A review of cervical cancer occurrences in New Zealand 2008–2012

Phil Hider, Kieran Dempster-Rivett, Jonathan Williman, Michelle Dempster-Rivett, Lynn Sadler, Melissa McLeod, Andrew Miller, Peter Sykes

ABSTRACT

BACKGROUND: A review of the screening histories of women/wahine diagnosed with cervical cancer was undertaken to assess where the screening pathway can be improved.

METHODS: Women diagnosed with confirmed or possible cervical cancer during 1 January 2008–31 December 2012 were identified from the National Cancer Registry (NCR) records. Screening histories for these women were obtained from the National Cervical Screening Programme (NCSP) Register along with pathology and cytology reports and staging information. Women aged 25-69 years with confirmed cervical cancer underwent a review of their screening history. Cervical cancer incidence rates were calculated using Statistics New Zealand mid-year population estimates.

RESULTS: Seven hundred and seventy-two confirmed diagnoses of cervical cancer were made during 2008–2012 for an incidence rate of 6.9 per 100,000 women per year. Only 13% of 644 women aged 25–69 years had regular cervical cancer screening according to New Zealand guidelines and this proportion was lower among Māori and Pacific people and those living in deprived areas. However, 37% of women had had a screen in the preceding three-year screening interval, excluding screens undertaken within six months of histological diagnosis. In addition, a significant number developed cancer following an abnormal screen.

CONCLUSION: Ongoing efforts are required to improve uptake of regular cervical screening particularly for Māori and socio-economically disadvantaged women/wahine. Further investigation of incident cervical cancers using population-linked data, slide reviews of screens reported as negative and more clinical information is needed to facilitate clinical pathway review to determine the contributing factors that lead to the development of cervical cancer following normal and abnormal screening tests.

The introduction of organised screening programmes has resulted in significant reductions in the morbidity and mortality from cervical cancer in many developed nations, including New Zealand.[1,2] The National Cervical Screening Programme (NCSP) oversees the programme in New Zealand and has to balance the intensity of screening with practicality, cost and the risk of potential harm. Current screening recommendations from the NCSP are that eligible women should undergo cervical cytology screens at three-yearly intervals from the age of 20–69. These recommendations will be reviewed in 2018 with the introduction of HPV-based screening.

Monitoring of the NCSP is multifaceted and summarised by regular monitoring reports. These reports suggest that between 2008–2012 the proportion of women/wahine aged 25–69 screened in the previous three years was stable at about 76%, however coverage rates are lower among Māori, Pacific, Asian women, and in women aged 25–35 and 60–69 years.[3,4]

It is recognised that not all cervical cancers can be prevented by screening, but the review of cervical cancer cases within a screened population can identify areas where the screening pathway may be improved. Two previous reviews of women/wahine with cervical cancer in New Zealand

have been conducted. The first followed the ministerial inquiry into the under reporting of cervical abnormalities in the Gisborne region[5] and included 445 women with histologically proven cervical cancer between 2000 and 2002. The second was performed by NCSP staff and involved 438 cases of cervical cancer diagnosed between 2003 and 2006.[6] Both reviews concluded that over 80% of women with cervical cancer were inadequately screened and drew attention to the need for improving coverage and ongoing monitoring of the programme, among other recommendations.

Aim

This review was commissioned by the NCSP and aimed to evaluate the quality of the NCSP by examining the screening histories of women/wahine diagnosed with cervical cancer between 2008 and 2012.

Methods

All women with a diagnosis of either cervical cancer or possible cervical cancer (ICD-10 codes: C530, C539 and C578) between 1 January 2008 and 31 December 2012 were identified from National Cancer Registry (NCR) records. For each record, the Ministry of Health provided the relevant screening history from the NCSP Register along with all pathology and cytology reports and recorded staging information from the NCR. All information was transcribed into a customised database created in Microsoft Access™. Data entry was reviewed in two ways. Every fifth record (total of 45) initially entered into the database was independently checked for accuracy. On completion, a random sample (n=105) of the records were reviewed. From these checks, four transcription errors were noted, each relating to the date of diagnosis as recorded by the NCSP.

All pathology reports in conjunction with the corresponding NCR and NCSP Register records were assessed by the review team to confirm histological diagnosis, date of diagnosis (defined as the first histological diagnosis of cancer) and FIGO staging.

Ethnicity information was derived from NCR records and has been classified using a total response methodology[7,8] where individuals are included in all of the ethnic groups that are recorded for them. The only exception are the results in Table 1 where a Māori non-Māori classification has been presented. Cervical cancer incidence rates were calculated by year using Statistics New Zealand mid-year population estimates as the population denominators. For the Māori and non-Māori comparisons, incidence rates were age standardised to the Māori 2001 census population.

A comparison of the information held in the NCSP Registry and the NCR was made and discrepancies regarding date of diagnosis, histological type, stage and mode of diagnosis were identified. Following the review of pathology reports and available clinical information the fidelity of data on the individual registers was assessed.

Confirmation of cervical cancer diagnosis within the study timeframe (2008–2012) involved, in the first case, identifying a histology report clearly describing a cancer arising from the cervix. Alternatively, if this information was not available, a diagnosis was inferred where there was at least a high grade screen (ie, HSIL) or biopsy (ie, CIN3) information accompanied by documented clinical evidence of advanced cervical cancer. The confirmed date of diagnosis was considered to be the date of the diagnostic biopsy or, in the absence of histology, the cytology report.

Women aged between 25 and 69 were eligible for the review of their screening history. Cases were excluded if they were not confirmed as having cervical cancer according to the criteria outlined above. In addition, women with rare non-HPV types of cervical cancer were excluded for the review of screening history.

Consistent with previous reviews, any screens taken within six months of diagnosis were considered to be part of the diagnostic process and not screening screens.[1,6] The number and proportion of women with the following screening histories were reported: those ever screened, those screened in the prior three-year, five-year and 6.5-year periods. In addition, the number of previous screens was reported along with the proportion undergoing regular screening as defined in 2002 and 2006 reviews.[1,6] Screening history was presented in relation to key demographic factors and histological types.

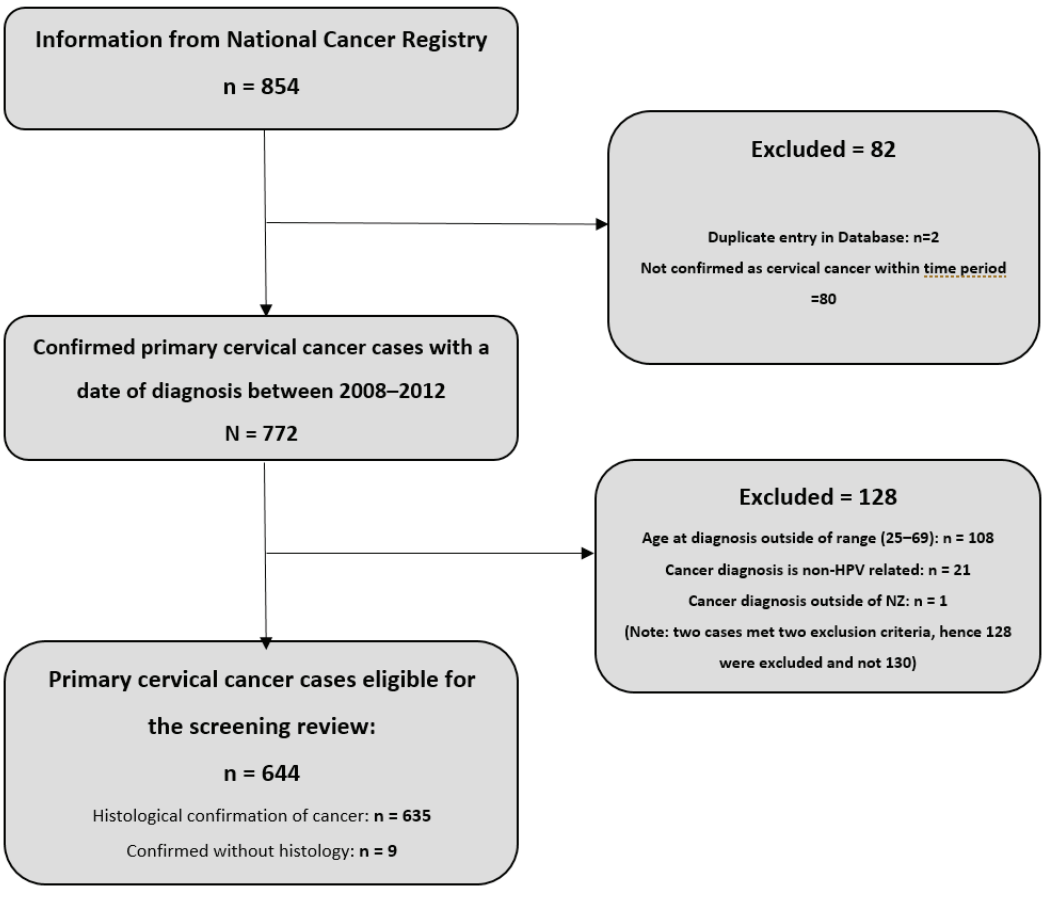
Women with previous screen-detected abnormalities were identified and it was determined whether they had a colposcopy appointment or cervical biopsy.

Results

Eight hundred and fifty-four cases of cervical cancer or possible cervical cancer were identified from the NCR. Two duplicate records were deleted. Using name, date of birth and NHI, 805 of the 852 women were linked to records in the NCSP Register. When information in the NCR was compared to what was recorded in the NCSP Register, some discrepancies were identified between the two registries. In 333 cases the date of diagnosis was different. The median difference between the dates was 24 days, although there were 141 occurrences where the date of diagnosis differed between records by greater than 31 days. In another 114 instances no date of diagnosis was recorded in the NCSP records, and there were 11 occasions where the histological type differed between registers. Within the NCR pre-invasive diagnoses are recorded on the same record as those which are malignant. It appears that the date of diagnosis is recorded as the date of the earliest biopsy or cytology result regardless of whether it is malignant or pre-invasive. Because of this, the date of diagnosis recorded may not be the date of histological diagnosis; in 73 cases the date of diagnosis apparently was obtained from a pre-invasive biopsy result and in 110 cases from a cervical cytology result.

Among the 852 women registered on the NCR, 772 were confirmed to have a diagnosis of cervical cancer within the review time frame (Figure 1). Among the 80 excluded, 42 women could not be confirmed as having a cervical cancer, 32 had no histological diagnosis information and seven were out of range after the date of diagnosis was corrected. Three cases were diagnosed at least three years earlier and a further four were noted in the NCR with diagnosis

Figure 1: Application of inclusion and exclusion criteria to the full dataset as supplied by the NCR and NCSP for selection of cases eligible to the screening review.



dates in December 2012 that were changed to January 2013 and hence were excluded. The 772 cases included 757 women with a histological diagnosis and 15 women for whom no histological diagnosis of cancer appears to have been made but sufficient pathological and clinical information was available to confirm the diagnosis. Six hundred and forty-four women aged 25–69 years with HPV-related cancers were included in the screening history review. One hundred and eight cases were outside the age limits and 21 had non-HPV related cancers. One additional case of cancer diagnosed overseas was considered ineligible, as the woman could not have attended screening in this country.

Over the five-year period from 2008 to 2012 the annual number of confirmed cases of cervical cancer varied between 133 and 167. This corresponds to a crude incidence rate of 6.9 per 100,000 female population per year. The crude incidence rate for Māori exceeded that for non-Māori in all years covered by the review with an age-adjusted IRR of approximately 1.6 (Table 1).

Among the 772 cases, the highest number of new cases in any five-year age grouping was among women aged 40–45 years. Twenty-two percent were among women/wahine who recorded Māori as at least one of their ethnicities and 27% were in the most deprived sociodemographic quintile (Table 2).

Among the HPV-related cancers, squamous cell carcinoma (SCC) (72%) was the most common histological type, followed by adenocarcinoma (19%) and adenosquamous carcinoma (3%). FIGO stage was unavailable for 463 cases (54%). Staging information was inferred from clinical data and histology reports to group 271 diagnoses into either Stage 1A or Stage 1B or greater (1B+). Among those that were coded, 18 cases of FIGO 1A were upgraded to 1B+ and five cases with FIGO 1B+ were downgraded to 1A, and 10 were assigned as unknown. Histological staging was not available in the NCR for 51% of women. After imputing information from the available reports staging could not be determined for 17% of women. On the basis of histology reports we determined at least 26% of all women with SCC had superficially invasive tumours (Stage 1A), 20% of women with adenocarcinoma and 6% of those with adenosquamous carcinomas had Stage 1A disease.

Overall, 70% of the 644 women diagnosed with cervical cancer and aged 25–69 had any screen recorded on the NCSP Register, and 51% had a screen within the 6–84 months prior to diagnosis while 37% had a screen between 6–42 months prior to diagnosis (Table 3). However, only 13% had an adequate screening history over the 84 months prior to diagnosis by the criteria used in the 2002 Review[1] (adequate screening is defined such that there is no between-screen interval of three calendar years or more in six to less than 84 months prior to diagnosis). Women with cancer aged under 45 years were more likely to have been screened than older women (80.6% versus 59.6%). The proportion of women

Table 1: Annual incidence of confirmed cervical cancer cases per 100,000 female population per year by year and ethnicity (crude and age-adjusted to the 2001 Census Māori population).

Year	Total n	Total rate	Māori rate crude	Māori rate age adj.	Non-Māori rate crude	Non-Māori rate age adj.
2008	162	7.4 (6.4, 8.7)	11.2 (8.1, 15.5)	10.6 (7.4, 14.8)	6.5 (5.4, 7.8)	4.7 (3.8, 5.9)
2009	132	6.0 (5.1, 7.1)	8.1 (5.5, 11.7)	7.7 (5.1, 11.4)	5.6 (4.6, 6.8)	3.7 (3.0, 4.7)
2010	168	7.6 (6.5, 8.8)	11.4 (8.4, 15.6)	10.5 (7.4, 14.6)	6.7 (5.6, 8.0)	4.9 (4.0, 6.0)
2011	157	7.0 (6.0, 8.2)	9.0 (6.3, 12.7)	8.6 (5.8, 12.4)	6.5 (5.4, 7.7)	4.9 (4.0, 6.1)
2012	153	6.8 (5.8, 8.0)	10.0 (7.2, 13.9)	9.5 (6.5, 13.4)	6.0 (5.0, 7.3)	4.2 (3.4, 5.3)
	772		9.9 (8.5, 11.5)	9.4 (8.0, 10.9)	6.2 (5.8, 6.8)	4.5 (4.1, 4.9)

*Prioritised ethnicity, where Māori include any individual with Māori recorded as their ethnicity on the 772 records.
*Non-Māori rates were directly age standardised to the 2001 Census Māori population.

Table 2: Demographics and tumour characteristics for cervical cancer cases per year (2008–2012).

		2008	2009	2010	2011	2012	TOTAL
Total		**162**	**132**	**168**	**157**	**153**	**772**
Age	20–<25	5	1	7	6	5	24
	25–<30	10	7	13	14	7	51
	30–<35	20	11	15	24	13	83
	35–<40	20	20	19	16	19	94
	40–<45	21	23	24	15	27	110
	45–<50	18	16	24	21	16	95
	50–<55	20	8	15	10	14	67
	55–<60	16	12	11	17	15	71
	60–<65	10	9	10	7	13	49
	65–<70	7	6	13	9	9	44
	70–<75	4	2	7	8	4	25
	75–<80	4	8	2	3	3	20
	80+	7	9	8	7	8	39
Ethnicity*	European/Other	97	90	104	103	99	493
(Total response)	Māori	37	27	39	31	35	169
	Pacific Island	11	19	14	16	12	72
	Asian	12	7	16	9	13	57
	MELAA	6	1	3	2	1	13
	Unknown	5	1	3	3	3	15
Deprivation index	1	17	16	14	8	10	65
	2	14	9	15	9	14	61
	3	8	10	8	16	17	59
	4	14	12	16	9	9	60
	5	11	9	17	19	10	66
	6	18	16	18	12	15	79
	7	15	8	14	14	13	64
	8	17	9	23	16	20	85
	9	26	23	21	20	14	104
	10	20	19	17	23	25	104
	Unknown	2	1	5	11	6	25
Type	SCC	118	87	120	113	114	552
	Adeno	25	30	33	37	25	150
	Adenosquamous	8	5	4	2	1	20
	Other	7	8	6	1	7	29
	Non-HPV related	4	2	5	4	6	21
Stage histological	1A	35	22	45	42	32	176
	1B+	93	89	96	90	100	468
	Not available	34	21	27	25	21	128
	Total	162	132	168	157	153	772

*Total response ethnicity—individuals are included in each of the ethnic groups that have been recorded on the 772 women/wahine. For example, an individual identifying as Māori and Pacific will be included in both of these categories.

Table 3: Screening adequacy by patient demographics among women/wahine with HPV-related cervical cancer aged 25–69.

	Total	Any screen since 1990*		6 to 84 months		6 to 66 months		6 to 42 months		Every five years		Adequately (every three years)	
	N	n	%	n	%	n	%	n	%	n	%	n	%
Age													
25–<30	50	43	86	40	80	37	74	29	58	28	56	12	24
30–<35	81	67	83	49	60	44	54	36	44	26	32	14	17
35–<40	93	78	84	54	58	47	51	37	40	18	19	11	12
40–<45	106	78	74	54	51	47	44	39	37	10	9	12	11
45–<50	93	62	67	39	42	35	38	29	31	9	10	7	8
50–<55	65	36	55	27	42	25	38	23	35	4	6	5	8
55–<60	66	39	59	32	48	29	44	24	36	6	9	11	17
60–<65	47	24	51	16	34	15	32	11	23	6	13	3	6
65–<70	43	26	60	17	40	17	40	13	30	5	12	6	14
Ethnicity^													
European	351	267	76	207	59	189	54	151	43	87	25	63	18
Māori	159	116	73	71	45	61	38	53	33	18	11	10	6
Pacific	61	33	54	18	30	15	25	13	21	2	3	3	5
Asian	46	27	59	25	54	24	52	18	39	4	9	5	11
MELAA	12	3	25	2	17	2	17	2	17	0	0	0	0
Other	3	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	12	7	58	5	42	5	42	4	33	1	8	0	0
Deprivation (quintile)													
1 (least deprived)	102	76	75	64	63	59	58	43	42	27	26	19	19
2	93	70	75	59	63	56	60	45	48	23	25	17	18
3	123	85	69	67	54	57	46	48	39	24	20	13	11
4	125	84	67	55	44	47	38	43	34	16	13	12	10
5	180	121	67	71	39	67	37	54	30	18	10	18	10
Unknown	21	17	81	12	57	10	48	8	38	4	19	2	10
Type													
SCC	472	312	66	219	46	191	40	153	32	77	16	50	11
Adeno	132	117	89	90	68	88	67	73	55	31	23	25	19
Adeno-squamous	19	11	58	9	47	8	42	7	37	3	16	4	21
Other	21	13	62	10	48	9	43	7	33	1	5	2	10
Stage													
1A	159	126	79	97	61	87	55	61	38	36	23	13	8
1b+	390	281	72	197	51	177	45	153	39	61	16	53	14
Unknown	95	46	48	34	36	32	34	26	27	15	16	15	16
Total	644	453	70	328	51	296	46	241	37	112	17	81	13

*Includes screen within six months of diagnosis.
^Total response ethnicity as recorded on the NCR .

Table 4: Screening history in the 6 to 84 months prior to diagnosis among…

	Total	One + high grade		Two + low grade		One low grade		One negative		Two+ negative		No screening	
	N	n	%	n	%	n	%	n	%	n	%	n	%
Age													
25–<30	50	8	16	2	4	5	10	10	20	16	32	10	20
30–<35	81	19	23	3	3	3	3	13	16	11	13	32	39
35–<40	93	10	10	1	1	6	6	13	13	24	25	39	41
40–<45	106	13	12	1	0	4	3	20	18	16	15	52	49
45–<50	93	14	15	2	2	5	5	10	10	8	8	54	58
50–<55	65	12	18	0	0	2	3	8	12	5	7	38	58
55–<60	66	11	16	1	1	1	1	10	15	9	13	34	51
60–<65	47	2	4	0	0	0	0	4	8	10	21	31	65
65–<70	43	3	6	0	0	0	0	2	4	12	27	26	60
Ethnicity*													
European	351	45	12	5	1	20	5	48	13	89	25	144	41
Māori	159	31	19	1	0	2	1	23	14	14	8	88	55
Pacific	61	8	13	0	0	1	1	7	11	2	3	43	70
Asian	46	6	13	3	6	3	6	8	17	5	10	21	45
MELAA	12	2	16	0	0	0	0	0	0	0	0	10	83
Other	3	0	0	0	0	0	0	0	0	0	0	3	10
Unknown	12	0	0	1	8	0	0	4	33	1	8	7	58
Deprivation (quintile)													
1	92	16	15	1	0	6	5	17	16	24	23	38	37
2	105	12	12	5	5	6	6	12	12	24	25	34	36
3	115	15	12	1	0	4	3	19	15	28	22	56	45
4	134	17	13	0	0	5	4	16	12	17	13	70	56
5	177	30	16	3	1	3	1	20	11	15	8	109	60
Unknown	21	2	9	0	0	2	9	5	23	5	23	9	42
Total	644	92	14	10	1	26	4	89	13	111	17	316	49

*Total response ethnicity as recorded on the NCR.

who had had adequate screening was low across all age groups (<25%), especially for those aged 60–65 (6%). Pacific and Asian women were less likely than European or Māori women/wahine (54% and 59% versus 76% and 73%) to have ever had a cervical screen. The proportion of Māori and Pacific women/wahine who were adequately screened was low (6% and 5%) and less than that of European or Asian women (18% and 11%). Women/wahine residing in areas of greater socioeconomic deprivation were less likely to have had screens at most time intervals and were less likely to have regular screens than women who were residing in less deprived areas.

Among the women aged 25–69 years with cervical cancer who had undergone a screen 6–84 months prior to diagnosis, 38% had recorded an abnormal screen, of which 74% were high grade. Māori comprised 34% of this group. Eighty-seven (95%) of the women/wahine with high-grade abnormalities received a referral for colposcopy, but only 67% had a subsequent biopsy. We were unable to further determine the factors associated with treatment failure for these women.

Discussion

This review demonstrates that the majority of women/wahine who develop cervical cancer have not been adequately screened. In fact, only 13% of women age 25–69 with confirmed cancer from 2008 to 2012 had regular screening according to New Zealand cervical screening guidelines prior to their diagnosis. This was even lower among Māori women/wahine, and those that live in areas of higher levels of socio-economic deprivation. The failure of the system to engage women/wahine, especially Māori and those living in deprived areas, with regular cervical screening appears to be the most important modifiable risk factor associated with the diagnosis of cervical cancer in this cohort of women. Therefore, an emphasis should continue to be placed both on enrolling women in the screening program and ensuring that they get regular ongoing screening tests, with a particular focus on Māori. The disparity in incidence of cervical cancer between Māori and non-Māori has reduced from 1996 but has remained persistent[9] despite improved efforts to engage Māori women/wahine with screening. However, there is evidence that suggests coverage rates among Māori have improved since 2010.[3,4] There is a clear need for renewed effort and novel approaches to the prevention of cervical cancer in Māori women/wahine. Fortunately, HPV vaccination in particular, as well as the option of HPV self-sampling may offer real opportunities to reduce these disparities.[10–12]

The findings from this review indicate that discrepancies between the NCR and the NCSP Register are common. For a significant proportion of women the diagnosis of cervical cancer is not present on the NCSP Register. The date of diagnosis recorded on the NCR does not necessarily reflect the date of histological diagnosis, but may reflect the date of a preceding non-invasive biopsy or cervical screen. The NCR records all in-situ and invasive malignancies, and currently considers the first abnormality to be the date of diagnosis. The median discrepancy in date of diagnosis was 24 days. While this may be of little direct clinical importance it leads to some confusion. If the NCR date is used for review of diagnosis to treatment times it will introduce an apparent delay. A small number of cases (4) were excluded from the review because of the discrepancy of date, but the number was too small to have any material impact on the review results. To help reduce discrepancies we would recommend that the date of histological diagnosis be used to define the date of diagnosis and that the NCR report new cases of cervical cancer routinely to the NCSP Register. Finally, it is disappointing to note the lack of FIGO stage data on the NCR; this is unchanged from the 2002 audit. As stage correlates well with outcome, the recording of this information on the NCR or collection of this information from clinical records would add significantly to the information gained from future reviews.

Between 2000 and 2012, there has been a fall in the incidence of cervical cancer in New Zealand from 8.4 to 6.3 per 100,000 women per year.[6,13] During this time, the proportion of adenocarcinomas has increased slightly, from 15 to 19%. As screening is known to offer greater protection from squamous cancers, this would imply more effective screening. Between 2006 and 2012, changes in cervical cancer rates among all women have been minimal while a small increase occurred among Māori.[14] This would suggest that improvements in screening were largely made prior to 2006.

In comparison to the 2000–2002 review, the proportion of women with cancer that have been screened has reduced. The reduction in the proportion of women with cancer that had been screened between reviews may be due to increased protection from cancer for screened women. However, it is important to note that women who were not resident in New Zealand for the prior four years were excluded in the previous review, whereas we were unable to determine residency in this review. In addition, we included some women with cytological rather than histological confirmation of disease who had advanced disease and were perhaps less likely to be screened. The interpretation of these trends is therefore challenging and complicated by changes in methodology between reviews.

In order to provide accurate figures regarding the protective effect of screening, the utilisation of a case control methodology by linking the NCSP with NHI-related

data with a consistent definition of regular screening that can be applied to both the screened population and the group of women with cancer is required. Such a methodology including random controls who may or may not be on the NCSP would give some of the benefits of a population-based registry and should be seriously considered for future reviews.

The review has shown that there was a significant proportion (37%) of women who developed cervical cancer who had had a screen within the three-year screening period prior to their cancer diagnosis. Although the slides were not reviewed and the under reporting of cervical abnormalities cannot be excluded, it is likely that this is largely due to the limited sensitivity of the cervical cytology, augmented by low screening frequency. Due to its higher sensitivity, primary HPV testing is expected to result in a significant decrease in cancers in this group, assuming best practice follow-up and management. New *Clinical Practice Guidelines for Cervical Screening in New Zealand* are currently being drafted to include the introduction of primary HPV screening in New Zealand.

Of the 644 women diagnosed with cancer age 25–69 years, 328 had been screened in the 6–84 months prior to their diagnosis. From these, 128 had had an abnormal screen, including 92 who had had a high-grade screen. This represents almost 20% of women with cancer in the 25–69 age group. In principle these women should either have had their cancer diagnosed earlier or prevented. For the purpose of this review, colposcopy data available to us from the NCSP was of limited value. While the majority of women in this sub-group had a colposcopy appointment or referral registered on the NCSP, without access to clinical records, limited inferences can be made regarding the management pathway. As such, we are unable to further determine the factors that contribute to screening and/or diagnosis and treatment pathway failure in these women. As this group represents a significant proportion of women of screening age with cervical cancer and Māori women/wahine are over represented in this group, a more detailed clinical review is recommended to determine if there are identifiable factors that contribute to these failures.

Various limitations are associated with this review. As the NCR was used as the starting point for identification of cervical cancer cases prior to matching, women with cervical cancer who are not registered on NCR, those registered with an incorrect ICD 10 code or whose date was incorrectly recorded outside the review period were not included in this review. There was only limited access to clinical information, screens were not re-read and no data was sought from patients or relatives/whānau. There was no history describing the duration of national residency, thus the presented results may include women who have not been resident in New Zealand during previous screening periods. For the calculation of incidence rates, Statistics New Zealand census data was used for the population denominators, whereas ethnicity numerator data was obtained from the NCSP or NCR. It is possible that ethnicity may be recorded variably in different sources with one or more being incorrect. If Māori ethnicity was under-recorded in the NCSP or NCR then incidence rates would be underestimated.

Ongoing review of cervical cancer occurrences is an important aspect of quality assurance for the national cervical cancer prevention strategy. While continuation of retrospective matching of the NCR and NCSP records is feasible, it would be preferable to modify the NCSP data management systems to facilitate electronic transfer of data contemporaneously to support ongoing review. However, both retrospective and prospective reviews of NCR and NCSP data alone offer limited information to support quality improvement activities because they currently lack adequate staging data and any data on clinical management following an abnormal screening test. Additional work should be conducted to support quality improvement that includes matching the NCSP with a population-based registry to allow estimation of the protective effect of screening within different populations. Prospective collection of clinical data, which could be facilitated by collaboration with the three national gynaecological cancer treatment units, along with the NCSP data will add greater accuracy to demographic information, cancer stage and the diagnostic/treatment pathway. For public reassurance and quality improvement

purposes it would also be useful to report the results of a review of negative screening tests. In view of the planned change to HPV-based screening and our HPV vaccination programme, consideration should also be given to the HPV typing of cervical cancers.

We conclude that the review of cervical cancer occurrences is an important aspect of quality assurance for the NCSP, and data discrepancies between the NCSP and the NCR should be addressed. Lack of access to regular screening remains the most common factor associated with the occurrence of cancer and emphasis should continue to be placed on regular screening, especially for Māori and those with greater levels of social deprivation. Over one-third of women/wahine with cancer had a screen prior to their diagnosis and reassurance is required that the sensitivity of the screening test is optimised. Review of the clinical pathways prior to the diagnosis of cancer in women with previous abnormal screening tests is required.

Competing interests:
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Author information:
Phil Hider, University of Otago, Christchurch; Canterbury District Health Board, Christchurch; Kieran Dempster-Rivett, Canterbury District Health Board, Christchurch; Jonathan Williman, University of Otago, Christchurch; Michelle Dempster-Rivett, University of Otago, Christchurch; Lynn Sadler, Auckland District Health Board, Auckland; Melissa McLeod, University of Otago, Wellington; Andrew Miller, University of Otago, Christchurch; Canterbury District Health Board, Christchurch; Peter Sykes, University of Otago, Christchurch; Canterbury District Health Board, Christchurch.

Corresponding author:
Dr Phil Hider, University of Otago, Christchurch; Canterbury District Health Board, Christchurch.
phil.hider@otago.ac.nz

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