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# PSA testing in general practice

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## ABSTRACT

**INTRODUCTION:** In New Zealand, prostate-specific antigen (PSA) testing has increased significantly (275 000 tests/year). Controversy exists around PSA testing as part of an unorganised screening programme.

**AIM:** To look at the use of PSA testing in a sample of general practices and investigate the reasons GPs undertake PSA testing.

**METHODS:** Five Waikato general practices investigated looking at PSA laboratory tests of men  $\geq 40$  years in 2010 compared against GP notes. Testing rates, reasons for testing, histology and referral/s were examined for different age groups. A questionnaire was sent to the GPs to determine their views on PSA testing.

**RESULTS:** One in four men aged 40+ years had a PSA test in 2010. Of these men, 71% were asymptomatic. More than half of men tested aged 70+ years were asymptomatic. Ten percent of all PSA tests were elevated. Twenty-one of 23 prostate cancers were diagnosed following an elevated PSA test: more than 80% of these men had histories of prostate pathology or lower urinary tract symptoms. The questionnaire confirmed that GPs believe in the benefits of PSA screening and it also showed they had difficulty in providing patients with information about pros and cons of PSA testing.

**DISCUSSION:** All GPs in this study tested asymptomatic men. GPs in this study value PSA screening and believe that it reduces mortality rates. However, although PSA tests were most frequently done on asymptomatic patients, the majority of patients subsequently diagnosed with prostate cancer had been tested because of symptoms or had previous prostate problems.

**KEYWORDS:** Prostate specific antigen (PSA); PSA testing; screening; prostate cancer; general practitioners

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## Introduction

Prostate cancer is a common cause of male cancer in New Zealand with approximately 3000 new cases diagnosed each year and 560 deaths.<sup>1</sup> The natural history of prostate cancer is that it usually occurs in older men. It is slowly progressive with a long lead-time to diagnosis and symptoms. Five-year survival rates are also high at more than 80%.<sup>2-4</sup> The long lead-time prior to symptoms suggests prostate cancer to be a good candidate for screening. The PSA test is helpful as a management tool in patients with established prostate cancer; despite its limitations it is also used as a screening tool, being relatively cheap and simple to use.<sup>5</sup>

General practitioners (GPs) face conflicting messages about the need to screen. The Urological Society of Australia and New Zealand believe GPs should offer asymptomatic men a PSA test.<sup>6</sup> This advice is partly based on the results of two randomised control trials, the European Randomized Study of Screening for Prostate Cancer (ERSPC) and Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial.<sup>7,8</sup> The ERSPC study has shown reduced mortality in men who were screened between the ages of 50 and 69 years.<sup>8</sup> However, because of the acknowledged global issues of over diagnosis and harm caused by screening, the NZ Ministry of Health has fol-

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Table 1. The number and percentage of men who received a PSA test, had an elevated PSA and had been referred to a specialist in a 12-month period in five general practices by age

Age group Years	Had PSA test		PSA raised		Referred to specialist		Total
	n	%	n	%	n	%	n
40–49	241	12.4	6	2.5	2	33.3	1938
50–59	481	26.7	38	7.9	16	42.1	1802
60–69	415	35.7	48	11.6	21	43.8	1161
70–79	244	35.2	32	13.1	11	34.4	694
80+	99	30.7	23	23.2	5	21.7	323
<b>Total</b>	<b>1480</b>	<b>25</b>	<b>147</b>	<b>9.9</b>	<b>55</b>	<b>37.4</b>	<b>5918</b>

lowed the trend in other OECD countries and has avoided making recommendations supporting a national screening programme.<sup>5,9</sup>

What are GPs to do? Patients typically have a very straightforward understanding of the PSA test. A negative test means they do not have cancer, while a positive test will identify cancer early enough to allow curative treatment. They believe the risks of having a simple blood test are minimal.<sup>10</sup> However, several studies confirm that patients' perception of risk are not accurate.<sup>11,12</sup>

In New Zealand, it is known that PSA tests are used widely, with 275 000 tests a year being carried out principally ordered by GPs.<sup>13</sup> In general, GPs would test asymptomatic men, but many tests are also being undertaken in men with lower urinary tract symptoms (LUTS) or previous history of prostate problems.<sup>14–19</sup> What has not been recorded is why men are tested and what happens to the men who have been tested and are found to have a raised PSA level.

This study was designed as a pilot for a larger project looking at costs and complications of screening. This pilot was to be run within the Waikato District Health Board. The Waikato region is a large geographical area covering 34 890km<sup>2</sup> or approximately 13% of New Zealand's land mass, with a population of 353 000. There are a number of main urban areas in the region, including Hamilton. A characteristic of this region is the number residing in rural and isolated areas (23.8% compared with 14.3% for the total population).<sup>20</sup>

The aim of this study is to examine the age-specific rate of PSA testing in five general practices

in the Waikato region during a 12-month period and to understand why they are being tested. We also examined the outcomes of testing.

## Methods

This study was carried out in five Waikato-based general practices with a total population of approximately 25 000 registered patients. The practices were purposefully selected to be representative of both rural and urban practice. Ethics approval was obtained (reference number NTY/11/02/019). Practices were approached by the lead author, provided information on the content of the study and then invited to be part of the project. GP permission was sought to access PSA test results for all enrolled men aged 40 years and older from their practice who had received a PSA test result during 2010.

Once permission was received, the laboratory provided all PSA results for the given period attached to the GP and the practice. In-house GP patient records were reviewed to determine the reason the PSA test was performed. These were coded under four broad categories:

1. Opportunistic testing (e.g. done with blood tests for acute or non-related chronic problems, e.g. cardiovascular risk assessment (CVRA), flu injection, non-specific check-up etc.)
2. Previous raised PSA or prostate problems (including prostate cancer, prostatitis, benign prostatic hyperplasia)
3. Patient request (patient with no symptoms)
4. Patient had evidence of lower urinary tract symptoms (LUTS), including retention, reduced flow, nocturia, urgency, frequency, haematuria, dribbling, and erectile dysfunction.

Each practice provided baseline data of their population of enrolled men aged 40 years and over, date of birth, ethnicity, and National Health Index (NHI) number. The age and PSA levels of those tested were recorded.

We analysed the data looking at testing rates by age and reason for testing. We also analysed referral rates to specialists for those with a raised PSA test. A raised PSA was defined according to Pathlab recommendations:

- 40–49 years >2.5ug/L
- 50–59 years >3.5ug/L
- 60–69 years >4.5ug/L
- 70–79 years >6.5ug/L
- 80+ years >7ug/L.

Data were entered into an Excel spreadsheet that included date of birth and reason for testing for all men 40 years and older. In addition to reasons for PSA testing, details such as digital rectal examination, referrals, biopsies, complications, treatment, diagnosis date, stage/Gleason/extent were all captured.

A questionnaire survey was later sent to the GPs in the practices to ascertain their views regarding PSA testing. Each question had a choice of five responses from 'strongly agree' through to 'strongly disagree'. It included questions such as 'I believe that PSA screening will improve mortality rates for prostate cancer'; 'I am concerned about the harm caused to men due to PSA screening for prostate cancer'; 'I believe that the benefit of screening outweighs any harm'; and 'It is difficult to give a balanced view to patients regarding the pros and cons of PSA testing.' Demographic information was also collected.

## WHAT GAP THIS FILLS

**What we already know:** Despite ongoing debate regarding the benefits of PSA screening in general practice, PSA testing is frequently done, and the majority of tests can be considered screening rather than as an aid to diagnosis in men with symptoms.

**What this study adds:** While many studies have asked GPs for their views regarding screening of asymptomatic patients, this study reviewed not only GPs' testing activity but also looked at their subsequent management. An important finding was that a considerable proportion of PSA screening is performed in men aged 70+ years despite the fact that international advisory groups discourage screening in older men since it is known to cause harm and there is no evidence of reduced mortality in men aged over 70 years.

## Results

We identified 5918 resident male patients aged 40 years and older in the five practices. During the 12 months 1480/5918 (25%) had been tested with at least one PSA test. The range varied 10–37% over the five practices. Testing was least likely in the 40–49 year age group and declined slightly in the 80+ year age group (see Table 1).

Overall 147/1480 (10%) PSA tests were elevated (Table 1). In those with an elevated PSA, 55 out of 147 (37%) were referred to a specialist. Of the 55 referrals, 39 had a biopsy, 21 out of these had prostate cancer, and 18 were benign (Table 2).

However, there were 10 referrals to specialists with normal PSA test results. These had reasonable clinical grounds (LUTS and/or abnormal DRE) to do so (Figure 1). Two men who were biopsied had prostate cancer.

When we looked at the notes to ascertain the reason patients had a PSA test overall, 71% of the

Table 2. Number of men with raised PSA test, referral, biopsy, and diagnosed with prostate cancer grouped by reason for PSA test

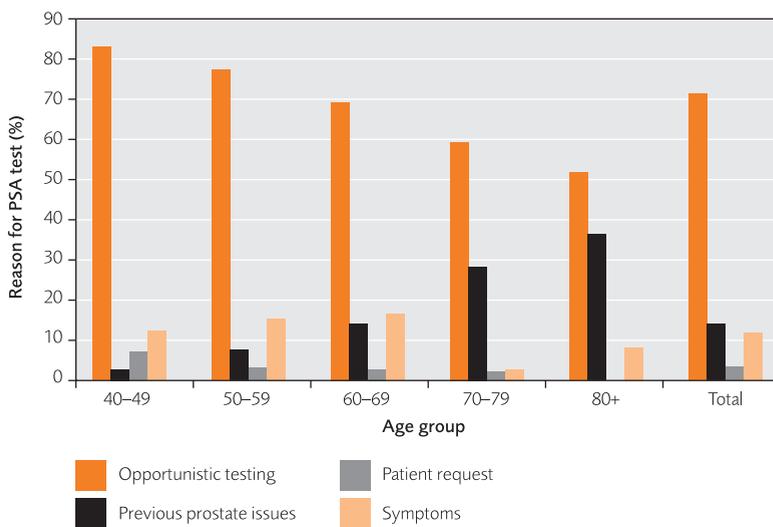
Reasons for PSA test	Raised PSA test	Referral	Biopsy	Diagnosis of prostate cancer
Opportunistic testing	28	6	5	4
Previous prostate problems	98	40	29	14
Patient requested test	2	1	0	0
LUTS	19	8	5	3
<b>Total</b>	<b>147</b>	<b>55</b>	<b>39</b>	<b>21</b>

Figure 1. Patients with normal PSA level referred to a specialist and their outcomes

#### Reasons for referral

- 6 with lower urinary tract symptoms > 1 biopsy > 1 diagnosed with prostate cancer
- 1 with abnormal digital rectal examination > 1 biopsy > 1 diagnosed with prostate cancer
- 2 with previous prostate cancer and rising but normal PSA level > no biopsy
- 1 with elevated PSA in 2009 and upper normal range PSA in 2010 > no biopsy

Figure 2. Proportion (%) of reasons for PSA test in five general practices by patients' age



time GPs did this opportunistically; 14.3% when there was a history of prostate problems; 3.9% on patient request; 10.8% with lower urinary tract symptoms (Figure 2).

#### GP questionnaire results

Of the 26 GPs in the five practices, 18 questionnaires were returned (69%); 10 male and 8 female. The majority worked five or more sessions in joint practices and were aged in their 40s and 50s.

Sixty-one percent agreed or strongly agreed that PSA screening reduced mortality rates. Fifty-five percent were concerned regarding harm caused by PSA testing, but the majority felt the benefits outweighed this. All but one GP did PSA screening; mostly selectively and/or opportunistically, mainly focused on men aged between 50 and

70 years. Only 44% agreed that all men over 40 should have at least one PSA test. Seventy-two percent of GPs said they did a digital rectal examination and PSA test when checking for prostate cancer.

Certain questions looked at consultation restraints surrounding PSA explanations. Thirty-nine percent of the GPs felt they needed more knowledge to advise patients. Fifty-six percent felt it was difficult to give a balanced view to patients regarding PSA testing. The majority felt patients had difficulty understanding the issues despite the GP's best efforts, and 61% said that patients elected to get the test anyway. However, the majority did not feel pressured by patients to perform PSA screening. GPs were evenly divided in their views regarding such things as medico-legal concerns, time restraints and whether patients could in fact make up their own minds about PSA testing.

#### Discussion

All doctors in the five general practices involved in the study were testing asymptomatic patients. This was confirmed by the GP questionnaire, in which all but one GP said they practised screening. Testing of asymptomatic men is common in New Zealand and this seems to be consistent with findings in other countries.<sup>15-17</sup> Many studies have asked GPs and primary care doctors for their views regarding screening of an asymptomatic patient; we have gone one step further in this study and identified why men are tested.

In our study, 25% of men 40 years and over were tested in 2010. Testing rates increased with age and GPs focused most of their screening on men aged between 50 and 69 years. This may in fact be worthwhile as the ERSPC study showed up to 20% reduction in mortality in men in this age group.<sup>8</sup> What is of concern in our study is the number of PSA tests done on patients aged 70+ years. A large number of these tests (56%) were done opportunistically when there is no evidence to support a mortality benefit in this age group. The National Screening Advisory Committee identified that nearly 50% of men 40 years and over had had a PSA test at some time, which compared to only 18% during 2008.<sup>21</sup> In a 2011

Health Committee inquiry into the early detection and treatment of prostate cancer, 50% of men 50 years and over were estimated to have a PSA test over a two-year period.<sup>22</sup> The New Zealand Health Survey suggests that approximately 50% of men aged 50 and over had a PSA test in the previous five years, of which 80% were asymptomatic.<sup>23</sup> This represented a 40% coverage rate in New Zealand in any one year. Our study found that there was a 25% chance of having a PSA test in 2010 if 40 years and over. If we limit it to 50 years and over the chance is 31%. These figures are consistent with the above-mentioned reports. Our GPs generally believed that the benefits of PSA testing outweighed harm and resulted in reduced mortality rates.

Ten percent (147/1480) of men who had a PSA tests in 2010 showed an elevated level of PSA. Management of these patients reflect the uncertainty over the value of PSA testing as a screening tool. Fifty-five out of 147 (37%) men were referred to a specialist (mostly urologist), which at face value seems to be a low referral rate. It seems that many men with raised PSA tests are initially managed with repeated PSA tests, rather than proceeding directly to referral. As this study had only a limited follow-up period we cannot comment on how many patients may eventually require a referral and biopsy.

In our sample, we observed that younger patients (40–69 years) were more likely to be referred (42.4%) and to have a biopsy (79.5%) than older men (29.1% referred, and 31.3% biopsied, respectively). In total, 39 out of 55 men with elevated PSA (71%) underwent a biopsy; 21 new cases of prostate cancer were identified. In addition, there were 10 referrals to a specialist in the absence of raised PSA. There seemed to be reasonable clinical grounds (LUTS and/or abnormal DRE) to do so. Two of these 10 men were biopsied, both of whom proved to have cancer.

We looked at the reasons for having the PSA test done and checked whether this was helpful in identifying men with prostate cancer. Having a previously raised PSA or history of a prostate problem together with a raised PSA proved to be the most productive in identifying prostate cancer. From our study it is estimated that for every

1000 PSA tests done for patients with previous prostate problems (including previously elevated PSA), approximately 66 new prostate cancers would be identified. There would be 18 new cancers for patients presenting with LUTS, while only four new cancers for every 1000 tests done opportunistically (i.e. those without symptoms or previous prostate problems). Therefore, when diagnosing prostate cancer it seems worthwhile if GPs focus their PSA testing on men with previous history of prostate problems or LUTS.

GPs within our study reported that they find explanation to patients about PSA screening difficult. Most seem convinced that screening is beneficial although evidence supporting improved mortality rates in the 70+ years age groups is lacking. More education for GPs may prove worthwhile.

One of the strengths of this study was that it was population based and that the researchers were able to link patient data with laboratory data. Collection of detailed data directly from clinical notes by the same researchers, one of whom was a clinician, is considered a strength. Seeking GP views via a questionnaire and relating these findings to practice was likewise believed to be a positive strength.

Weaknesses of this study could include the selection of practices which might not reflect a true representation of current practice. We also had lower numbers of Maori men than we were hoping to find, precluding analysis by ethnicity. GP questionnaire numbers were small and may not be representative of the New Zealand population. This study did not look at follow-up after biopsy and any risk or benefits from the diagnosis of prostate cancer. These aspects are being followed up by the larger, three-year Midland Prostate Cancer Study of which this study represents the pilot stage.

In conclusion, this study looked at PSA testing by GPs in five practices in the local Waikato setting. GPs in this study believed in the benefits of screening and were opportunistically testing, focusing their screening on men aged 50–69 years. They were more likely to refer and there was a greater chance of identifying prostate cancer

when PSA testing was done on men with previous history of prostate problems or LUTS. Using their clinical judgment, GPs identified further prostate cancer cases even when PSA levels were within normal ranges.

This study has provided useful findings that are informing a larger study on the management of men with prostate cancer.

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### COMPETING INTERESTS

None declared.