THE UNIVERSITY OF AUCKLAND
FACULTY OF MEDICAL AND HEALTH SCIENCES

THE MIDLAND PROSTATE CANCER STUDY

MAPPING AND UNDERSTANDING PATIENT PATHWAYS IN GENERAL PRACTICE

Executive Summary

There were two main objectives for this report. The first was to examine the patterns of PSA testing in general practice, with a focus on reasons why the PSA test was undertaken (testing or screening). Second was to explore the management of patients following an abnormal PSA result, including: referrals to specialists, biopsy rates, diagnosis, treatment and hand-over back to the GP.

Men who had a PSA during 2010 were identified through a search of laboratory data and clinical notes at 31 general practices in the Midland Region. Practices were purposefully selected with a focus on rural and Māori populations. Practices provided baseline data of enrolled men aged 40+ years (n=35,734), including NHI, date of birth and ethnicity. 1006 (2.7%) were identified as having a diagnosis of prostate cancer and excluded. Practices provided access to lab data for men who had received a PSA test. We reviewed electronic records for men with a first raised PSA test to identify the management of these patients following an abnormal PSA test. We found 9,344/35,734 (26%) of men had been tested at least once during 2010. 7,936/9,344 (84.9%) of men we considered to have been screened.

Some of the findings from the study included:

- PSA testing varied considerably between clinics
- Men aged 60-69years are most likely to be tested
- Māori men were half as likely to be tested as non-Māori
- 24% of men aged 70 years plus were screened
- Rural practices less likely to screen
- Māori are twice as likely to have an elevated result from screening than non-Māori
- Approximately 60% of men screened during 2010 had at least one PSA test during 2007-2009
- Only 2% of men PSA screened were found to have an elevated result and 0.3% had prostate cancer
- Approximately 75% of men received a DRE at the time of their first raised PSA result
- Only 43% of men with an elevated result were referred to a specialist
- 65% of men referred received a biopsy
- 55% of men biopsied had a positive result

We suggest strategies that aim to improve patient management at the time of testing and screening and once an elevated PSA result is identified.

We welcome your feedback to us regarding these recommendations.

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1.0 Introduction

General Practitioners do about 350,000 prostate specific-antigen (PSA) tests per year. The reasons for using a PSA test can be: 1. an aid to diagnosis in men with symptoms, 2. a regular check when monitoring men who have had a previous raised PSA, a prostatectomy, radiotherapy, or are being treated for metastatic disease, or 3. to screen asymptomatic men for unrecognised prostate cancer.

Prostate cancer screening in general practice is not recommended by the Ministry of Health but the European Randomized Study of Screening for Prostate Cancer (ERSPC) and the Prostate, Lung, Colorectal and Ovarian (PLCO) Cancer Screening Trial of men aged 55-69 and 50-64 years of age, respectively, have shown a reduction in prostate cancer mortality. Increasing prostate cancer screening has triggered a series of problems, including increasing medical costs and the potential of overtreatment. The well recognised harm from treating prostate cancer and the over diagnosis caused by screening has meant that balancing potential harms and benefits of screening is difficult [1].

The Ministry of Health issued a Request for Funding (RFP) for a study into prostate cancer in 2009. One of the requirements of the RFP was that the proposed study looks at current practice. In particular they wanted to know who was being screened and how often. They also wanted to examine pathways of care including referral practices and what happened to men beyond an abnormal PSA result. A major aim was that the research should inform advice and subsequent care provided by health professionals, to improve health outcomes and equity for New Zealand men diagnosed with prostate cancer.

The University of Auckland (UniServices) responded to the RFP. The team was principally based in the Midland Cancer Region (made up of Waikato, Lakes and Bay of Plenty DHBs.) This cancer region has the largest proportion of Māori men and so was well placed to examine the issues of equity of access to cancer care for Māori. The region

also includes a substantial rural population allowing research into the influence of geography on cancer care.

We were only interested in the overall practice, not what individual GPs do. We were looking at the 'bigger picture'. To achieve this understanding we included a number of steps:

- A review of the literature of the natural history of prostate cancer comparing rural and urban men.
- A pilot study that explored PSA testing in general practice. This looked at GP perspectives as well as patient perspectives of their PSA experience [2].
- A medical record review identifying all men aged 40plus in 31 practices and linking their records to laboratory data.
- A postal questionnaire study asking men about what happened after they had a raised PSA test.

1.1 Prostate Taskforce Recommendations for General Practice

Since the release of the RFP the Prostate Taskforce has been completed and released its recommendations. Key points, relevant to the general practice sector from the taskforce include:

1. Primary health care should provide high-quality, culturally appropriate information on prostate cancer and PSA testing to men aged 50 to 70 years. All men who are concerned about prostate cancer or are requesting a PSA test must be presented with high-quality, culturally appropriate information.
2. Systems must be introduced to general practices to facilitate the informed consent process.
3. Screening for prostate cancer must be by both PSA and DRE testing. PSA testing alone is acceptable only where DRE is considered a barrier to testing.
4. All men presenting with lower urinary tract symptoms, and men with systemic features of malignancy, must have an appropriate examination and assessment, which includes checking for prostate cancer. This check will include a serum PSA and creatinine, other appropriate blood tests, urinalysis and a clinical examination, including digital rectal examination.
5. In the presence of a normal DRE, PSA values of <4.0 ng/mL do not generally merit specialist referral. A significant PSA rise in a man whose PSA has previously been low may warrant referral.
6. General practitioners should refer patients to a urologist according to the following criteria:

- men aged 50–70 years – when the PSA is elevated to ≥4.0 ng/mL
- men aged 71–75 years – when the PSA is elevated to ≥10.0 ng/mL

- men aged ≥76 years – when the PSA is elevated to ≥20 ng/mL
- men with a palpable abnormality in the prostate on DRE
- a significant PSA rise in a man whose PSA has previously been low may warrant referral.

7. The primary health organisation or clinical network in which the patients are enrolled must support general practices in meeting some of the requirements of a Quality Improvement Programme. The Ministry of Health must lead a national process to define a prostate care pathway with provision of appropriate resources.

1.2 Structure of the Midlands Prostate Cancer Study

The project partners were the University of Auckland and the Midlands Cancer Network. The identification and engagement of key stakeholders was seen as essential for the research project. We therefore set up three key advisory groups.

The first was an Academic Steering Group (ASG) that included clinical academics dealing day to day with the issues of men with prostate cancer. This group included a general practitioner, urologist, radiation-oncologist and expert nurses. The group also included key academics. The Academic Steering Group provided academic and clinical governance and assured the quality of the Prostate Cancer research project. The group provided expert academic advice and clinical support to the researchers; ensuring that risks identified were assessed and managed.

The second advisory group was the Community Advisory Group (CAG) which included lay representatives from the Prostate Foundation, the Cancer Society, the Midland Cancer Network and local self-help groups. This group provided a consumer and community perspective to the Midlands Prostate Cancer research project and met on a regular basis to discuss the implications of the findings.

Hei Pa Harakeke is the Māori advisory group. This group is a generic cancer group formed by the Midland Cancer Network and Te Puna Oranga (Waikato DHB) to advise on all aspects of care for Māori with cancer – including prostate cancer.

The study team engaged with a wide group of stakeholders. Two of the investigators (Professor Lawrenson and Dr Scott) participated in the Ministry of Health Prostate Cancer taskforce. We made presentations to the Urological Society of Australia and New Zealand (USANZ), the Royal New Zealand College of General Practitioners, the UK Royal College of General Practitioners, the New Zealand Rural

General Practice Network, the Midland Health Network, the Midland Cancer Network, the Prostate Cancer Foundation and the Prostate Cancer World Congress. All peer-reviewed outputs have been noted in the publication list at the end of this report. We will continue to disseminate findings and information to the wider community to help inform men and their families about prostate cancer.

There were two overarching aims for this phase of the overall study. The first was to explore the patterns of testing, including differences in care between Māori vs. non- Māori, and rural vs. urban men and identifying reasons why a PSA test was undertaken in Midland general practices. We wanted to identify the pathways of care following an abnormal PSA test result, including what happens after a referral to a specialist. The second aim was to explore the costs of identifying a new case of prostate cancer by age group, ethnicity and previous PSA testing history, using data collected from the general practices.

2.0 Method

2.1 Clinic Recruitment and Laboratory Datasets

Thirty-six general practices in the Midland region were approached during 2011 to participate in this study. Clinics were purposefully selected with a focus on rural and Māori populations. Thirty-one clinics agreed to participate, with a total eligible currently enrolled male population aged 40 years and over of 36,740. We excluded 1006 (2.7%) men aged over 40 years who had a co-existing diagnosis of prostate cancer, leaving an eligible baseline population of 35,958. Just over 5,000 were of Māori ethnicity.

We sought permission from participating clinics to access all local laboratory and DHB data for men in our baseline population who had received a PSA test during 2010. We identified men who had a PSA test during the period 01 January 2010 to 31 December 2010 and the result of the test. For these men we looked at individual frequency of testing and velocity of PSA back to 2007. Testing rates were analysed by practice location (main urban centre/rural, District Health Board [DHB]), the ratio of patients to general practitioners (GPs) in the practice and whether the practice was a Māori provider. PSA tests were categorised as raised if they exceeded the age-specific levels recommended by Pathlab (Table 5-1).

Age	Normal value range (ng/mL)
40-49y	0 - 2.5
50-59y	0 - 3.5
60-69y	0 - 4.5
70-79y	0 - 6.5
>80y	0 - 7.0

Table 1: Age-specific PSA ranges recommended by Pathlab

2.2 Medtech Search

The electronic general practice records (Medtech) of men with a raised PSA test were then examined to ascertain:

- Was this a patient with known prostate pathology (e.g. already diagnosed with prostate cancer) or were they a new "case" requiring further investigation?
- If they were a new "case" (i.e. a positive test), did they present to the GP with symptoms or were they identified through screening?
- Had the patient ever had a PSA test before and, if so, when was it performed and what was the result?
- At what level of PSA test were they referred for specialist opinion/biopsy?
- If the patient was not referred for a specialist opinion, what was the management plan for that patient?
- If the patient had a biopsy, what was the result of the biopsy?
- If the patient was found to have cancer, to whom were they referred?
- If the patient was treated, what treatment did they receive?

When we searched the general practice records the reasons for PSA testing were defined into four categories: A. screening; B. previous prostate issues (including previously raised PSA); C. patient request (included in screening for analysis); and D. symptoms, including lower urinary tract symptoms and erectile dysfunction.

To estimate costs, the patient's National Health Index (NHI) number was linked to the data used for capitation payments. The information collected on patients' characteristics from the general practices, including ethnicity and age was 100% complete. Patients enrolled in general practices are required to provide these data before their enrolment is complete.

2.3 Cost estimation

We estimated direct medical costs in 2010 and 2011 from a health service perspective. Medical resources considered included: initial general practitioner consultations (the first consultation related to PSA testing), follow up general practitioner consultations, PSA tests, first specialist assessments (FSA), follow-up specialist consultations, prostate biopsies, pathology reports of prostate biopsy and hospitalisation due to complications after prostate biopsy.

The volumes of the PSA tests, FSAs, prostate biopsies and pathology reports were calculated from the data collected from the 31 clinics. The number of GP consultations was estimated based on records of

PSA tests ordered by GPs. The number of follow-up specialist consultations was estimated from the number of prostate biopsies and PSA tests ordered by specialists. A 2% complication rate [3] and a mean hospital stay of 4.87 days [4] for complications of prostate biopsy were assumed to quantify the hospitalization after prostate biopsy.

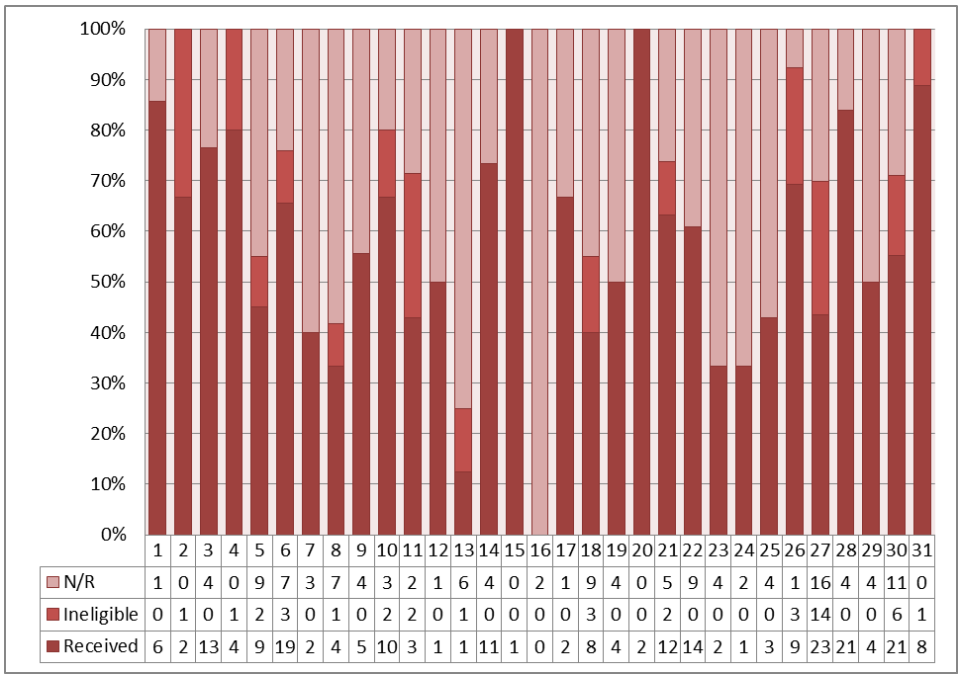
The quantity of healthcare resources was multiplied with the unit cost of each type of medical resource to generate an aggregate cost. The subsidy per general practitioner consultation was estimated by dividing the capitation rate by the average number of general practitioner consultations per patient [5]. The unit costs corresponding to different time periods were converted into 2010 values (as the base year of this analysis) by applying the NZ Inflation Calculator developed by the Reserve Bank (the central bank in NZ). All costs were valued in NZ dollars (NZ$).

The time spent on discussion about PSA testing in the initial GP consultation varied between from general practices. This discussion is related to the level of informed consent, ranging from almost no time (ticking the box of a laboratory form) to the whole consultation spent on discussing the harms and benefits associated with prostate cancer screening. Three percentages (20%, 50% and 100%) of the cost of an initial GP consultation were assumed to be attributed to prostate cancer screening. This and further information and specific detail on the method used for the cost calculations have been published [6].

2.4 Questionnaire

All men within the 31 practices, with a first raised PSA test during 2010 were mailed out a questionnaire, sent from and back to the general practice. Out of the 1082 men who had a raised PSA result during 2010, 391 were identified as being 'first-raised' tests. However, 84 of these men were later identified as ineligible. Patients were identified as ineligible at the discretion of their GP, primarily based on vital status and/or co-morbidity that would not allow the patient to fill in the questionnaire. Fifty-two were ineligible due to death, previous prostate cancer diagnosis, transfer from the clinic (no contact address) or had a condition that precluded them from filling in the questionnaire. Twenty-nine (5 from non-respondents, 24 from respondents) had a previously raised PSA test of which we were not aware earlier, because the test was performed prior to 2007. One respondent did not recollect any of the information asked about.

One was diagnosed in the 1980s and one patient was sent the questionnaire twice. In total 113 (37%) patients did not respond. There were 194 eligible responses (63%).



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
N/R	1	0	4	0	9	7	3	7	4	3	2	1	6	4	0	2	1	9	4	0	5	9	4	2	4	1	16	4	4	11	0
Ineligible	0	1	0	1	2	3	0	1	0	2	2	0	1	0	0	0	0	3	0	0	2	0	0	0	0	3	14	0	0	6	1
Received	6	2	13	4	9	19	2	4	5	10	3	1	1	11	1	0	2	8	4	2	12	14	2	1	3	9	23	21	4	21	8

Figure 1: Patient response rate for mail-out questionnaire.

2.5 Ethical Approval

Ethical approval for MPC was gained through Northern Y: NTY/10/09/070 (pilot) and NTY/11/02/019 (phases 1, 3, 4) and multi-region ethics committees: MEC/11/EXP/044 (phase 2).

3.0 Results

3.1 Clinic Characteristics

The total enrolled population of men aged 40 years and older in the 31 clinics was 35,958. There were 14% Māori (5,030) and 84% non-Māori (30,153) in the sample (775 men of unknown ethnicity were excluded). An additional 224 men were removed from baseline because of enrolment in more than one clinic at the time of the study. This left a total of 35,734 men remaining.

The clinics were spread over the Midland region: 19 Waikato, eight Bay of Plenty, and four Lakes DHBs. The population sizes of the communities were well spread: <10,000 for 11 clinics; 10,000-30,000 for nine clinics; and >30,000 for 11 clinics. Thirteen clinics were in main urban areas and 18 were considered to be in rural locations. Rural allowance was only applicable for 11 clinics. Rural allowance criteria include general practices located in settlements with <15,000 inhabitants and for which the distance to the nearest urban centre is >35 km.

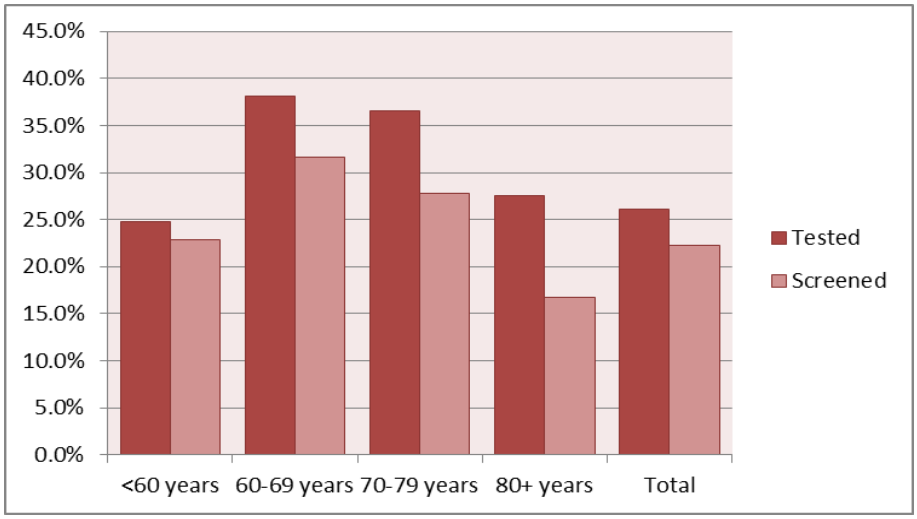
There is only one Cancer Centre in the Midland region, located in Hamilton. Therefore, the distance from practice to Cancer Centre was substantial, with half (15) of the clinics being 100km away or further. Nine clinics were 10-99km from the Cancer Centre, while seven were located less than 9km away.

In total, nine clinics were identified as being a Māori Health Provider, defined by the Ministry of Health as "a provider that is owned and governed by Māori and is providing services primarily but not exclusively to Māori". Clinics where there were communities of high Māori population were purposefully selected and recruited. Overall, we found strong representative numbers from Māori men, with 14 clinics having >20% of patients being Māori males aged 40 years and over.

3.2 Who gets tested?

Overall 26% (9,344/35,734) of men 40 years and older in the 31 general practices underwent PSA testing during 2010. In all age categories, men who were tested were more likely to have been screened, rather than having been tested because of symptoms or previous prostate problems. In total, the asymptomatic screening rate was 22.2% (7,936/35,734).

Figure 2: Proportion of testing/screening during 2010 by age.



A considerable amount of screening was undertaken on men aged 70+ years (24.4%) (Figure 2). The highest screening rates were observed in men aged 60-69 years (31.5%) and in asymptomatic men 70 years and older with no prior history of a raised PSA result in the previous three years (27.7%). This was also the case for 17% of men aged 80+ years.

PSA testing was performed in significantly more non-Māori (26.9%) than Māori men (13.0%) in 2010. Māori were 53% less likely to be tested than non-Māori [1].

3.3 Patterns of testing between clinics

PSA testing and screening were defined for the purposes of this study as the following:

Testing is used to determine the presence or absence of prostate cancer in a patient who has symptoms or is known to have a raised PSA and is being monitored.

Screening is done on an asymptomatic patient and is either requested by the patient or done by the GP – with or without discussion with the patient.

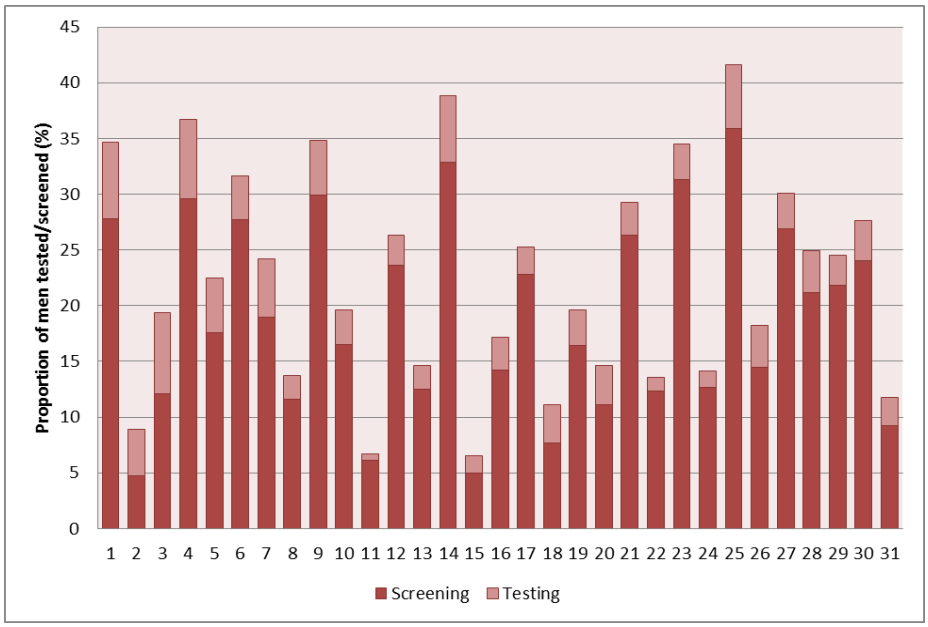


Figure 3: Proportion of PSA testing and screening between practices during 2010.

3.3.1 Do all practices test/screen at the same rate?

Practices varied considerably in the way that they tested and/or screened men. In eight practices, 30% or more of men were tested in 2010, whereas in three practices less than 10% of men were tested (Figure 3). Overall 9,344 men aged 40+ years had a PSA test. While 15% (1,408/9,344) of tests were performed because of symptoms or previous prostate problems, the bulk of the tests 7,936/9,344 (85%) were considered to be for screening. This was the same for screening rates, with more non-Māori (22.4%) than Māori men (10.9%) having been screened. For all men aged 70 years or over, the screening rates remained high regardless of ethnicity.

3.4 Frequency of elevated PSA

Patients were identified as having an elevated PSA result using the laboratory guidelines (Table 1). Overall, 1,082/9,344 (11.6%) men had an elevated PSA result (Figure 4). The proportion of men who underwent testing for screening with an elevated PSA result was 2.1% (170/7,936).

We found that elevated PSA tests were significantly more commonly detected in screened men with no previous tests compared with those tested prior to 2010 [7]. Māori men were more likely than non-Māori to have an elevated PSA result until the 80+ year age range.

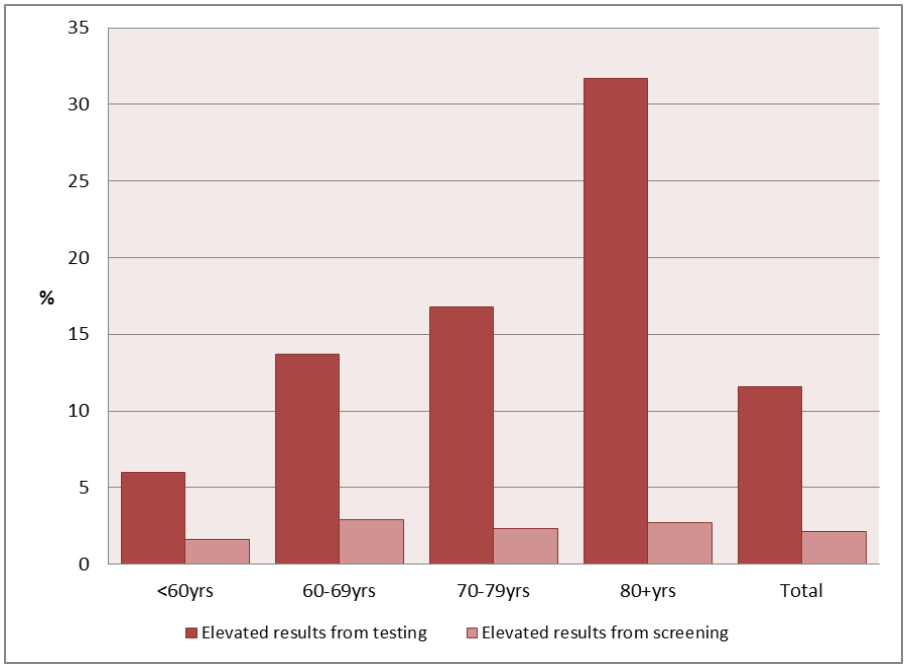


Figure 4: Proportion of elevated PSA during 2010 from testing/screening by age group.

3.5 How often do we screen?

Fifty seven percent of men screened in 2010 had a record of at least one previous PSA test between 2007 and 2009 (Figure 5). Māori men who were tested during 2010 were significantly less likely than non-Māori to have had a PSA test in the previous three years.

We found that overall 57% of men had one or more prior PSA test during the previous three years. Seventy five percent of men in the 70-79 year age range who were screened had at least one PSA test in the previous three years. Over 60% of men in the 80+ year age range had been screened in the previous three years.

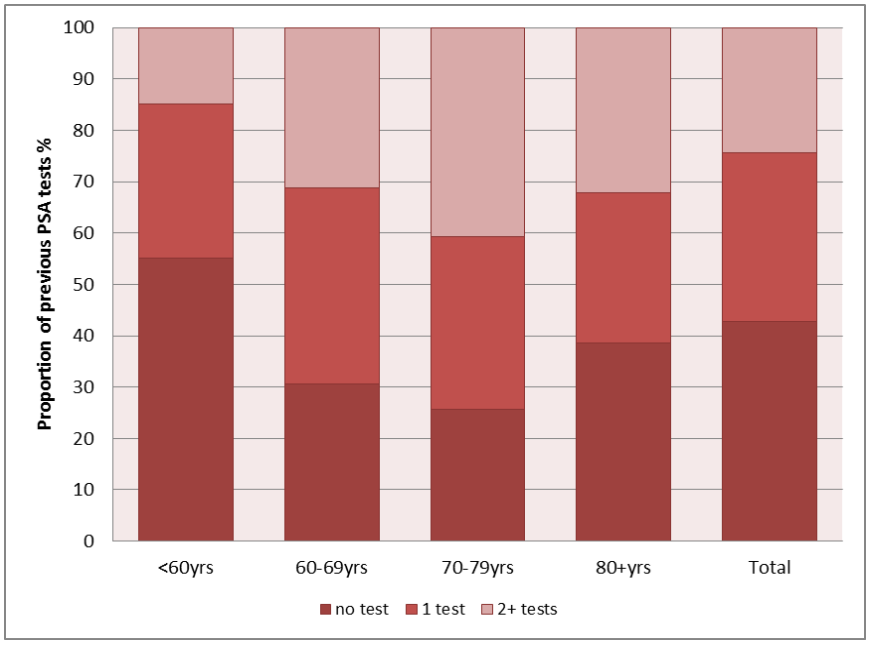


Figure 5: Proportion of previous PSA tests (2007-2009) in screened men.

Among the tested men, the overall proportion of men without previous PSA tests between 2007 and 2009 was 38.7%, while 29.5% of men had two or more PSA tests prior to 2010.

3.6 Do Māori get tested and screened as frequently as non-Māori?

In total 4,986 out of 35,734 men were Māori (14%). Figure 6 shows that there were significantly more non-Māori (25.5%) than Māori men tested (12.4%) in 2010 (less than 70 years). Screening rates were the same, with more non-Māori (22.4%) than Māori men (10.9%) screened. For all men 70 years or over, regardless of ethnicity the screening rates remained high. When tested Māori men aged 40-69years were more likely than non- Māori to have an elevated result. Overall, Māori are 53% less likely to be tested than non- Māori (Obertova, in press).

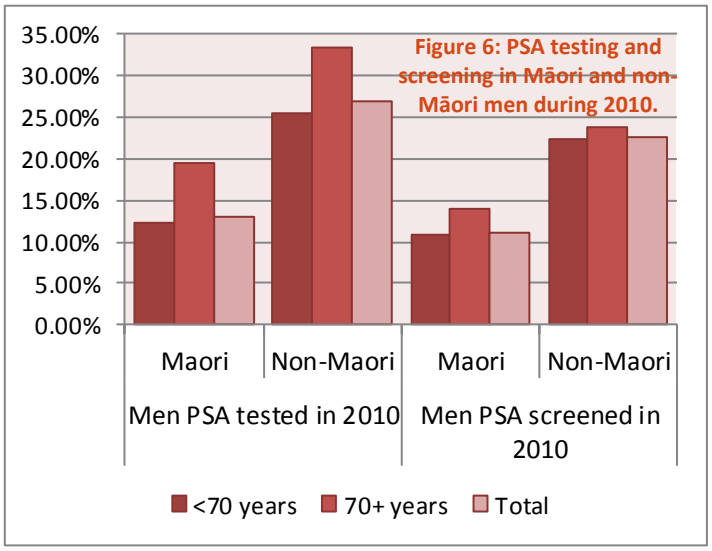
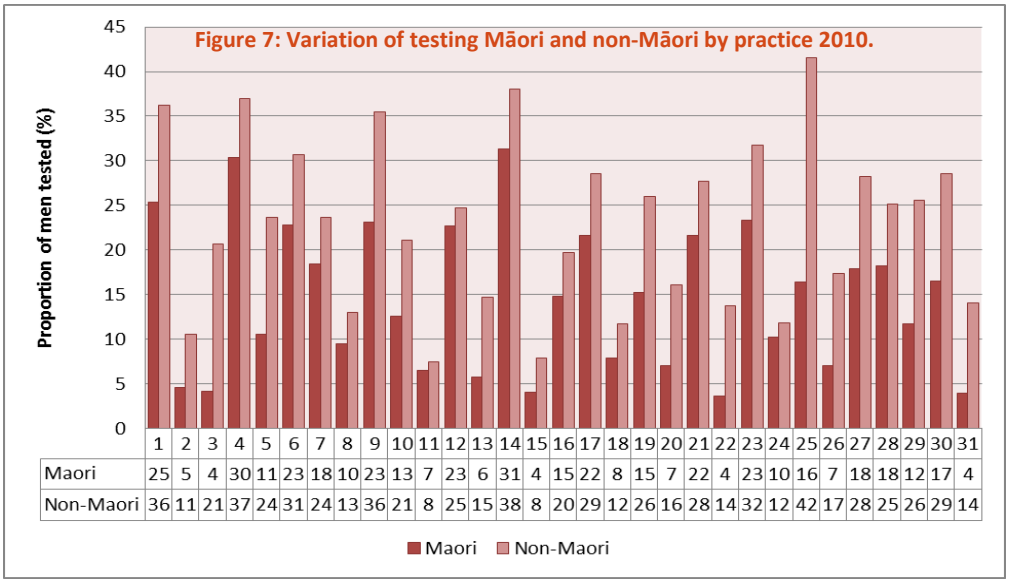


Figure 6: PSA testing and screening in Māori and non-Māori men during 2010.

Practices varied considerably in the way they tested Māori men (Figure 7). In all practices the proportion of Māori men tested during 2010 was less than the proportion of non-Māori men tested. In ten practices Māori men were 50% less likely to be tested than non-Māori. We cannot comment on the reasons why the differences are so great in some cases.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Maori	25	5	4	30	11	23	18	10	23	13	7	23	6	31	4	15	22	8	15	7	22	4	23	10	16	7	18	18	12	17	4
Non-Maori	36	11	21	37	24	31	24	13	36	21	8	25	15	38	8	20	29	12	26	16	28	14	32	12	42	17	28	25	26	29	14

Figure 7: Variation of testing Māori and non-Māori by practice 2010.

3.7 Does being a rural patient make a difference?

Eighteen of the 31 general practices were classified as 'rural practices'. In total 47% of men (16,951/35,734) were enrolled in rural clinics. Rural practices had a larger proportion of Māori men compared to practices in urban regions. Men in rural practices were less frequently screened than men in main urban centres (20.2% vs. 26.8%; $x^2P<0.0001$). Depending on the size of settlement, the proportion of men who underwent PSA testing fell by nearly 15% from the highest populated locations to the smallest settlements (Figure 8).

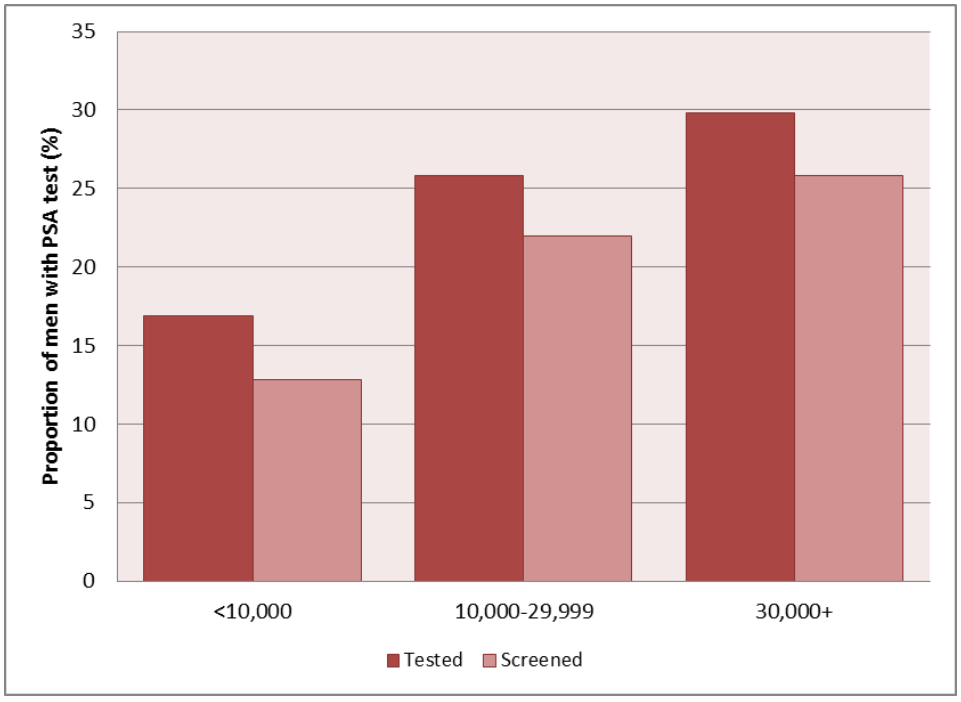


Figure 8: Proportion of overall PSA testing and screening by settlement size.

Among those screened, elevated PSA levels were found in 2.6% of men in rural practices, compared with 1.8% of men in main urban centres. Māori were more likely to have a PSA test if they were based in a main urban area than in a rural area (14.1% vs. 11.7%) and this was the same for non-Māori (26.6% vs. 21.2%).

Reduced screening rates were seen in practices with more than the average number of patients per GP (x2P<0.0001), and in Māori Health Provider practices (x2P<0.0001). General practices in the Lakes DHB had the lowest PSA screening rate (21.2%), while the practices in the Bay of Plenty DHB had the highest rate (26.0%).

3.8 At what PSA level are men referred to a specialist?

Prostate taskforce recommendations for referral to urologist:

- men aged 50–70 years – when the PSA is elevated to ≥4.0 ng/mL
- men aged 71–75 years – when the PSA is elevated to ≥10.0 ng/mL
- men aged ≥76 years – when the PSA is elevated to ≥20 ng/mL
- men with a palpable abnormality in the prostate on DRE
- significant PSA rise in a man whose PSA has previously been low may warrant referral.

Overall, 43% (467/1082) of men with an elevated PSA result during 2010 were referred by their GP to a specialist (Table 2). The referral rate was 34.8% for Māori men and 44.1% for non-Māori men (the difference is not significant). However, 57% of men who had an elevated PSA level were not referred and were still being managed by their GP. In general, the median level of referral reflected the levels recommended by the Prostate Taskforce (above).

Table 2: Median PSA level of referral and non-referral for: tested, screened and non-screened men.

		Median PSA Level for Referral **(TESTED** - ALL) ng/mL	Median Level of elevated PSA levels for **Referral 43% (N=467)** ng/mL		Median Level for **Non-Referral 57% (N=615)** ng/mL	
Age	Normal value range ng/mL	Median (min; max)	Screened (n=66)	Non-Screened (n=401)	Screened (n=104)	Non-Screened (n=511)
40-49y	0 - 2.5	3.2 (1.7; 9.1)	3.5	3.3	3.0	2.9
50-59y	0 - 3.5	5.9 (2.7; 203.3)	6.1	5.3	3.8	5.0
60-69y	0 - 4.5	7.5 (2.1; 170.3)	6.5	7.4	5.0	6.0
70-79y	0 - 6.5	9.9 (1.9; 320.0)	10.7	9.8	8.0	8.4
>80y	0 - 7.0	16.6 (7.0; 409.6)	38.5	15.4	15.4	10.2

3.9 Who gets referred?

Of the men who were referred to a specialist, those men aged 50-59 years were most likely to be referred (over half (50.5%) of patients in this age group). Overall, 16% of the total referrals were as a result of GP screening. The majority of men (84%) referred were identified because of symptoms or previous prostate problems.

Table 3 shows the referral, biopsy and positive biopsy rates for those men who were referred after an elevated PSA level. Of those men who were referred to a specialist, 302 were biopsied (64.7%). 56.3% Māori men were biopsied compared to 65.4% non-Māori men. Men in the 50-59 and 60-69 year age ranges were the most likely to be biopsied (73% and 76% of referrals, respectively).

The proportions of men biopsied that were identified by screening and symptoms were the same as for referrals (16% and 84%, respectively). Of those who underwent a biopsy, 165 men (55%) were found to have a positive result. Sixteen percent (27/165) of detected cancers were identified by screening and 1% (2/165) were identified without an elevated PSA, on digital rectal examination (DRE).

	Referral rate(from men with elevated PSA): n/N (%)	**Biopsy** rate (from referred men): n/N (%)	**Positive biopsy** rate(from biopsied men): n/N (%)
40-49 years	18/44 (40.9%)	9/18 (50.0%)	5/9 (55.6%)
50-59 years	111/220 (50.5%)	81/111 (73.0%)	37/81 (45.7%)
60-69 years	187/398 (47.0%)	142/187 (75.9%)	79/142 (55.6%)
70-79 years	107/264 (40.5%)	57/107 (53.3%)	39/57 (68.4%)
80+ years	44/156 (28.2%)	13/44 (29.5%)	5/13 (38.5%)
Total	467/1082 (43.2%)	302/467 (64.7%)	165/302 (54.6%)

Table 3: Referral rates, biopsy rates and positive biopsy rates

In Māori men 66.7% of the biopsies were positive compared to 54.3% in non-Māori men. The cancer detection rate from men with elevated PSA test was 13.0% for Māori men and 15.6% for non-Māori men. None of these differences was statistically significant. Most of the positive biopsies in both Māori (58.3%) and non-Māori men (60.8%) returned a Gleason score of 6 [8].

In total, 165/1082 (15.2%) of men with elevated PSA tests were found to have prostate cancer. Nearly 70% of men in the 70-79 year

age range were found to have a positive biopsy result. This showed that 137 men had a negative biopsy; however, these men are still at increased risk of developing prostate cancer. In addition, 615/1082 (57%) of men who were not referred will need follow-up in general practice.

3.10 Questionnaire

In the 31 clinics, 1082 men had at least one raised PSA result during 2010. Of these 1082, 391 had a first raised PSA result in that year. Once we omitted the ineligible men (n=84), 307 (40 to Māori; 267 to non-Māori) questionnaires were mailed out by the general practice for patients to fill out and return to their GP. 194 eligible responses were received.

3.10.1 Findings from patient questionnaires

- Seventeen Māori (42.5%) and 177 non-Māori (66%) responded.
- Twenty seven percent (53/194) of men said that they had asked for the PSA test, while 66% of men (128/194) felt that the testing was initiated by the GP.
- For those men who self-initiated the test we asked what their main reason was for doing this. Having a family history of prostate cancer (21%; 11/53) or being prompted by the media or a friend or family member (47%; 25/53) were the main reasons.
- The majority of men (58%; 125/194) said they did not have symptoms at the time of the test, while 42% of men (83/194) stated they did have symptoms.
- Fifty four percent of men (105/194) were referred by their GP to see a specialist; 40% (78/194) of men reported that they were not referred.
- Fifty one men reported seeing the specialist in the public health care system, while the same number (51) of men said they had seen their specialist in private practice.
- For those men that did see a specialist, 69 men (68%) received a biopsy. (Some men who had a biopsy did not identify that they had been referred).
- Fifty men were monitored post-PSA testing by either the GP or a specialist, or by both. The majority of men (134/194) thought that they were not currently monitored.
- Twelve percent of men went on to receive an operation.
- Most men who went to a private practice for their first specialist appointment waited 4 weeks or less (71%, n=40). For the majority of men who went to a public hospital, the wait was estimated at 4-8 weeks (75%, n=22).

3.10.3 Do I do a DRE?

Ninety seven percent of men (189/194) responded either yes or no to having had a DRE, with five men unsure if they had or had not received a DRE. Of those who responded, 141/189 (74.6%) identified

that a DRE had been performed at the time of their first raised PSA test (Figure 9). Twenty-five percent of men (n=48) identified they did not receive a DRE. Men in the 60-69 year age range were the most likely to receive a DRE by their GP (85.9%). Māori men were slightly less likely to receive a DRE than non-Māori (66.7% vs. 73.2% respectively).

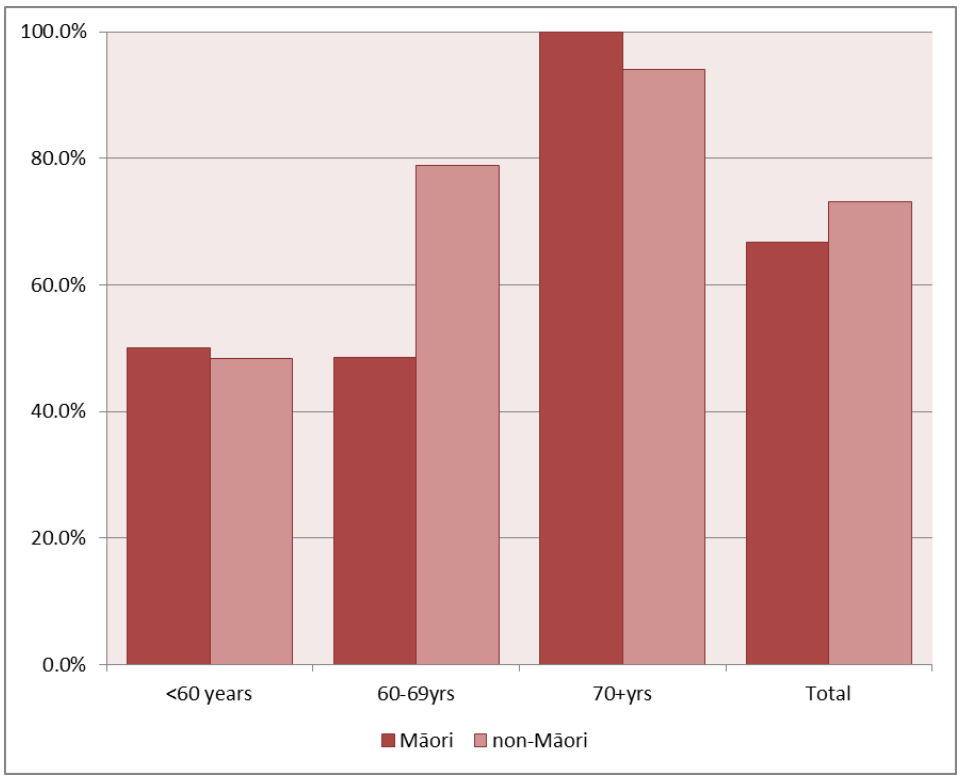


Figure 9: Proportion of self-reported patient DREs at time of raised PSA test during 2010.

The Prostate Taskforce recommends that screening should be done by both PSA testing and DRE. It should be noted that two asymptomatic men with normal PSA levels were found to have prostate cancer on DRE.

3.11 How many men do we have to screen to find one cancer?

After the first PSA test, 27 men were referred to a specialist; 146 men were followed up by GPs, of whom 42 were referred to specialists in 2010 or 2011. Of the total of 69 men referred to specialists, 46 men underwent biopsies, and 29 men were diagnosed with prostate cancer (Figure 10 - page25).

Table 4 shows that the number of asymptomatic men who needed to be screened to identify a new case of prostate cancer was 274 for the whole screening group. But this differed according to patient characteristics. The number of asymptomatic men who needed to be

screened that was below this average figure of 274 were for the following groups: those aged 60-69 (127); Māori men (139); and men who had not previously had PSA tests between 2007 and 2009 (188).

Table 4: Men screened per cancer identified by characteristic.

	Men screened per cancer identified	Prostate cancer identified
AGE GROUP		
40-49 years	717	2
50-59 years	868	3
60-69 years	127	19
70+ years	298	5
ETHNICITY		
Māori	139	4
Non-Māori	295	25
PSA TESTING HISTORY		
No PSA tests in 2007-2009	188	18
PSA tests in 2007-2009	413	11
Overall	274	29

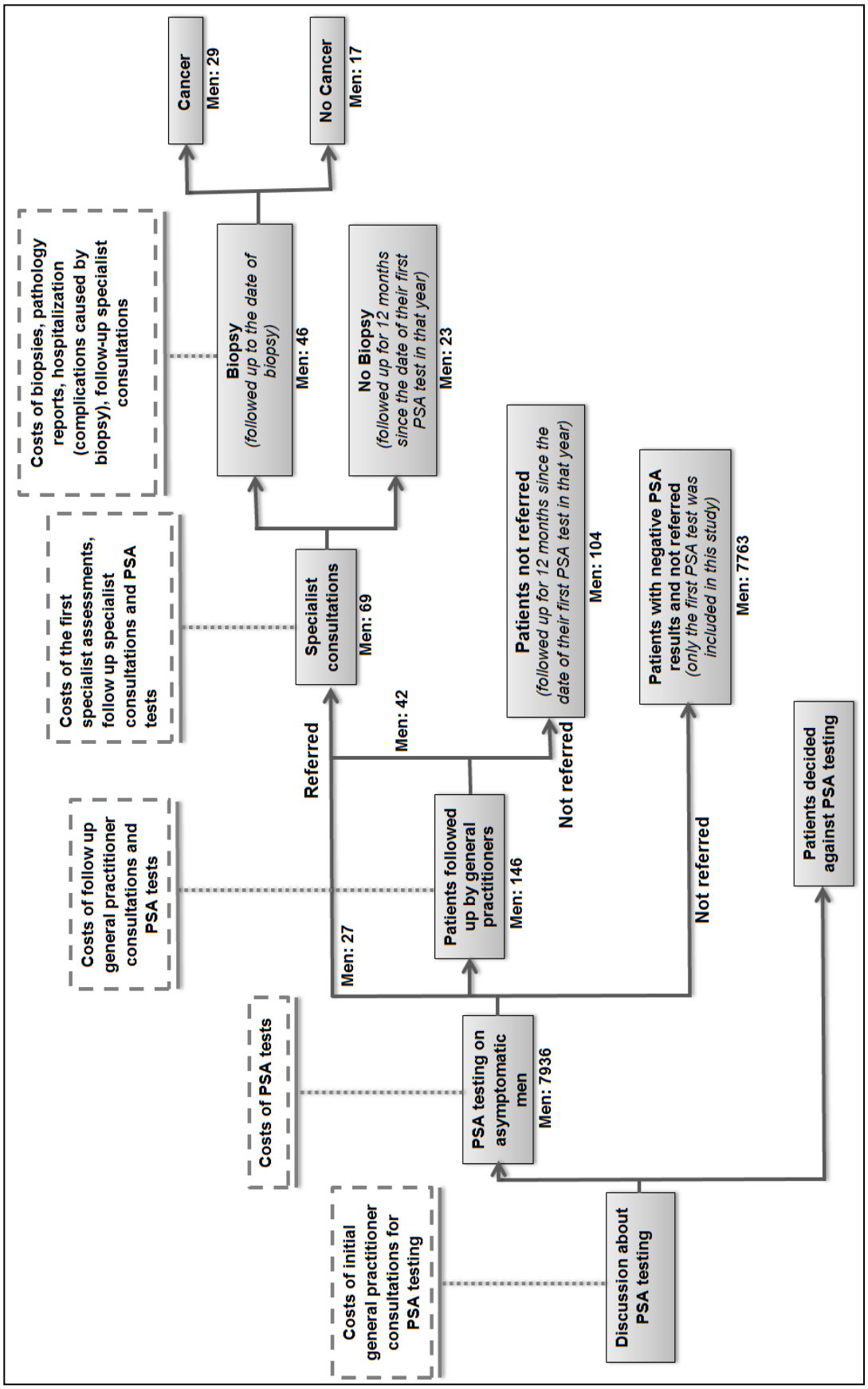


Figure 10: Screening pathway in 31 Midland practices.

3.12 How much does it cost to find a cancer?

The total unit costs for medical resources for prostate cancer are identified in Table 5. This consisted of 7,936 initial GP consultations, 197 follow-up GP consultations, 8,165 PSA tests (ordered by general practitioners and specialists), 69 first specialist assessments (FSAs), 78 follow-up specialist consultations, 46 biopsies, 46 pathology reports, and 4.48 hospital bed days.

If we assumed more GP time was involved in a PSA test, the proportion of the cost of GP consultations in total costs increased substantially, while the costs of the other health resources as percentages of total costs decreased. When 20% of GP consultation cost was considered to be attributable to prostate cancer screening, the costs per cancer detected were NZ$10,777 (€5,820; £4,817), compared with NZ$16,814 and NZ$26,877 when 50% and 100% of GP consultation cost was utilised in the cost estimation, respectively.

Table 5: Unit costs of medical resources.

Medical resources	Corrected cost in 2010 New Zealand Dollars	Unit cost collected		
		Reported cost	Year	Data source
PSA test	NZ$11.07	NZ$10.44	2008-2009	Report from MoH [#1]
general practitioner consultation	NZ$73.54			
charge	NZ$35.88	NZ$36.73	2012	Unpublished data from MoH
subsidy	NZ$37.66	NZ$38.69	2012	Website of MoH [#2], Report from the Royal New Zealand College of General Practitioners [#3]
First specialist assessment	NZ$268.79	NZ$276.36	2012	Unpublished data from Urology Services Ltd & Venturo Ltd
Follow-up specialist consultation	NZ$233.64	NZ$213.09	2006-2008	Report from MoH [#1]
Biopsy	NZ$427.96	NZ$440.00	2012	Unpublished data from Urology Services Ltd & Venturo Ltd
Pathology report of biopsy	NZ$710.02	NZ$730.00	2012	Unpublished data from Waikato Hospital in WDHB
Hospitalization after biopsy (per bed day)	NZ$405.82	NZ$349.50	2005	Website of World Health Organization [#4]

The costs per cancer shown in table 6, were lowest for men aged 60-69 years (NZ$6,268 to NZ$13,721 if 20% to 100% of the GP consultation cost was included), followed by the costs for Māori men (NZ$7,685 to $NZ15,877) and the costs for men without a PSA testing history in 2007-2009 (NZ$8,887 to $NZ19,970). The costs for men aged 40-49 years (NZ$24,290 to $NZ66,472), 50-59 years (NZ$30,022 to $NZ81,089) and 70+ years (NZ$10,957 to $NZ28,501) were 3.9-4.8 times, 4.8-5.9 times and 1.7-2.1 times the costs for men aged 60-69 years, respectively. The costs for non-Māori men (NZ$11,272 to $NZ28,637) were 1.5-1.8 times the costs for Māori men. The costs per cancer detected for men with a prior history of PSA testing in 2007-2009 (NZ$13,870 to $NZ38,178) were 1.6-1.9 times the costs for men without previous PSA tests during that period.

Table 6: Costs per prostate cancer identified.

Categories	20% of initial general practitioner consultation cost included	50% of initial general practitioner consultation cost included	100% of initial general practitioner consultation cost included
Age group			
40-49	NZ$24,290	NZ$40,108	NZ$66,472
50-59	NZ$30,022	NZ$49,172	NZ$81,089
60-69	NZ$6,268	NZ$9,063	NZ$13,721
≥70	NZ$10,957	NZ$17,536	NZ$28,501
Ethnicity			
Māori	NZ$7,685	NZ$10,757	NZ$15,877
Non-Māori	NZ$11,272	NZ$17,784	NZ$28,637
PSA testing history			
No PSA tests in 2007-2009	NZ$8,887	NZ$13,043	NZ$19,970
Had PSA tests in 2007-2009	NZ$13,870	NZ$22,985	NZ$38,178
Overall	NZ$10,777	NZ$16,814	NZ$26,877

4.0 Discussion

PSA testing was commonly carried out in the practices that took part in our study, although testing varied considerably between practices. Screening of asymptomatic men for prostate cancer is widely practiced in NZ. Most PSA testing (85%) was screening, while 15% was done by the GP because the patient had presented with symptoms or previous prostate problems.

Although 85% of testing is screening, only 2.1% of raised PSA tests and 27 cases of cancer were identified. The yield is greater in men who have not previously been tested. Almost 60% of men screened in 2010 had undergone at least one PSA test between 2007 and 2009. Only 1.6% of screening PSA tests in 2010 were first raised tests. PSA screening rates differed with respect to the characteristics and location of the general practices in the Midland region. For example, practices with more GPs per population were found to do more testing. Urban practices screened more than rural practices. These findings suggest that organisational factors as well as patient characteristics influence patient care.

The screening rate in Māori men was significantly less than in non-Māori. In every practice less testing was undertaken on Māori compared to non-Māori men. However, if a Māori man was tested, he was more likely than a non-Māori man to be found to have an elevated PSA result. Once found to have an elevated PSA, Māori men were less likely to be referred to a specialist and less likely to be biopsied, but when biopsied were more likely to be found to have a positive biopsy result.

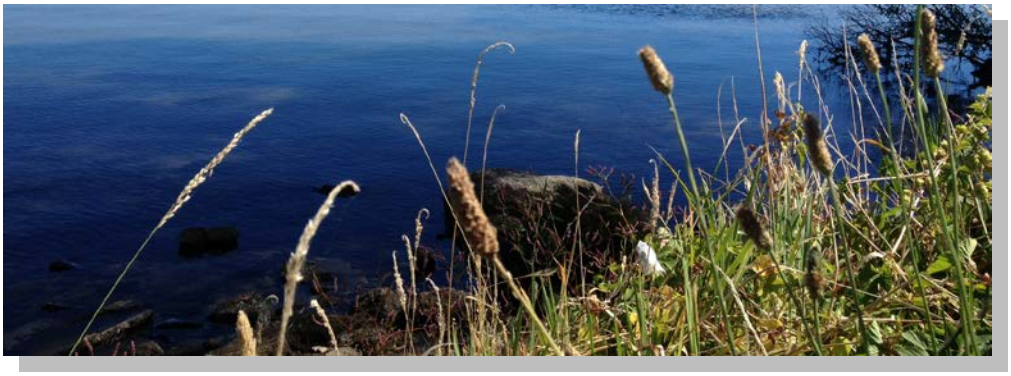
A significant number of men over 70 years of age were screened. This was even the case for men over 70 years who were asymptomatic with a history of negative PSA results. Only a few of these men were referred or went on to be biopsied and treated.

Referral to a specialist by the GP occurred for 43% of men with an elevated PSA result. This raises some questions about the management of care for men with an elevated PSA result but no

referral to specialist. Further research is needed to follow up general practice management of men with a first raised PSA result, including specialist referrals.

Most of the estimated costs of screening were incurred in general practice. Calls for men to receive increased information on the harms and benefits of screening will substantially increase the costs per cancer identified. The costs could be reduced by better targeting of screening [6].

While we recognise that screening for prostate cancer is controversial, we found significant differences in the delivery of health services, particularly in the frequency of PSA testing and biopsy rates in Māori men. The differences in screening help explain the lower incidence of prostate cancer in Māori men. The relationship between screening and all-cause mortality is unclear and so the reduced use of screening in Māori does not explain the higher mortality rate [8].



5.0 Recommendations

From the study we have some suggested recommendations to refine the management of patients both at the time of testing and once an elevated result comes back. **We welcome your feedback on these recommendations.** We found that most PSA testing is for screening purposes and most screening is initiated by general practitioners rather than by patients. We found that Māori were significantly less likely to be screened and tested than non-Māori. Patients can be transferred to and from primary to secondary care multiple times in their prostate cancer journey. Improving the transitions in the handling of patients between the two settings is important to ensure continuity, quality and equitable access to care. Recommendations aim to improve patient management at the time of testing and screening and once an elevated PSA result is identified.

5.1 At the initial PSA test:

5.1.1 We found evidence that many men are tested by GPs without extensive information being available. We support the recommendation from the Prostate Taskforce that primary health care should provide high-quality, culturally appropriate information on prostate cancer and PSA testing to all men aged 50 to 70 years.

5.1.2 We recommend that the primary care providers discuss the implications of a positive PSA result prior to undertaking the test, including the need for repeat testing and the option of referral to a specialist if the test is positive (>4 ng/mL).

5.1.3 We recommend that primary care practitioners are made aware of the inequities in access to prostate cancer screening between Māori and non-Māori men.

5.1.4 We found evidence of PSA testing being undertaken annually. This resulted in only a small number of additional positive cancers being identified. We recommend that asymptomatic

men without known family history of prostate cancer who have a normal PSA test and digital rectal examination (DRE) can be reassured and should not need to be screened for another 4 years unless they develop prostatic symptoms.

5.1.5 Seventy percent of men appear to have had a DRE at the time of their first raised PSA result this suggests that 30% of men have not been comprehensively assessed. We found 7 men who had a normal PSA but were subsequently diagnosed with prostate cancer, by DRE. We recommend that all men who are screened for the first time should have a DRE to assess the size of the prostate and presence of any abnormality.

5.1.6 We recommend that men with prostatic symptoms have a DRE, and if PSA is raised they be referred to a specialist even if the symptoms alone do not warrant referral.

5.2 After an elevated PSA result:

5.2.1 We noted more than 50% of men (65% Māori, 55% non-Māori, n.s.) had a raised PSA level but did not warrant referral. These men are at high risk of cancer and robust strategies need to be in place to ensure they are followed up. We recommend that practices should have a clear strategy for management of men with an elevated PSA result which includes regular follow-up and/or referral.

5.3 Where screening is not warranted and may cause harm:

Screening asymptomatic men over 70 years of age with previous normal PSA tests has not been shown to be of benefit and could lead to unnecessary treatment and harm. Men in this age group are rarely referred for specialist assessment. Of the 1491 men aged 70+ years screened, only 13 were referred and five biopsied, and all of those men had cancer. For those with a positive diagnosis: one had hormone therapy; one had radiotherapy plus hormone therapy; one had a radical prostatectomy (at 70 years) and two had no active treatment. No one over 72 years old was treated.

5.3.1 We recommend that men aged over 70 years who have had previous negative PSA tests should not continue to be screened.

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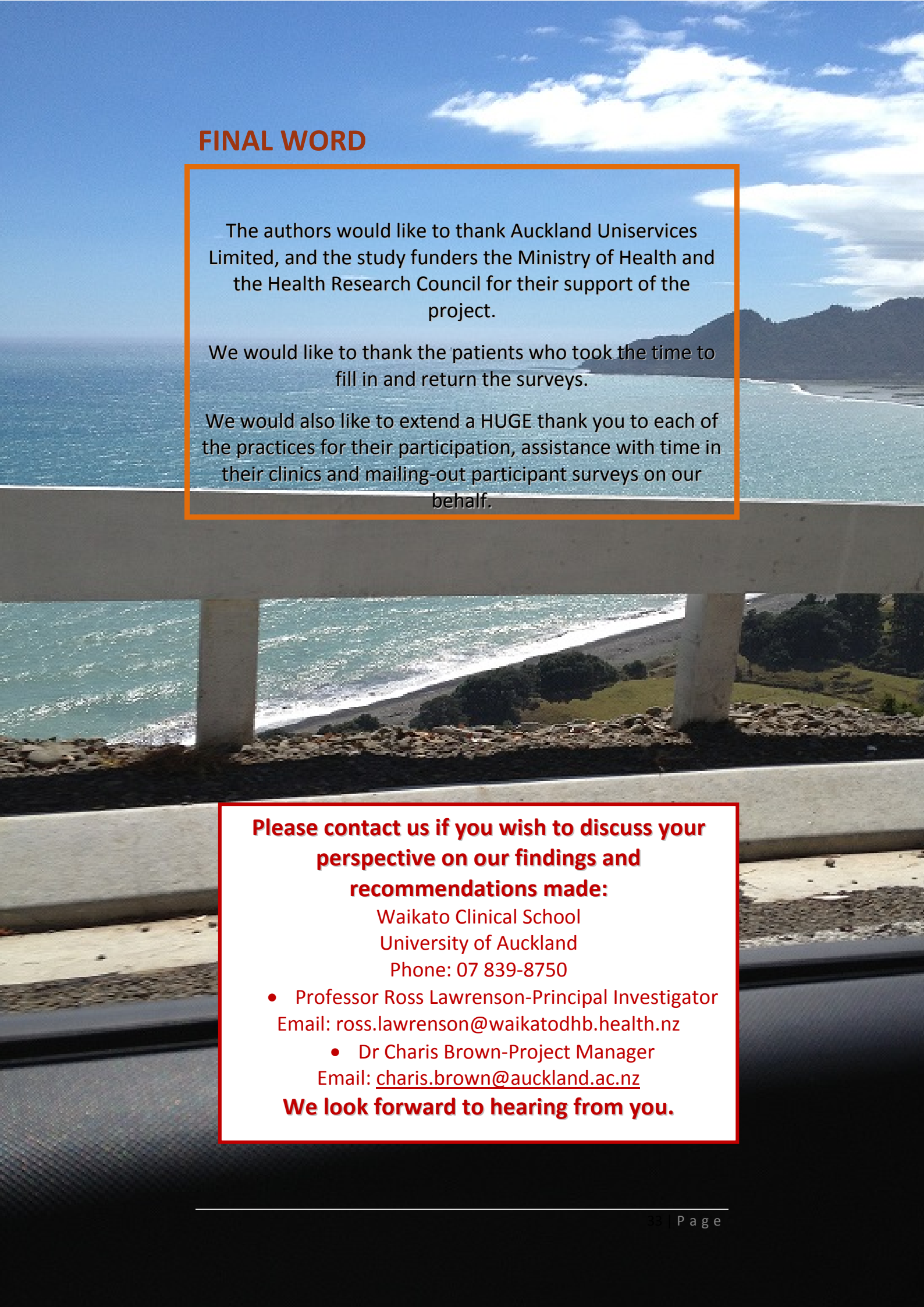

FINAL WORD

The authors would like to thank Auckland Uniservices Limited, and the study funders the Ministry of Health and the Health Research Council for their support of the project.

We would like to thank the patients who took the time to fill in and return the surveys.

We would also like to extend a HUGE thank you to each of the practices for their participation, assistance with time in their clinics and mailing-out participant surveys on our behalf.

Please contact us if you wish to discuss your perspective on our findings and recommendations made:

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We look forward to hearing from you.