 PO Box 793, Wellington 6140, New Zealand

Published November 2024

ISBN 978-1-99-106783-8

This document is available at tewhatuora.govt.nz

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Summary

1. This study provides a systematic description of people’s interaction with a selected range of health services in the year prior to the diagnosis of colorectal cancer.
2. New Zealand has a good foundation to potentially deliver a set of services that enables earlier diagnosis of colorectal cancer, given the very high PHO enrolment coverage and primary care contacts in the year prior to colorectal cancer diagnosis.
 - a. Overall, PHO enrolment coverage prior to colorectal cancer diagnosis (from 2019 to 2021, n=9,884) is 99% (Table 7). Māori PHO enrolment coverage is also at 99% out of the 784 Māori who were diagnosed with colorectal cancer from 2019–2021.
 - b. While the specific nature of a primary care contact is not recorded nationally, 96% had a primary health care contact within a year prior to diagnosis in New Zealand, in 2021.
 - c. Closer to the diagnosis time, in the 90 days prior, 88.3% had at least one primary health care contact. This is higher than what would be expected for the general population at the same age and timing across the year, estimated at 70.8%.
3. Indian and Pacific peoples have lower PHO enrolment rates at 89% and 92% respectively. However, Indian and Pacific peoples have a relatively small number of colorectal cancer cases, accounting for 1% and 3% of the total number of people with colorectal cancer from 2019–2021.
4. Health service use in the year prior to colorectal cancer diagnosis is not substantially different whether the person had attended a hospital emergency department (ED) in the two weeks prior to colorectal cancer diagnosis or not. Counter-intuitively, 59% of people who attended ED within two weeks of diagnosis had a primary care contact within 30 days of diagnosis, compared to 53% of those people who did not have an ED attendance. These findings suggest ED attendance may be more related to factors other than primary care engagement, such as acuity or severity of symptoms.
5. People who had ED attendance in the two weeks prior to colorectal cancer diagnosis had a marginally lower PHO enrolment rate at 97% (Table 16).

6. The majority of people who presented as an ED attendance in the two weeks prior to colorectal cancer diagnosis had already received some laboratory testing work-up in the community. In the three months prior to colorectal cancer diagnosis, 56% had received a full blood count test (FBC), 42% had a ferritin test and 41% had a liver function test (LFT) (Table 18). In the 12 months prior to diagnosis, 75% had an FBC, 58% had a ferritin test and 60% had a LFT test, which suggests a significant proportion of people who presented to ED may have had a clinical suspicion or co-morbidities that required some form of laboratory work-up.
 7. People who had not presented to ED prior to colorectal cancer diagnosis had marginally higher community laboratory testing rates, with 66% having a FBC, 54% a ferritin test, and 46% a LFT in the three months prior to colorectal cancer diagnosis.
 8. After adjusting for age and ED attendance status, Māori and Pacific peoples with colorectal cancer generally have lower coverage of community FBC, ferritin and LFT testing prior to colorectal cancer diagnosis.
 9. People with colorectal cancer have a much higher FBC, ferritin and LFT testing coverage than the general population in New Zealand enrolled in a PHO in 2021, after adjustment for age and seasonality (Table 1).¹
- These health service interactions suggest that a significant proportion of people are being investigated and being treated for iron deficiency prior to colorectal cancer diagnosis.

TABLE 1: SUMMARY OF HEALTH SERVICE USE BY PEOPLE WITH COLORECTAL CANCER PRIOR TO DIAGNOSIS COMPARED TO THE AGE-MATCHED GENERAL POPULATION ENROLLED IN A PRIMARY HEALTH ORGANISATION IN 2021

Indicator	People registered with colorectal cancer in 2021	Expected coverage rate from general population enrolled in PHO in 2021*
Primary care contact 90 days prior to colorectal cancer diagnosis	88.3%	70.8%
Full blood count in the community within a three-month period (prior to diagnosis)	63%	30%
Ferritin test in the community within a three-month period (prior to diagnosis)	51%	14%
Liver function test in the community within a three-month period (prior to diagnosis)	44%	14%

* Within the same time frame, age-matched to the colorectal cancer cohort and seasonality-adjusted

1. See section on Community laboratory testing prior to colorectal cancer diagnosis

Implications of findings

A high PHO enrolment coverage, and contact with primary care in the year prior to colorectal cancer diagnosis, provide a strong foundation for delivering care that promotes early diagnosis. It is encouraging to see the high PHO enrolment coverage for Māori – comparable to the European and Other group in many instances, providing a platform on which to build equity initiatives. These may include:

- 1 **Development of information technology** that supports clinical workflows to enable proactive recalls, or opportunistic reminders at the time of primary care presentation. For example, a direct linkage and access to cancer screening, and registry data from primary health care practice management systems, could highlight population subgroups who are eligible but have not yet undergone colorectal cancer screening within the expected time frame.
- 2 **Improving the awareness of red flag symptoms** among clinical staff and patients. This may facilitate earlier presentation by conducting careful, opportunistic history-taking, that may lead to earlier diagnosis via relevant symptoms being elicited.
- 3 **Considering risk stratification processes** to prioritise cases at high risk of having colorectal cancer for access to timelier diagnostic testing (e.g. colonoscopy). Simultaneously, ongoing efforts are needed to build longer-term colonoscopy capacity.
- 4 **Conducting qualitative research** exploring people's experience and factors that lead to diagnosis in an emergency setting.

Primary care enrolment, having contacts with primary care, laboratory work-up and treatment with iron tablets are not substantially different between the subgroups who had attended ED in the two weeks prior to colorectal cancer diagnosis, or not. Furthermore, a marginally higher proportion of people who had attended ED in the two weeks prior to cancer diagnosis in fact attended primary care in the 30 days prior to diagnosis.

In addition, just over half (51%) had two or more FBC tests in the past year prior to colorectal cancer diagnosis, which might suggest abnormal results that needed follow-up, or persistent symptoms requiring repeated testing.

All these findings suggest that the ED attendance may not be primarily related to lack of primary health care engagement, but rather may be a reflection of delays in other parts of the diagnostic pathway (such as colonoscopy) or severity of symptoms requiring acute hospitalisation. However, the higher level of contacts with primary care of people with colorectal cancer may also be related to other co-morbidities or presentations that are not associated with colorectal cancer (such as repeat prescriptions for other long-term conditions).

Given that symptoms related to colorectal cancer can be insidious and non-specific, a one-off clinical review and basic laboratory work-up may not readily lead to a diagnosis.

The substantially higher testing coverage of laboratory tests and primary health care contacts prior to colorectal cancer diagnosis, compared to the age-matched general population, suggests people might have presented to primary care with symptoms or signs that may be consistent with colorectal cancer, or people with colorectal cancer have a high prevalence of co-morbidity.

Limitations, and scope for future analyses

These are exploratory analyses of routine administrative data that may provide further insights of health service use of people in the year prior to colorectal cancer diagnosis. The analyses are limited to the data that is readily available and would benefit from support with more detailed audit data. The actual laboratory results are not known, aside from the type and volume of tests being undertaken. It was assumed that oral iron was used for treatment of iron deficiency.

The primary care-qualified encounter dates are only reported as the last contact day of the month in the PHO Enrolment Collection since July 2019. Data on the actual frequency of primary care in a format that is linkable to other Ministry of Health Manatū Hauora collections is not readily accessible currently, albeit they are recorded. Prior to July 2019, only the last qualified encounter dates within a quarter of a year were available. Further analyses could be potentially sought by Te Aho O Te Kahu (Cancer Control Agency), or National Public Health Service, such as linkage to screening data.

While there is some evidence to suggest that ED attendance is associated with adverse lung cancer outcomes,² there may be more merit to directly review health service use prior to adverse cancer outcomes, such as mortality or late-stage diagnosis. Since health service use prior to colorectal cancer diagnosis is similar between people who attended ED and those who did not, a review that focuses on identifying bottlenecks in the diagnosis and treatment pathway may be more likely to identify actionable opportunities for improvement.

2. Gurney J, Davies A, Stanley J, et al. Emergency presentation prior to lung cancer diagnosis: A national-level examination of disparities and survival outcomes. *Lung Cancer* 2023; 179: 107174.

Background

One of the Quality Performance Indicators (QPI) of the care pathway for colorectal cancer is the route to diagnosis. Diagnosis of colorectal cancer following a hospital emergency department (ED) presentation has been considered a proxy for barriers to care along the diagnostic pathway. Other indicators of care that include primary care enrolment and activity data may provide a better yield of actionable insights into the pre-hospital pathway.

Objective

The objective of this report is to explore whether the use of nationally collected administrative data along the patients' journey to diagnosis of colorectal cancer would provide insights into the key areas for system improvement. In particular, this is to understand the level of engagement with primary care and opportunities for early diagnosis of colorectal cancer.

Specific questions to be answered

Out of the people with colorectal cancer reported in the New Zealand Cancer Registry, what proportions:

- 1 were enrolled in a PHO at the time of diagnosis?
- 2 had attended primary health care in the year prior to diagnosis?
- 3 had received blood tests consistent with workup for colorectal cancer?
- 4 had faecal occult blood tests in the year prior to diagnosis?
- 5 had dispensed oral iron medication in the year prior to diagnosis?

In addition, the study asks:

- 6 Did the analyses support the use of the 'attended ED within two weeks of diagnosis' indicator?

These questions are designed to identify possible service gaps or to improve the understanding of health service use prior to colorectal cancer diagnosis.

Note that data on colonoscopy referrals and waiting times was not available for this linkage study. Likewise screening data was not available to the authors. These could provide important and useful follow-ups to the present work.

Methods

Data sources

1. New Zealand Cancer Registry (NZCR)
2. Primary Health Organisation Enrolment Collection
3. General Medical Subsidy Collection
4. Laboratory Claims Collection
5. Pharmaceutical Collection.

Definitions and data linkage

The New Zealand Cancer Registry defined the population of interest, namely people diagnosed with colorectal cancer from calendar years 2018–2021. Only first registration with colorectal cancer is included (ICD 10 codes C18, C19, C20).

Via encrypted NHI individual level linkage, PHO enrolment status, primary health care contacts, laboratory tests claims and pharmaceutical dispensing events are determined. Diagnosis date is taken as recorded in the NZCR. Ethnicity is reported as prioritised ethnicity as recorded in the cancer registry and individual-level linkage ensures ethnicity is analysed consistently for an individual within this study, eliminating numerator-denominator bias. Given data quality is better in the last three years of analyses, the more recent years, 2019–2021, were aggregated for ethnicity analyses.

Primary care contact date in this report refers to the last General Practice Qualifying Encounter Date (GPQEDs) in a month. GPQEDs include, but "are not limited to, doctor and nurse consultations (face-to-face and remote) and follow-up communications, prescription requests and immunisations".³ Only the last contact date was recorded in each month of the

PHO register since July 2019. Before July 2019 the last contact date was recorded quarterly in the PHO register.

Oral iron dispensing

Sourced from Pharmhouse based on the following chemical names (oral formulations):

- Ferrous fumarate;
- Ferrous fumarate with folic acid;
- Ferrous sulfate.

Community laboratory tests types

Sourced from Laboratory Claims Collection:

S01	Complete blood count (full blood count)
BH1	Ferritin, serum
BV9	Liver function group
BF1	Faecal occult blood, human haemoglobin specific ⁴

Comparison to health service use by the general population in New Zealand

Given that people with colorectal cancer have an older age structure (Table 21) compared to the general population of New Zealand (Table 22), comparisons of primary health care contacts and community laboratory tests coverage between people with colorectal cancer and general population are age-adjusted by applying the age-specific general population laboratory testing coverage rates to the same age structure of the people diagnosed with colorectal cancer 2019–2021.⁵

3. Ministry of Health. Primary Care Activity Update: General Practice Qualifying Encounter Date (GPQED) Data, Ministry of Health 2022.

4. Not all faecal occult blood tests are recorded in the community claims data, e.g. screening tests are not captured unless reported back to laboratory claims data.

5. The general population laboratory test coverage is also seasonality-adjusted by averaging the testing coverage of three-month period prior to PHO enrolment 2021 in March, June, September and December.

Results

Number of people registered with colorectal cancer by age and ethnicity 2018–2021

From 2018 to 2021, a total of 13,041 people were registered with colorectal cancer, with 55% of them aged 70 and over (Table 2). Overall, people with newly diagnosed colorectal cancer are

generally older than the general population, where only 12% were aged 70 and over based on PHO enrolment in December 2021 (Table 22 in appendix).

A cohort of 9,884 people with colorectal cancer registered from 2019–2021 was examined in more detail in this report by ethnicity.

TABLE 2: NUMBER OF PEOPLE REGISTERED WITH COLORECTAL CANCER BY AGE AND BY ETHNICITY FROM 2018–2021⁶

Age	Māori	Pacific	Indian	Chinese	Other Asian	European/Other	Overall
<50	189	79	25	30	44	869	1,236
50–59	199	73	23	43	39	1,242	1,619
60–69	300	102	30	124	57	2,447	3,060
70–79	229	68	24	98	29	3,446	3,894
>80	99	34	11	62	14	3,012	3,232
% over 70	32%	29%	31%	45%	23%	59%	55%
2018 to 2021 total	1,016	356	113	357	183	11,016	13,041

2019 to 2021 total	784	279	95	283	142	8,301	9,884
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6. Note: Ethnicity prioritised in the order given, based on the Cancer Registry entry.

The number of people with colorectal cancer who presented to an emergency department within two weeks of diagnosis

The number of people registered with colorectal cancer by year of diagnosis

and the percentage of people who had an ED presentation within two weeks of diagnosis is similar⁷ to that previously reported by Te Aho o Te Kahu (Table 3).

TABLE 3: NUMBER OF PEOPLE DIAGNOSED WITH COLORECTAL CANCER IN NEW ZEALAND FROM 2018–2021 BY ED PRESENTATION WITHIN TWO WEEKS OF DIAGNOSIS

Description	2018	2019	2020	2021
No ED presentation within two weeks of diagnosis	2,296	2,388	2,443	2,409
ED presentations within two weeks of diagnosis	861	884	900	860
Number of people diagnosed with colorectal cancer	3,157	3,272	3,343	3,269
% of people with colorectal cancer having an ED presentation within two weeks of diagnosis	27.3%	27.0%	26.9%	26.3%

Percentage of people with colorectal cancer who were enrolled in a Primary Health Organisation (PHO) at the time of diagnosis

People with colorectal cancer have a very high level of PHO enrolment prior to the cancer diagnosis. In 2021, 98.7% of people with newly diagnosed colorectal cancer were enrolled in a PHO at the time of diagnosis (Table 4). Out of 860 people in 2021 who had an ED presentation within two weeks of colorectal cancer diagnosis,

97.2% were enrolled in a PHO prior to colorectal cancer diagnosis. Therefore, non-PHO enrolment does not appear to be a major driving factor for ED presentation near the time of colorectal diagnosis.

Given that the average age of people diagnosed with colorectal cancer is 69 years, the observed PHO enrolment coverage is consistent with the enrolment of people aged 65 and over in the general population of New Zealand.

TABLE 4: PHO ENROLMENT COVERAGE OF PEOPLE WITH COLORECTAL CANCER PRIOR TO DIAGNOSIS IN NEW ZEALAND FROM 2018–2021

Description	2018	2019	2020	2021
Number of people not enrolled in a PHO prior to colorectal cancer diagnosis	56	50	40	42
Number of people enrolled in a PHO prior to colorectal cancer diagnosis	3,101	3,222	3,303	3,227
Number of people diagnosed with colorectal cancer	3,157	3,272	3,343	3,269
% of people with colorectal cancer who are enrolled in a PHO at the time of diagnosis	98.2%	98.5%	98.8%	98.7%

7. Minor differences are likely related to the timing of data extract and minor differences in interpretation of methods. <https://teaho.govt.nz/reports/qpi/qpi-bowel>

Primary health care contact prior to colorectal cancer diagnosis

Based on the last primary health care contact date (General Practice Qualifying Encounter Date) prior to colorectal cancer diagnosis, the majority of people with colorectal cancer had a recent contact with primary health care prior to diagnosis. Only 3.7% of people with colorectal cancer diagnosed in 2021 did not have a primary health care contact in the 12 months prior to cancer diagnosis.

In addition, while the PHO enrolment coverage remains relatively static at around 99%, the percentage of people with colorectal cancer who had contact within 182 days prior to cancer diagnosis rose modestly from 92.3% in 2018 to 94.0% in 2021 (Table 5). The increase of primary health care contacts up to 90 days prior

to diagnosis in an annual step-wise manner from 2018–2020 is likely related to data artefact predominantly. Before July 2019, only the last GPQED for each person was recorded in the quarterly PHO enrolment data extract, and potentially more primary care contact dates near the time colorectal cancer was diagnosed, were not reported in the PHO enrolment quarterly update – compared to the monthly PHO enrolment reporting since July 2019.⁸

In 2021, 80.4% had primary health care contact up to 60 days prior to diagnosis. Within 90 days prior to diagnosis, 88.3% had primary health care contact. This compares to 70.8% of the general population in New Zealand enrolled in a PHO who had a primary contact within a 90-day period in 2021.⁹

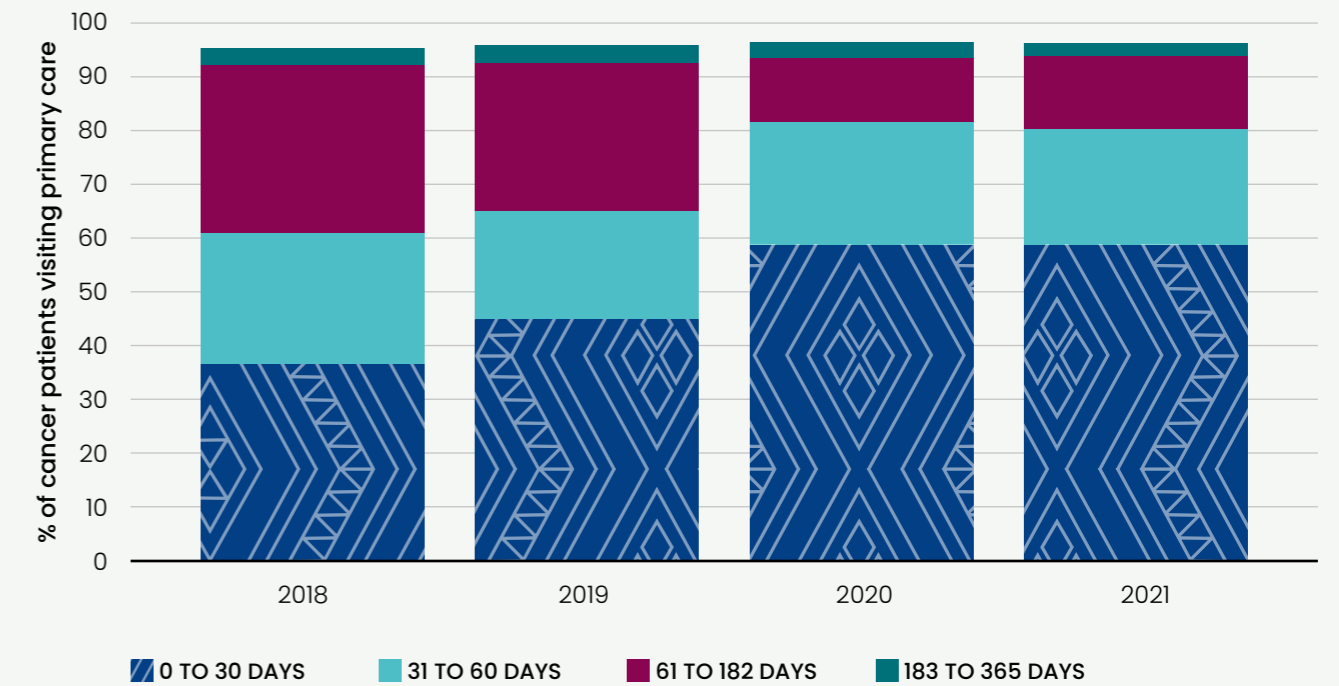
TABLE 5: LAST PRIMARY HEALTH CARE CONTACT PRIOR TO COLORECTAL CANCER DIAGNOSIS IN NEW ZEALAND FROM 2018–2021

The last primary health care contact date before diagnosis (Number of days before diagnosis)	2018	2019	2020	2021
0 to 30 days	36.3%	45.2%	58.9%	58.8%
31 to 60 days	24.7%	20.0%	22.3%	21.6%
61 to 90 days	17.2%	11.1%	6.9%	7.9%
91 to 182 days	14.2%	16.3%	5.4%	5.8%
183 to 365 days	3.1%	3.4%	3.0%	2.3%
No primary health care contact within a year	4.5%	4.1%	3.5%	3.7%
Number of people diagnosed with colorectal cancer	3,157	3,272	3,343	3,269

% refers to the number of people with colorectal cancer within the specified year of interest.

8. If there is a GP contact a day post-diagnosis and that happens to be at the end of PHO enrolment data quarterly cut-off date, then GP contacts up to 90 days prior to cancer diagnosis would not be captured. This compared to up to 30 days possible missing data from monthly PHO enrolment extract since July 2019.
 9. Age-adjusted to the age structure of colorectal cancer cohort from 2019–2021 and seasonality-adjusted by averaging the testing coverage of three-month period prior to PHO enrolment 2021 in March, June, September and December.

Figure 1: Last primary health care contact prior to colorectal cancer diagnosis in New Zealand from 2018–2021



Within the subgroup of people who had an ED presentation within two weeks of colorectal cancer diagnosis, 63.7% had a primary health care contact within 30 days of diagnosis and only 7.6% did not have a primary health care contact within a year of diagnosis in 2021.

TABLE 6: THE LAST PRIMARY HEALTH CARE CONTACT DATE OF PEOPLE WITH COLORECTAL CANCER IN NEW ZEALAND FROM 2018–2021 WHO HAD AN ED PRESENTATION WITHIN TWO WEEKS OF DIAGNOSIS

The last primary health care contact date before diagnosis (Number of days before diagnosis)	2018	2019	2020	2021
0 to 30 days	35.7%	50.0%	63.2%	63.7%
30 to 60 days	19.4%	14.8%	16.1%	14.0%
60 to 182 days	31.4%	24.0%	9.8%	10.8%
183 to 365 days	4.8%	2.9%	4.0%	4.0%
No primary health care contact within a year	8.8%	8.3%	6.9%	7.6%
Number of people diagnosed with colorectal cancer who had an ED presentation within two weeks of diagnosis	861	884	900	860

Primary health care contact prior to colorectal cancer diagnosis by ethnicity

Given the observed increase in the percentage of people with colorectal cancer who had more recent primary care contact in the last three years of analyses (with more monthly PHO enrolment updates), 2019–2021 were aggregated for ethnicity analyses.

Pacific peoples (42%) had the highest ED attendance rate within two weeks of diagnosis followed by Māori people (39%) (Table 7). Indian people had the lowest PHO enrolment in the year prior to colorectal cancer diagnosis at 89% but they also have a lower than national average ED attendance rate within two weeks of diagnosis. However, Indian people accounted for only 1% (n= 95) of the total number of people with colorectal cancer diagnosed from 2019–2021.

Pacific peoples also had a lower PHO enrolment at 92% and they accounted for 3% of the number of people with colorectal cancer diagnosed from 2019–2021.

Primary health care contact within 30 days prior to the colorectal cancer diagnosis is relatively similar across ethnicities, with Pacific and Asian groups having a marginally lower coverage of primary care contact. However, Pacific and Indian people had the highest percentage of individuals who did not have a primary care contact within a year prior to their colorectal cancer diagnosis, at 12%, compared to the European and Other group at 3%.

TABLE 7: ED AND PHO ENROLMENT INDICATORS FOR PEOPLE WITH COLORECTAL CANCER DIAGNOSED FROM 2019–2021 BY ETHNICITY IN NEW ZEALAND

Indicator	Māori	Pacific	Indian	Chinese	Other Asian	European/ Other	Overall
ED attendance within 2 weeks of diagnosis	39%	42%	26%	21%	29%	25%	27%
PHO enrolment	99%	92%	89%	96%	96%	99%	99%
Primary care contact within 30 days prior of cancer diagnosis	54%	50%	51%	52%	46%	55%	54%
No primary care contact within a year of cancer diagnosis	6%	12%	12%	10%	7%	3%	4%
Number of people diagnosed with colorectal cancer from 2019 to 2021	784	279	95	283	142	8,301	9,884
Percentage of people diagnosed with colorectal cancer from 2019–2021 (by ethnicity)	8%	3%	1%	3%	1%	84%	100%

Community laboratory testing prior to colorectal cancer diagnosis

Laboratory tests that are commonly performed for people suspected of cancer include full blood count (FBC), liver function test, iron studies (ferritin), and/or faecal occult blood tests. Given that the reasons for presentation at primary care are not captured in the national collections as yet, the uptake of these tests may be helpful proxies to indicate patients that had engaged with community-based health services, potentially for symptoms indicative of colorectal cancer. Note that the national data collection only captures data related to laboratory test volumes by test type, without capturing the actual laboratory results.

In 2021, about 63% of people with colorectal cancer had one or more FBC tests in the community within three months prior to the diagnosis of cancer (Table 8). The testing coverage of FBC within the three-month period is almost double that of the corresponding general population enrolled in a PHO at 32% in 2021, after adjusting for age and seasonality.¹⁰

In the year prior to colorectal cancer diagnosis, 83% had one or more FBC tests (Table 9). Notably just over half (51%) had two or more FBC tests in the past year prior to colorectal cancer diagnosis, which might suggest abnormal results that needed follow-up or persistent symptoms requiring repeated testing.

TABLE 8: THE PERCENTAGE OF PEOPLE WITH COLORECTAL CANCER BY THE NUMBER OF FULL BLOOD COUNT TESTS IN THE THREE MONTHS PRIOR TO COLORECTAL CANCER DIAGNOSIS

Number of full blood count tests three months prior to colorectal cancer diagnosis	2018	2019	2020	2021
0	36%	37%	37%	37%
1	41%	39%	41%	40%
2	16%	15%	15%	15%
3 or more	8%	10%	7%	8%
Number of people with colorectal cancer	3,157	3,272	3,343	3,269

TABLE 9: THE PERCENTAGE OF PEOPLE WITH COLORECTAL CANCER BY THE NUMBER OF FULL BLOOD COUNT TESTS IN ONE YEAR PRIOR TO COLORECTAL CANCER DIAGNOSIS

Number of full blood count tests one year prior to colorectal cancer diagnosis	2018	2019	2020	2021
0	15%	16%	17%	17%
1	33%	32%	32%	32%
2	23%	22%	23%	23%
3 or more	29%	31%	28%	28%
Number of people with colorectal cancer	3,157	3,272	3,343	3,269

10. Adjusted for the age structure of the colorectal cancer cohort from 2019–2021.

Iron deficiency anaemia is common in people with colorectal cancer, with just over half (51%) having a ferritin test in the three months prior to colorectal cancer diagnosis in 2021 (Table 10). This compares to only 14% of the corresponding general population enrolled in a PHO in 2021 having

a ferritin test within a three-month period, after adjusting for age and seasonality.

Overall, in 2021, 68% had a ferritin test one year prior to colorectal cancer diagnosis with 31% having two or more ferritin tests within the year of diagnosis (Table 11).

TABLE 10: THE PERCENTAGE OF PEOPLE WITH COLORECTAL CANCER BY THE NUMBER OF FERRITIN TESTS THREE MONTHS PRIOR TO COLORECTAL CANCER DIAGNOSIS

Number of ferritin tests three months prior to colorectal cancer diagnosis	2018	2019	2020	2021
0	49%	50%	49%	49%
1	39%	36%	40%	38%
2	9%	10%	9%	10%
3 or more	2%	3%	2%	2%
Number of people with colorectal cancer	3,157	3,272	3,343	3,269

TABLE 11: THE PERCENTAGE OF PEOPLE WITH COLORECTAL CANCER BY THE NUMBER OF FERRITIN TESTS ONE YEAR PRIOR TO COLORECTAL CANCER DIAGNOSIS

Number of ferritin tests one year prior to colorectal cancer diagnosis	2018	2019	2020	2021
0	30%	31%	32%	32%
1	42%	37%	38%	37%
2	17%	18%	18%	18%
3 or more	11%	14%	12%	13%
Number of people with colorectal cancer	3,157	3,272	3,343	3,269

Liver function tests (LFTs) can be part of the work-up for colorectal cancer as well as being part of the general testing. In 2021, about 44% of people had a LFT three months prior to colorectal cancer diagnosis.

This is in contrast to only 14% of the corresponding general population enrolled in a PHO in 2021 having a liver function test within a three-month period, after adjusting for age and seasonality.

TABLE 12: THE PERCENTAGE OF PEOPLE WITH COLORECTAL CANCER BY THE NUMBER OF LIVER FUNCTION TESTS THREE MONTHS PRIOR TO COLORECTAL CANCER DIAGNOSIS

Number of liver function tests three months prior to colorectal cancer diagnosis	2018	2019	2020	2021
0	53%	56%	55%	56%
1	37%	32%	36%	35%
2 or more	10%	12%	9%	10%
Number of people with colorectal cancer	3,157	3,272	3,343	3,269

In the year prior to colorectal cancer diagnosis in 2021, 66% of people had a liver function test.

TABLE 13: THE PERCENTAGE OF PEOPLE WITH COLORECTAL CANCER BY THE NUMBER OF LIVER FUNCTION TESTS ONE YEAR PRIOR TO COLORECTAL CANCER DIAGNOSIS

Number of liver function tests 1 year prior to colorectal cancer diagnosis	2018	2019	2020	2021
0	32%	35%	35%	34%
1	39%	35%	36%	37%
2 or more	29%	30%	29%	29%
Number of people with colorectal cancer	3,157	3,272	3,343	3,269

Few people (5%) had received a community faecal occult blood test in the year prior to colorectal cancer diagnosis. This may be partly related to the fact not all faecal occult blood tests are recorded in the community claims, and colorectal cancer may present with fresh rectal bleeding that

does not require a faecal occult blood test (an obvious symptom that does not need to be validated). However, there may be a role for faecal immunochemical testing (FIT) to prioritise symptomatic cases for more urgent colonoscopy.

TABLE 14: PERCENTAGE OF PEOPLE WITH COLORECTAL CANCER BY THE NUMBER OF FAECAL OCCULT BLOOD TESTS ONE YEAR PRIOR TO COLORECTAL CANCER DIAGNOSIS

Number of faecal occult blood tests one year prior to colorectal cancer diagnosis	2018	2019	2020	2021
0	90%	94%	94%	95%
1	6%	4%	4%	4%
2 or more	4%	2%	2%	1%
Number of people with colorectal cancer	3,157	3,272	3,343	3,269

Treatment with an iron supplement

Treatment with iron supplement via prescription indicates the clinician is likely to be treating iron deficiency. Providing iron supplements is reasonable while waiting for further investigation of the cause of iron deficiency.

In 2021, 17% of people had received at least one oral iron dispensing in the year before the diagnosis of colorectal cancer. People receiving repeated iron supplement dispensing (7%) may suggest possible delays in access to investigations related to colorectal cancer.

TABLE 15: PERCENTAGE OF PEOPLE WITH COLORECTAL CANCER BY THE NUMBER OF ORAL IRON DISPENSINGS ONE YEAR PRIOR TO COLORECTAL CANCER DIAGNOSIS

Number of oral iron dispensings one year prior to colorectal cancer diagnosis	2018	2019	2020	2021
0	83%	83%	82%	83%
1	11%	9%	10%	10%
2 or more	6%	8%	8%	7%
Number of people with colorectal cancer	3,157	3,272	3,343	3,269

Exploring associated factors with ED attendance within two weeks of colorectal cancer diagnosis

PHO enrolment coverage rates by ethnicity

PHO enrolment prior to colorectal cancer diagnosis is overall very high, regardless of whether a person attended ED within two weeks of diagnosis.

Of those people who had an ED attendance within two weeks, 97% were enrolled in the year prior to diagnosis, compared to 99% PHO enrolment coverage of those people who did not have an ED attendance with two weeks (Table 16). However, Pacific and Indian people have lower PHO enrolment coverage amongst those who had an ED attendance at 89% and 84% respectively.

TABLE 16: PERCENTAGE OF PEOPLE DIAGNOSED WITH COLORECTAL CANCER FROM 2019–2021 WHO WERE ENROLLED IN A PHO BY ED ATTENDANCE WITHIN TWO WEEKS OF DIAGNOSIS AND ETHNICITY

Indicator	Māori	Pacific	Indian	Chinese	Other Asian	European/ Other	Overall
Did not have an ED attendance within two weeks: % enrolled in PHO	99%	94%	91%	98%	98%	99%	99%
Number of people who did not have an ED presentation within two weeks of diagnosis	478	161	70	223	101	6,207	7,240
Had an ED attendance within two weeks: % enrolled in a PHO	98%	89%	84%	92%	93%	98%	97%
Number of people who had an ED presentation within two weeks of diagnosis	306	118	25	60	41	2,094	2,644
Overall, PHO enrolment coverage	99%	92%	89%	96%	96%	99%	99%

Primary care contact by ethnicity

People who attended ED within two weeks of colorectal cancer diagnosis had a higher percentage of primary care contact (59%), compared to people (53%) who did not attend ED within two weeks (Table 17). This suggested there may be other factors (such as acuity of presentation

or severity of the symptoms) rather than the lack of primary care engagement per se that had led to ED presentation in an acute setting. Nevertheless, a marginally lower coverage of primary care contact over a year (92% vs 98%) was associated with ED attendance within two weeks of diagnosis.

TABLE 17: PERCENTAGE OF PEOPLE DIAGNOSED WITH COLORECTAL CANCER FROM 2019–2021 WHO ATTENDED PRIMARY CARE BY ETHNICITY AND ED ATTENDANCE WITHIN TWO WEEKS OF DIAGNOSIS

Indicator	Māori	Pacific	Indian	Chinese	Other Asian	European/Other	Overall
People who did not have an ED attendance within two weeks: % attended primary care within 30 days prior to colorectal cancer diagnosis	56%	48%	46%	52%	39%	53%	53%
People who had an ED attendance within two weeks: % attended primary care within 30 days prior to colorectal cancer diagnosis	50%	53%	64%	53%	63%	61%	59%
People who did not have an ED attendance with two weeks: % attended primary care within one year prior to colorectal cancer diagnosis	97%	93%	91%	93%	94%	98%	98%
People who had an ED attendance within two weeks: % attended primary care within one year prior to colorectal cancer diagnosis	90%	81%	80%	80%	90%	94%	92%

Laboratory testing coverage by ethnicity

People who had an ED attendance within two weeks of colorectal cancer diagnosis are less likely to have received community laboratory tests such as full blood count (FBC), ferritin, and liver function tests (LFT) in the three months prior to their diagnosis. Their testing coverage of FBC, ferritin and

LFT were at 56%, 42% and 41% respectively (Table 18). In comparison, people who did not have an ED attendance within two weeks prior to their colorectal cancer diagnosis had modestly higher testing coverage of FBC (66%), ferritin (54%), and LFT (46%) tests in the three months prior to their cancer diagnosis.

After adjusting for age and ED attendance status, Māori and Pacific peoples with colorectal cancer generally have lower coverage of community FBC, ferritin and LFT testing prior to colorectal cancer diagnosis.

TABLE 18: PERCENTAGE OF PEOPLE DIAGNOSED WITH COLORECTAL CANCER FROM 2019–2021 WHO HAD SELECTED LAB TESTS WITHIN THREE MONTHS OF DIAGNOSIS BY ETHNICITY, AND ED ATTENDANCE WITHIN TWO WEEKS OF DIAGNOSIS

Indicator	Māori	Pacific	Indian	Chinese	Other Asian	European Other	Overall
People who did not have an ED attendance within two weeks: % had a FBC test within three months	59%	56%	67%	60%	54%	67%	66%
Age-adjusted: No ED attendance, % had FBC within three months	61%	61%	76%	64%	64%	67%	66%
People who had an ED attendance within two weeks: % had a FBC test within three months	50%	46%	76%	53%	63%	57%	56%
Age-adjusted: ED attendance % had FBC within three months	56%	45%	78%	52%	60%	57%	56%
People who did not have an ED attendance within two weeks: % had a ferritin test within three months	47%	42%	54%	48%	46%	55%	54%
Age-adjusted: No ED attendance: % had ferritin within three months	49%	49%	62%	51%	44%	55%	54%
People who had an ED attendance within two weeks: % had a ferritin test within three months	33%	38%	60%	45%	44%	43%	42%
Age-adjusted: ED attendance: % had ferritin within three months	38%	36%	64%	40%	38%	42%	42%
People who did not have an ED attendance within two weeks: % had a LFT test within three months	42%	39%	49%	48%	47%	46%	46%
Age-adjusted: No ED attendance: % had LFT within three months	43%	42%	56%	51%	58%	46%	46%
People who had an ED attendance within two weeks: % had a LFT test within three months	34%	39%	68%	42%	49%	42%	41%
Age-adjusted: ED attendance: % had LFT within three months	38%	36%	65%	40%	38%	42%	41%

Association between full blood count testing frequency and primary care contact prior to colorectal cancer diagnosis

People with higher frequency of FBC testing in the three months prior to colorectal cancer diagnosis are more likely to have primary care contact in the last month (or three months) prior to diagnosis. Interestingly, the primary care contact coverage in the 30 or 90 days prior to diagnosis is higher in people with

higher frequency of FBC testing, as well as in subgroups that had attended ED attendance within two weeks of diagnosis (adjusted for FBC testing). These findings may suggest that the presentation to ED is also related to underlying acuity and severity of symptoms on presentation. The correlation between primary care contact and full blood count testing may also be related to co-morbidities that are not cancer-related.

TABLE 19: DISTRIBUTION OF THE LAST PRIMARY CARE CONTACT TIMING PRIOR TO COLORECTAL CANCER DIAGNOSIS IN SUBGROUPS OF ED ATTENDANCE AND FREQUENCY OF FBC TESTS

ED attendance status prior to diagnosis	Frequency of FBC tests in three months prior to diagnosis	Last primary care contact (number of days prior to cancer diagnosis)					No primary care contact in the year prior to cancer diagnosis	Number of people with colorectal cancer
		0–30	31–60	60–89	90–182	183–365		
No ED attendance within two weeks	0	42%	24%	11%	15%	4%	4%	2,488
	1	57%	23%	9%	7%	2%	2%	3,096
	2	59%	25%	8%	5%	2%	1%	1,073
	3 or more	64%	23%	5%	5%	1%	1%	583
No ED attendance overall		53%	24%	9%	10%	3%	2%	7,240
ED attendance within two weeks	0	47%	15%	9%	11%	6%	13%	1,162
	1	67%	16%	5%	6%	2%	5%	840
	2	70%	14%	5%	5%	1%	3%	405
	3 or more	73%	14%	6%	6%	1%	0%	237
ED attendance within two weeks overall		59%	15%	7%	8%	4%	8%	2,644
Overall		54%	21%	9%	9%	3%	4%	9,884

Laboratory testing and iron tablets dispensing within a year of colorectal cancer diagnosis

The majority of people who had an ED attendance within two weeks of colorectal cancer diagnosis had some form of

laboratory work-up in the community in the year prior to their cancer diagnosis. From 2019–2021, 75% of those attending ED within two weeks of colorectal cancer diagnosis had a FBC test, 58% had a ferritin test to determine iron deficiency, and 60% had an LFT test in the year prior to diagnosis.

In addition, 15% had received at least one dispensing of oral iron in the year prior to cancer diagnosis. People who did not have an ED attendance in the two weeks prior to cancer diagnosis only have a marginally higher laboratory testing coverage, and iron tablets dispensing. The difference would not fully account for all the reasons for the ED attendance.

These health service contacts suggest that a significant proportion of people are being investigated and being treated for iron deficiency prior to colorectal cancer diagnosis.

TABLE 20: PERCENTAGE OF PEOPLE DIAGNOSED WITH COLORECTAL CANCER FROM 2019–2021 WHO HAD SELECTED LAB TESTS OR ORAL IRON PRESCRIPTION DISPENSED BY ETHNICITY AND ED ATTENDANCE WITHIN TWO WEEKS OF DIAGNOSIS

Indicator	Māori	Pacific	Indian	Chinese	Other Asian	European Other	Overall
People who did not have an ED attendance within two weeks: % had a FBC test within 12 months	81%	78%	84%	80%	85%	87%	86%
People who had an ED attendance within two weeks: % had a FBC test within 12 months	66%	61%	88%	70%	76%	77%	75%
People who did not have an ED attendance within two weeks: % had a ferritin test within 12 months	63%	65%	73%	64%	65%	73%	72%
People who had an ED attendance within two weeks: % had a ferritin test within 12 months	44%	52%	76%	50%	54%	61%	58%
People who did not have an ED attendance within two weeks: % had a LFT test within 12 months	67%	61%	73%	72%	68%	67%	67%
People who had an ED attendance within two weeks: % had a LFT test within 12 months	50%	58%	80%	60%	56%	62%	60%
People who did not have an ED attendance within two weeks: % had oral iron prescription dispensed	16%	13%	20%	11%	18%	19%	18%
People who had an ED attendance within two weeks: % had oral iron prescription dispensed	9%	12%	28%	15%	10%	16%	15%

Appendix A

Age structure of people diagnosed with colorectal cancer from 2019–2021

TABLE 21: NUMBER OF PEOPLE DIAGNOSED WITH COLORECTAL CANCER IN NEW ZEALAND FROM 2019–2021 BY AGE

Age	Number of people diagnosed with colorectal cancer	% of cohort by age band
<50	939	9.5%
50–59	1,193	12.1%
60–69	2,373	24.0%
70–79	2,936	29.7%
80–90	2,202	22.3%
>90	241	2.4%
Total	9,884	100%

Age structure of the general population (PHO-enrolled in December 2021)

TABLE 22: NUMBER OF PEOPLE IN NEW ZEALAND ENROLLED IN A PHO IN DECEMBER 2021 BY AGE

Age	Number of people enrolled in a PHO	% of cohort by age band
<50	3,088,514	64.2%
50–59	622,935	12.9%
60–69	539,202	11.2%
70–79	367,597	7.6%
80–90	160,247	3.3%
>90	32,933	0.7%
Total	4,811,428	100%

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