

Patterns of prostate-specific antigen (PSA) testing in Australian men: the influence of family history

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OBJECTIVE

- To describe how a family history of prostate cancer influences men's prostate cancer testing behaviours, information support preferences, and motives for testing.

SUBJECTS AND METHODS

- Men with a first-degree family history (239 men) and a comparison sample from the general population of Queensland, Australia (289) aged 40–65 years, and no prior history of cancer.
- Cross-sectional, retrospective survey assessing: prevalence of prostate-specific antigen (PSA) testing and digital rectal examination (DRE); discussion of prostate cancer risks and benefits with a physician;

prostate cancer information needs and preferences; motivations for testing.

RESULTS

- Men with a family history were more likely to report: having ever had a PSA test (odds ratio [OR] 4.98; 95% confidence interval [CI] 3.16–7.85), more PSA tests in their lifetimes (b 1.04; SE 0.40; 95% CI 0.26–1.82); to have had a DRE (OR 2.23; 95% CI 1.54–3.23); to have spoken to a doctor about prostate cancer (OR 3.72; 95% CI 2.30–6.02); and to have instigated these discussions (OR 1.74; 95% CI 1.13–2.70).
- Most men from both groups did not recall any discussion of the 'cons' of prostate cancer testing with a doctor.
- Men with a family history reported a greater desire for information about

prostate cancer prevention than did men without a family history.

CONCLUSIONS

- Men with a family history are more concerned about getting prostate cancer and are tested more often; however, information needs, discussions about prostate cancer, and motivations for testing are similar to those of all men.
- There appears to be a disparity between public health approaches that promote informed decision-making and what is happening in practice.

KEYWORDS

prostate cancer, family history, early detection

INTRODUCTION

In Australia, prostate cancer is the most prevalent cancer in men, with one in seven men diagnosed by the age of 75 years [1]. Men with a first-degree family history of prostate cancer are at more than double the risk of being diagnosed than men without a family history [2,3], although the clinical course is similar for both groups [4]. Current guidelines on the use of PSA testing for the early detection of prostate cancer recommend that men considering testing should make an informed decision about testing with their health practitioner, taking into account family history [5–12]; with one organisation advising that men with a

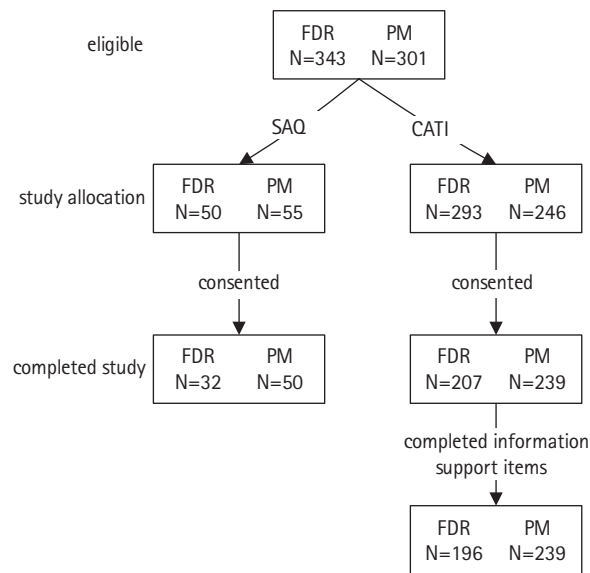
family history consider testing after the age of 40 years [5]. However, there is currently little Australian data to inform how this might best occur.

While it appears that having a first-degree family history of prostate cancer leads to greater uptake of early detection testing [13], rigorous data on this topic is only available from North American studies. However, this data may not be relevant to Australia, where overall testing rates tend to be lower [14,15] and where public health policies on testing vary [5,7,16,17]. In addition, key motivations for why men with a family history of prostate cancer may seek testing are not known; and preferred

sources of information and support for these men in making a testing decision have not yet been described in the Australian context. With regards to the latter, in North America men rate their healthcare provider as the most important source of information about testing for prostate cancer [18]. However, discussions about prostate cancer with healthcare providers did not tend to address the 'cons' of early detection tests.

The present study targets these gaps in evidence by applying a case control methodology to examine early detection of prostate cancer testing behaviours, information needs and preferences and

FIG. 1.
Recruitment flowchart.



motivations for testing of Australian men with a family history of prostate cancer.

SUBJECTS AND METHODS

Men with a first-degree family history of prostate cancer (FDRs) and a comparison sample of men from the general population (PMs) were recruited for the study. FDRs were recruited from their affected relatives (probands) who were participating in a longitudinal prostate cancer cohort study being conducted by the Cancer Council Queensland [19,20]. Recruitment occurred over a 12-month period commencing April 2008. FDRs who met eligibility criteria and for whom consent to contact was obtained were sent an information package and consent form. FDR participants were eligible if an affected relative was diagnosed before the age of 66 years and if the FDR was aged 40–65 years, did not have a prior history of cancer, lived within Australia, and had basic English literacy. In all, 40 FDRs who reported having a personal history of prostate cancer were excluded from the study. A total of 343 FDRs met eligibility criteria and were able to be contacted, and of these 239 (69.7% consent rate) completed the study.

An external market research firm recruited and interviewed a sample of PMs. Identical eligibility criteria as that used in the FDR sample recruitment was applied to the PM sample. PMs who indicated that they had a personal history of prostate cancer (seven men) or a first-degree family history of prostate cancer (32) were excluded from the

study¹. Sampling quotas were applied such that 50% of the sample was recruited from south-east Queensland and 50% were recruited from outside south-east Queensland. Of the 301 PMs whose eligibility for the study could be determined, 289 completed the study (96.0% consent rate).

The project was undertaken in two waves to allow for a parallel discrete project assessing decision-making strategies in depth. Hence, for a small subgroup of 82 men (32 FDRs and 50 PMs) involved in the additional decision strategy study (Fig. 1), prostate cancer testing behaviour and physician discussion questions were assessed by self-administered questionnaire. This subgroup of men was selected if they lived within 50 km of Brisbane CBD and were interviewed face-to-face. The remaining 446 men completed all measures in a computer-assisted telephone interview (CATI), which also contained questions about information and support preferences, and motivations for testing. Most FDRs who participated in the CATI (196, 94.7%) completed the information and support preference items that were contained in a separate interview (Fig. 1). Ethical clearance was obtained from Griffith University Human Research Ethics Committee.

¹Although it is possible that there may have been some PMs who were not aware of their family history, men in Australia have been shown to provide a reliable family history of prostate cancer [21].

Background variables. Participant's marital status, country of birth, ethnic background, education, work status, annual income and smoking status were assessed by self-report.

Prostate cancer testing behaviour.

Participants reported whether they had: ever had a blood test for prostate cancer; how many times they have had the test in their lifetimes and within the past 2 years. The reason for the participant's most recent PSA test was assessed with an unprompted item and the interviewer coded each participant's responses into one of seven categories (e.g., *the doctor suggested you have a blood test for prostate cancer*; Table 1). Participants who indicated that they intended to have a blood test for prostate cancer in the future were asked to indicate when they intended to have this test (e.g., *within the next 12 months*; Table 1). Participants who reported having had a DRE indicated whether this occurred within the previous 12 months.

Physician discussion. Participants who indicated that they had spoken to a doctor about testing for prostate cancer were asked: who first mentioned prostate cancer testing (*self* or *doctor*); how much time was spent discussing testing (1, *did not spend any time at all* to 5, *spent a great deal of time*); approximately how many minutes the doctor spent discussing testing; and whether the doctor discussed any advantages and any disadvantages of testing for prostate cancer. Participants also indicated who made the decision to order or not to order a PSA test (Likert scale ranging from 1, *entirely the doctor* to 5, *entirely the participant*).

Information and support preferences².

Participants completing the CATI (FDR 196, PM 239) were asked to indicate their degree of preference for receiving advice or information about prostate cancer from various sources (e.g. GP, Urologist, brochure or pamphlet, take-home DVD). Participants ranked seven information topics from most important to least important (e.g. *what is known about the risk factors for prostate*

²Participants who requested additional information about prostate cancer were referred to the Cancer Council Queensland Helpline (staffed with trained health professionals) or the participant provided contact details so an information package could be sent to them.

cancer, what is known about prostate cancer prevention).

Motivation for testing. Participants were read seven possible reasons for choosing testing and asked to indicate how important each reason was to them when considering testing for prostate cancer (e.g. *I want the best chance of finding it early, if I do get it*) [22].

RESULTS

Standard ordinary least squares and logistic regressions examined differences between FDRs and PMs across study variables using Stata (version 11.2) with a $P < 0.05$ considered to indicate statistical significance. Results are presented as frequencies, regression coefficients or odds ratios (ORs) with 95% CIs (mean differences reported for group comparisons). All analyses adjusted for potential confounding effects of age and geographical location³.

Table 1 contains demographic information for FDRs and PMs. Most of the participants were born in Australia (83.5%), were married or in a defacto relationship (83.7%), had completed a trade certificate or some form of tertiary education (67.8%), were employed full-time (70.8%), and more than half of the sample earned or had earned the equivalent of >\$60 000 per year (56.6%). The FDR sample were older on average than the PM sample (mean difference -1.55 ; 95% CI -2.81 to -0.29 ; $P = 0.016$) and were less likely to be recruited from metropolitan south-east Queensland (mean difference -0.14 ; 95% CI -0.23 to -0.06 ; $P = 0.001$), and to be more likely to be born in compared with outside of Australia (mean difference -0.18 ; 95% CI -0.24 to -0.12 ; $P < 0.001$) and to identify with a British/Scottish/Welsh/Irish ethnicity compared with other ethnicities (mean difference -0.11 ; 95% CI -0.18 to -0.04 ; $P = 0.004$).

PROSTATE CANCER TESTING BEHAVIOUR

FDRs were more likely than PMs to report having had a PSA test (OR 4.98; 95% CI

³A few participants gave extreme values for the total lifetime PSA tests and to reduce their influence on normality distributions these values were right-censored at the highest value that fell within the range of the majority of responses.

TABLE 1 Participant demographics

Demographics	FDR	PM
Mean (SD) age, years	54.09 (7.50)	52.54 (7.20)
N (%):		
Marital status:		
never married	20 (8.4)	13 (4.5)
married/defacto	196 (82.0)	246 (85.1)
widowed	2 (0.8)	2 (0.7)
divorced, separated	20 (8.4)	26 (9.0)
Lives in metropolitan (vs regional) area	105 (43.9)	169 (58.5)
COB		
Australia	225 (94.1)	216 (74.7)
New Zealand	3 (1.3)	14 (4.8)
UK	7 (2.9)	32 (11.1)
Northern, Southern, Eastern Europe	2 (0.8)	12 (4.2)
Asia or Middle East	1 (0.4)	8 (2.8)
Education		
did not complete or no formal schooling	15 (6.3)	1 (0.4)
primary School	44 (18.4)	5 (1.7)
junior High school	14 (5.9)	42 (14.5)
senior High school	94 (39.3)	47 (16.3)
trade or technical certificate/diploma	71 (29.7)	118 (40.8)
university/college degree		75 (26.0)
Work status		
full-time	166 (69.5)	208 (72.0)
part-time	13 (5.4)	18 (6.2)
casual	2 (0.8)	11 (3.8)
unemployed	3 (1.3)	6 (2.1)
retired	34 (14.2)	28 (9.7)
home duties/carer/unable to work	17 (7.1)	18 (6.2)
Smoker (yes)	36 (15.1)	52 (18.0)
Household income, \$ (AUD)		
<20 000	15 (6.3)	17 (5.9)
20 000–40 000	35 (14.6)	41 (14.2)
40 000–60 000	59 (24.7)	41 (14.2)
60 000–80 000	40 (16.7)	44 (15.2)
>80 000	86 (36.0)	129 (44.6)

Percentages may not equal 100% owing to missing data. COB, country of birth; AUD, Australian dollars.

3.16–7.85; $P < 0.001$), to have had a greater number of PSA tests in their lifetimes (b 1.04; SE 0.40; 95% CI 26–1.82; $P = 0.009$), to have had more PSA tests within the past 2 years (b 0.37; SE 0.11; 95% CI 0.14–0.59; $P = 0.001$), and to have intentions to have a further PSA test in the future (OR 5.72; 95% CI 1.92–17.08; $P = 0.002$; Table 2). FDRs (63.6%) were also more likely than PMs (42.9%) to report having had a DRE (OR 2.23; 95% CI 1.54–3.23; $P < 0.001$) and over a third of these men had received a DRE in the past 12 months (44.1% and 35.5%, respectively). Almost half of FDRs reported that the reason they participated in their

most recent PSA test was because of concern related to their family history.

PHYSICIAN DISCUSSION ABOUT PROSTATE CANCER

FDRs were more likely than PMs to have spoken to their doctor about testing for prostate cancer (OR 3.72; 95% CI 2.30–6.02; $P < 0.001$) and were more likely to have been the one to mention prostate cancer testing to their doctor (OR 1.74; 95% CI 1.13–2.70; $P = 0.012$; Table 3). Most of both FDRs and PMs reported that the doctor spent a small–moderate amount of time

discussing prostate cancer testing (86.7%) or ≈ 5 min on average (mean [SD] 5.22 [5.56]), and although more than half of all men recalled the doctor mentioning advantages of prostate cancer testing (56.3%), less than a fifth of men recalled the doctor mentioning any disadvantages (14.6%). On average, FDRs and PMs reported the decision about whether or not to test

for prostate cancer was made equally between themselves and their doctor (mean [SD] 3.24 [1.33] vs 3.00 [1.56], respectively).

INFORMATION AND SUPPORT

Both FDRs and PMs preferred to receive information about prostate cancer from a GP (86.6%, 75.7%) followed by a urologist

(74.9%, 73.6%), a prostate cancer support group (48.2%, 51.9%), or a special website (46.4%, 54.0%), respectively (Table 4). FDRs were significantly less likely to prefer to receive information from a prostate cancer support group (mean 3.22; SD 1.37; $b = -0.27$; SE 0.14; 95% CI -0.54 to -0.00 ; $P = 0.048$), or a confidential information helpline (mean 2.70; SD 1.39; $b = -0.43$; SE 0.14; 95% CI -0.71 to -0.15 ; $P = 0.002$) than were PM (support group: mean [SD] 3.84 [1.42]; information helpline: mean [SD] 3.16 [1.48]).

Table 5 displays the proportions of participants who ranked each of the information areas as a first, second, or third preference. All men considered knowing how to detect prostate cancer early and what to do about prostate cancer prevention to be their highest priorities for information followed by what is known about prostate cancer risk factors. FDRs were more likely than PMs to rank prostate cancer prevention higher as a first preference and in their first three preferences overall (78% vs 63%, respectively) whereas most PMs ranked detecting prostate cancer early as one of their first three preferences (89%) compared with two-thirds of FDRs (68%).

MOTIVATION FOR TESTING

The most important reasons endorsed by all participants were: wanting the best chance of finding prostate cancer early, and wanting to do everything possible to reduce the risk of dying from prostate cancer (Table 4). FDRs (mean [SD] 3.59 [1.36]) were more likely than PMs (mean [SD] 3.16 [1.40]) to be concerned that they might get prostate cancer ($b = 0.41$; SE 0.14; 95% CI 0.15–0.68; $P = 0.002$). Concerns about

TABLE 2 Description of prostate cancer testing items

Variable	FDR	PM
N	239	289
Ever had a PSA test (yes), n (%)	199 (83.6)	150 (51.9) [†]
mean (SD) PSA tests lifetime total ^a	3.59 (4.18)	1.64 (2.82) [†]
mean (SD) PSA tests performed within past 2 years ^a	1.79 (1.14)	1.40 (0.93) [†]
total participants who had > one PSA test in past 2 years ^a , n (%)	188 (94.5)	134 (89.3)
How frequently has participant had PSA tests ^a , n (%)		
has only had one test	49 (24.6)	49 (32.7)
more than once a year	37 (18.6)	14 (9.3)
once a year	82 (41.2)	53 (35.3)
once every 2 years	26 (13.7)	29 (19.3)
once every 5 years or more	4 (2.0)	4 (2.7)
What prompted most recent PSA test ^a , n (%)		
Dr suggested he have the test	16 (8.0)	18 (12.0)
family history of prostate cancer	91 (45.7)	1 (0.7)
participant had urinary symptoms	9 (4.5)	13 (8.7)
as part of a regular evaluation	68 (34.2)	71 (47.3)
wife/partner/family member insisted he get the test	1 (0.5)	6 (4.0)
friend/acquaintance suggested he get the test	2 (1.0)	3 (2.0)
other	12 (6.0)	26 (17.3)
Intend to get a PSA test in the future (yes), n (%)	234 (97.9)	254 (87.9) [†]
Intend to get a PSA test ^b , n (%)		
within the next 12 months	213 (91.0)	204 (80.3)
within the next 2 years	15 (6.4)	35 (13.8)
within the next 5 years	3 (1.3)	7 (2.8)
within the next 10 years	1 (0.4)	2 (0.8)

Percentages may not equal 100% owing to missing data and 'do not know' responses. ^aFDR 199, PM 150; ^bFDR 234, PM 254. * $P < 0.05$, $^{\dagger}P < 0.01$, $^{\#}P < 0.001$.

TABLE 3 Description of physician discussion items

Variable	FDR	PM
N (%)	239	289
Have you ever spoken to Dr about prostate cancer testing (yes), n (%)	208 (87.0)	190 (65.7) [†]
The doctor (vs myself) first mentioned prostate cancer testing ^a , n (%)	57 (27.4)	74 (39.0) [*]
How much time was spent discussing prostate cancer testing ^a , mean (SD, range), min	2.32 (0.72, 1–5)	2.25 (0.70, 1–5)
Approx how many minutes was prostate cancer testing discussed ^a , mean (SD, range), min	4.84 (4.47, 0–30)	5.64 (6.54, 0–30)
Did the doctor discuss any advantages of prostate cancer testing (yes) ^a , n (%)	119 (57.2)	105 (55.3)
Did the doctor discuss any disadvantages of prostate cancer testing (yes) ^a , n (%)	27 (13.0)	31 (16.3)

Percentages may not equal 100% owing to missing data and 'do not know' responses. ^aFDR 208, PM 190. * $P < 0.05$, $^{\dagger}P < 0.01$, $^{\#}P < 0.001$.

TABLE 4 Preferred information sources and motives for testing (% respondents answering quite to highly preferred)

Preferred information source:	FDR, n (%)	PM, n (%)
Your GP	169 (86.2)	181 (75.7)
A Urologist	146 (74.5)	176 (73.6)
A prostate cancer support group	94 (48.0)	124 (51.9)*
The newspaper	34 (17.3)	25 (10.5)
Television	42 (21.4)	41 (17.2)
A brochure or pamphlet	92 (47.0)	105 (43.9)
A DVD to watch at home	83 (42.3)	96 (40.2)
A confidential information helpline	64 (32.7)	101 (42.3) [†]
My family/partner	83 (42.3)	92 (38.5)
A special website	90 (45.9)	129 (54.0)
Motivation for testing (% respondents answering quite to very important)		
I am concerned that I might get prostate cancer	105 (53.6)	98 (41.0) [†]
I am not interested in waiting for all the proof about prostate cancer screening to be in	69 (35.2)	78 (32.6)
I think my chance of getting prostate cancer is low	69 (35.2)	63 (26.4)
I want the best chance of finding it early, if I do get it	178 (90.8)	212 (88.7)
I want to do everything possible to reduce my risk of dying from prostate cancer	179 (91.3)	209 (87.5)
I am not convinced about the effectiveness of testing	60 (30.6)	80 (33.5)
I am more concerned about avoiding treatment side effects	50 (25.5)	51 (21.3)

FDR 196 men, PM 239 men. *P < 0.05, [†]P < 0.01.

TABLE 5 Top three ranked information preferences by FDR (172^a) and PM (239) men

	FDR			PM		
	First	Second	Third	First	Second	Third
What is known about the risk factors for prostate cancer	23 (13.3)	27 (15.6)	94 (54.3)*	31 (13.0)	46 (19.3)	49 (20.5)
What is known about prostate cancer prevention	43 (24.9) [†]	54 (31.2)	38 (22.0)	32 (13.4)	68 (28.5)	51 (21.3)
How to detect prostate cancer early	47 (27.2) [†]	48 (27.8)	23 (13.3)	125 (52.3)	51 (21.3)	36 (15.1)
Treatment methods for prostate cancer	33 (19.1) [†]	20 (11.6)	10 (5.8)*	18 (7.5)	38 (15.9)	47 (19.7)
Where to get support after prostate cancer	12 (6.9) [†]	9 (5.2)	5 (2.9) [†]	4 (1.7)	5 (2.1)	23 (9.6)
The latest research on prostate cancer	11 (6.4)	10 (5.8)	2 (1.2)*	18 (7.5)	23 (9.6)	23 (9.6)
Alternative or complementary health care	4 (2.3)	5 (2.9)	1 (0.6) [†]	11 (4.6)	8 (3.4)	10 (4.2)

Adjusted standardised residuals showed cells were over/under represented when comparing proportions in FDR and PM cells. *P < 0.05, [†]P < 0.01, [‡]P < 0.001.

^a24 FDRs were excluded from analysis owing to a coding problem.

avoiding treatment side-effects, the effectiveness of testing, or wanting to wait for proof about prostate cancer were not rated highly by men in either group such that the means for these issues were below the midpoint of the scale.

DISCUSSION

The present study reports the first Australian data showing that men with a family history of prostate cancer are: more likely to initiate a conversation with their doctor about testing; more concerned about getting

prostate cancer; more likely to be tested; and are more interested in information about how to prevent prostate cancer than men from the general population. The present study also confirms the widely held suspicion that all men are interested in testing to reduce the chance that they will die from prostate cancer and for the purposes of detecting cancer early regardless of their family history. These results provide tangible evidence for implementing management strategies filling a crucial evidence gap by placing prostate cancer testing prevalence in an Australian context for men with a family history.

Furthermore, these findings indicate that the issues men think about when choosing testing are fairly straightforward and focus on avoiding death from prostate cancer without considering the morbidity from disease progression or from treatments.

These simple motivations seem inconsistent with public health messages that state that men need to understand the limitations of early detection testing and consider potential treatment side-effects when making testing decisions [5–7]. Inconsistencies between motivations and public health messages may help to explain

why, despite promoting informed decision-making for patients, early detection testing for prostate cancer continues to increase [14] with little evidence to be found that in-depth informed-decision discussions in primary care are common.

In this regard, when reporting on informed decision-making in practice, men recall a 5 min discussion and do not recall the disadvantages of early detection testing having been covered. A limitation of the present study is that the assessments of prostate cancer discussions were retrospective and not based on objective assessment but reliant on participants' recall of details of their consultation, which may have occurred sometime in the past. Accordingly, such assessments may be subject to bias, which may be inevitable without access to audiotaped consultations between patients and physicians during these consultations. Furthermore, physicians' perspectives are not known. It is clear that men do prefer to receive information from GPs suggesting that a greater understanding of the informed decision-making context by this group of doctors is needed. The reason that FDRs are less likely to prefer to receive information about prostate cancer from support groups is unclear but interesting and future research should investigate this further.

In conclusion, the present study suggests that men with a family history are concerned about getting prostate cancer and test more, yet their information needs, discussions about prostate cancer, and motivations for testing are similar to those of all men. There appears to be a disparity between public health approaches that promote informed decision-making and what is actually happening in practice.

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CONFLICT OF INTEREST

None declared.

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Abbreviations: **FDR**, men with a first-degree family history of prostate cancer; **PM**, men from the general population; **CATI**, computer-assisted telephone interview; **OR**, odds ratio.