Cancer screening in Queensland men

Philippe Carrière, Peter Baade, Beth Newman, Joanne Aitken and Monika Janda

ABSTRACT

Objectives: To describe the self-reported use of prostate specific antigen (PSA) tests, faecal occult blood tests (FOBTs), and whole-body skin examinations among Queensland men, reasons for use, and the personal characteristics of men undergoing the tests for cancer screening.

Setting and design: Data were obtained from the Queensland Cancer Risk Study (QCRS), a population-based telephone survey conducted in 2004, which used random sampling stratified by age, sex, and geographic location.

Participants: All men aged 50–75 years who participated in the QCRS ($n = 2336$).

Main outcome measures: Use of PSA test, FOBT, or whole-body skin examination, specifically as a screening procedure; the probability of being screened; and associations with sociodemographic factors, risk behaviour, and cancer experience.

Results: More than a third of men reported never having been screened for prostate, colorectal, or skin cancer. Of those who had been screened, the odds of PSA testing being reported were more than two times greater than the odds of whole-body skin examination (adjusted odds ratio [OR], 2.54; 95% CI, 1.49–4.32), and the odds of reporting an FOBT were less (adjusted OR, 0.48; 95% CI, 0.22–1.04). Men who participated in cancer screening tended to be older, white, living with a partner, and to have private health insurance. Smokers were less likely to be screened with any of the three screening tests.

Conclusions: Of these three cancer screening tests, the FOBT has the best evidence for reducing mortality and yet is the least frequently used by Queensland men. There are disparities in reported screening prevalence between the specific tests and across certain population subgroups.

MJA 2007; 186: 404–407

Three main tests are currently used for early detection of cancer in men: the serum prostate specific antigen (PSA) test, the faecal occult blood test (FOBT), and clinical whole-body skin examination. Screening with the PSA test is perhaps the most controversial, because of the test's low positive predictive value, its inability to distinguish clinically indolent cancers, and a lack of evidence for reduced mortality.[1] An individualised approach to PSA testing is recommended in Australia, based on a discussion of risks and benefits with patients.[2] However, the widespread use of PSA testing in general practice[3] surpasses what would be expected based on scientific evidence alone.

In contrast, the FOBT for colorectal cancer has been shown to reduce mortality.[4] Screening with FOBT is currently recommended in Australia for asymptomatic individuals aged 50 years or older,[4] and a National Bowel Cancer Screening Program is currently being phased in, providing formal population-based screening by FOBT.[5]

Screening for melanoma consists of a clinical whole-body skin examination. As there is no conclusive evidence that skin examination screening reduces mortality, population screening for melanoma is not currently recommended.[6] Some health bodies recommend such examinations opportunistically, or annually for high-risk individuals, such as those with numerous moles.[2,6]

These recommendations largely rely on doctors and patients making informed decisions as to whether to proceed with cancer screening. However, there is increasing evidence that men older than 50 years make suboptimal use of preventive health services, such as cancer screening.[7] Our population-based study describes the self-reported use of PSA tests, FOBTs, and whole-body skin examinations among Queensland men aged 50–75 years.

METHODS

Subjects and data collection

Data were derived from the Queensland Cancer Risk Study (QCRS). The QCRS was a statewide survey conducted among English-speaking residents of Queensland aged 20–75 years, and assessed the distributions and determinants of behavioural risk factors and screening activity for cancer. The sampling frame comprised the Electronic White Pages from the previous 6 years, to increase the probability of capturing silent telephone numbers. Households were sampled at random, within strata defined by age, sex, and geographic location. One eligible individual per household (based on sex and age group quotas) was surveyed anonymously, during a 30-minute computer-assisted telephone interview conducted between February and November 2004. Further details are described elsewhere.[8]

A total of 9419 people responded, for an overall response rate of 46%, similar to other recent surveys of this type.[9] For the analyses reported here, the sample was restricted to men aged 50 years or older. Men were asked if they had ever had a PSA, FOBT, or whole-body skin examination. For the most recent test, they were asked, "What prompted you to have this PSA test/FOBT/skin check?" A man was considered to have been screened if:

- the reported reason for the most recent test was a general or regular check-up, at a doctor's suggestion, or because of family history; and
- there was no personal history of prostate cancer, colorectal cancer, or melanoma.

Thus, a subsample was created that included only men whose last reported test was done as a screening procedure plus men who had never received any of these tests.

Measures

Telephone interviews collected the following information:

- Sociodemographic characteristics, including age, skin colour (white or not), currently married or living with a partner, area of residence, current gross household income by $10 000 strata, highest education level, and current private health insurance status;
- Risk behaviours, including current alcohol intake and smoking status; and
- Factors relating to men's experiences and perceptions of cancer, which included history of ever having had any cancer, experience with cancer (excluding non-melanoma skin cancer) that occurred either in acquaintances, friends, extended family

1 Number (%) of reported reasons (by age group) for obtaining the most recent PSA test, FOBT, or skin examination among Queensland men aged 50–75 years, who reported receiving at least one of these tests ($n = 2336$)

	Reported reason that prompted testing*					
	Screening			Diagnostic	Monitoring	
	General or regular check-up	Doctor suggested	Family history†	Symptoms	Personal history of cancer†	Any reason
PSA test						
50–64	465 (68.9%)	86 (12.3%)	26 (4.2%)	89 (12.6%)	17 (2.0%)	683 (47.1%)
65–75	366 (62.4%)	95 (16.1%)	11 (1.4%)	84 (13.9%)	38 (6.2%)	594 (64.1%)
All	831 (66.6%)	181 (13.6%)	37 (3.3%)	173 (13.0%)	55 (3.5%)	1277 (51.9%)
FOBT						
50–64	137 (58.7%)	33 (15.6%)	9 (5.3%)	42 (19.9%)	1 (0.6%)	222 (14.2%)
65–75	123 (59.3%)	36 (21.2%)	6 (3.0%)	29 (15.8%)	1 (0.7%)	195 (18.9%)
All	260 (58.9%)	69 (17.5%)	15 (4.5%)	71 (18.5%)	2 (0.6%)	417 (15.5%)
Skin examination						
50–64	318 (48.9%)		8 (1.7%)	207 (34.9%)	90 (14.5%)	623 (45.7%)
65–75	232 (57.0%)	not asked	3 (0.7%)	110 (27.0%)	62 (15.2%)	407 (44.8%)
All	550 (57.2%)		11 (0.6%)	317 (26.6%)	152 (15.1%)	1030 (45.4%)

*Some men received more than one test. Percentages are weighted to the 2003 Queensland population distribution. † History of prostate cancer, colorectal cancer, or any skin cancer, in the case of PSA testing, FOBT, and skin examination, respectively. FOBT = faecal occult blood test. PSA = prostate specific antigen. ◆

("Include blood relatives such as your mother's brother, and not relatives by marriage"), or in close family (parents, children, brothers and sisters), self-perceived cancer risk ("What are your chances of getting cancer other than skin cancer during your lifetime?"), and belief that early treatment for cancer increases survival.

Statistical analyses

The characteristics of men who had ever received a test were compared with those of men who had never received that test, and these bivariate results were used to build an unconditional, multivariable, logistic regression model, with the outcome being self-reported participation in any of the three screening tests, compared with never having had any of the three screening tests.

Because men could have received any combination of a PSA test and/or FOBT and/or skin check, repeated-measures logistic regression modelling was used, with the response variable being the different types of screening, rather than time-dependent variables. A similar method has been used previously in a cross-sectional survey.[10] This method allows concurrent estimation of the average probability of being screened, the probability of receiving a specific screening test, the independent associations with sociodemographic, risk behaviour, and cancer experience variables, as well as interaction effects. Skin examination was used as the reference screening test. Covariates for the repeated-measures regression model were chosen from the previous logistic regression model. Because of the requirement for non-zero cells in this model, strata were collapsed for the "experience with cancer" variable, and two variables from the logistic regression model had to be excluded (being white, living with a partner). When the interaction term was significant, adjusted marginal odds ratios and 95% confidence intervals for the main effects were calculated for each type of test, using the variance–covariance matrix from the model.

Statistical significance, size of parameter estimates, the effect of removal from the model, and substantive knowledge ultimately guided construction of the final, parsimonious models. All analyses were conducted with SAS, version 9.1 (SAS Institute, Cary, NC, USA), and all estimated proportions and regression parameters were weighted to the 2003 Queensland population distribution.

Ethics approval

The study protocol was approved by the Human Research Ethics Committee of the Queensland University of Technology, and all respondents provided verbal consent to participate.

RESULTS

Participant characteristics

Within the QCRS sample of men aged 50–75 years ($n = 2336$), 70 men (3.0%) had a history of prostate cancer, 47 (2.0%) colorectal cancer, and 171 (7.3%) melanoma. The median age was 63 years; 2240 (95.9%) described themselves as white; 1866 (79.9%) lived in a major city or inner region; and 1121 (48.0%) were in the lower two quintiles of the Socio-economic Indexes for Areas.[11]

Prevalence of tests and reasons for getting tested

Almost 52% of men reported ever having at least one PSA test for any reason, compared with 15.5% who reported an FOBT and 45.4% who reported whole-body skin examination (Box 1). More than 80% reported that either their most recent PSA test or FOBT was done for screening purposes, compared with 57.8% of men reporting a skin examination done for screening.

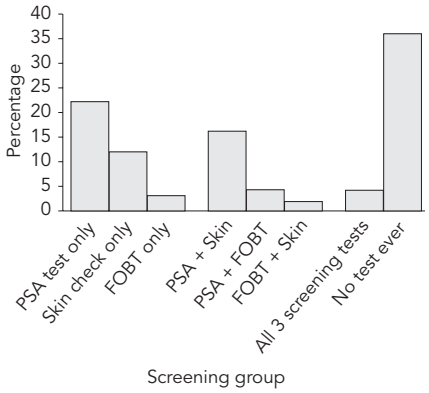
Tests done for screening purposes

The 734 men whose most recent test was for diagnostic or monitoring reasons were excluded from further analysis, leaving a sample of 1602 men who either had ever been screened by at least one of the three tests, or never received a test for any reason. Within this subset, 36.0% had never had any of the three tests (Box 2). The proportion of men screened by a PSA test only (22.2%) exceeded the combined proportion screened by FOBT only and skin examination only (15.1%).

After adjustment, older age, being white, living with a partner, and having private health insurance were positively associated with screening with a PSA test, FOBT, or skin examination (Box 3). The odds of smokers getting screened for cancer were significantly less than for non-smokers.

In the repeated-measures logistic regression model (Box 4), the odds of men reporting ever having been screened with a PSA test were 2.5 times greater than the odds of reporting a skin examination, and the odds of reporting an FOBT were non-significantly less than for a skin check. The odds of men aged 65–75 years having a screening PSA test or FOBT were greater than for men aged

2 Distribution of Queensland men aged 50–75 years who either received their most recent PSA test, FOBT, or skin examination for screening purposes, or never received a test ($n = 1602$)*



* Weighted to the 2003 Queensland population. FOBT = faecal occult blood test. PSA = prostate specific antigen. ◆

50–64 years, but there was no difference by age group for skin examination.

DISCUSSION

Men aged 50–75 years were least likely to report ever being screened for colorectal cancer with FOBT, compared with screening for prostate cancer by a PSA test or skin cancer by whole-body skin examination, despite the lack of definitive scientific evidence endorsing the latter two tests for population-based screening. The results also reveal lower cancer screening activities among men who are aged 50–64 years, who live alone, who lack private health insurance, and who smoke.

The overall participation rate of 46% raises concerns about the generalisability of results. Declining response rates have been reported in all types of studies over the past 30 years.[9] Encouragingly, empirical studies have shown little association between non-response and bias, even for response rates between 25% and 50%.[12,13] However, when the topic of a survey (such as familiarity with a specific disease) encourages participation and responses to survey questions are likely to differ in the survey sample, differential non-response bias can result.[14] Within the QCRS sample, there was under-representation of Indigenous people, and respondents were more likely to have higher educational attainment, be married, and have had a history of cancer[15] — all factors that could be associated with participation and our outcomes. Nevertheless, our study is among only a few that have described the characteristics of men who report screening for cancer by different tests.[16-18] Although the analysis is based on self-reported information, we assessed the reasons that prompted testing, so inferences can be drawn specifically for screening behaviour and related factors.

Although the benefits of participating in screening by FOBT are relatively clear, several barriers have been described, among which are the inconvenience and unpleasantness of the procedure, lack of perceived benefit from screening, anxiety over possible results, cost, and cultural beliefs and attitudes.[4] As previous participation in a screening test for cancer has been associated with further propensity to continue screening,[17] and given the wide acceptance of the

3 Characteristics associated with having been screened by a PSA test, FOBT, or skin examination, among Queensland men aged 50–75 years

	Adjusted OR*	95% CI
Age (years)		
50–64	1.00	
65–75	1.36	1.02–1.83
White		
No	1.00	
Yes	2.03	1.12–3.68
Living with a partner		
No	1.00	
Yes	1.48	1.07–2.06
Private health insurance		
No	1.00	
Yes	2.52	1.95–3.26
Smoker		
No	1.00	
Yes	0.65	0.47–0.89
Experience with cancer		
None	1.00	
Known someone	1.76	1.00–3.10
Extended family member	1.28	0.69–2.37
Close family member	1.72	0.99–2.96
Early treatment increases survival		
Agree	1.00	
Neither agree/ disagree	0.33	0.13–0.85
Disagree	0.67	0.26–1.69

* Estimates are weighted to the 2003 Queensland population distribution. FOBT = faecal occult blood test. OR = odds ratio. PSA = prostate specific antigen. ◆

4 Characteristics associated with self-reported screening among Queensland men aged 50–75 years, estimated by modified repeated-measures logistic regression*

	Adjusted OR	95% CI
Type of screening†		
Skin examination	1.00	
PSA	2.54	1.49–4.32
FOBT	0.48	0.22–1.04
Age‡		
PSA		
50–64 years	1.00	
65–75 years	1.71	1.31–2.25
FOBT		
50–64 years	1.00	
65–75 years	1.59	1.10–2.29
Skin examination		
50–64 years	1.00	
65–75 years	0.99	0.75–1.31
Private health insurance§		
No	1.00	
Yes	2.08	1.61–2.70
Smoking§		
No	1.00	
Yes	0.61	0.43–0.86
Close family history of cancer§		
No	1.00	
Yes	0.91	0.71–1.16

* The modified repeated-measures response was the type of screening (PSA, FOBT, and skin examination). Men could have more than one type of screening test. Estimates are weighted to the 2003 Queensland population distribution.
† Significant difference across the types of screening: $\chi^2 = 118.90$, df = 2, $P < 0.001$.
‡ Significant interaction between age and screening test: $\chi^2 = 10.30$, df = 2, $P = 0.006$.
§ No significant interactions: between smoking and screening test ($\chi^2 = 0.51$, df = 2, $P = 0.77$); between private health insurance and screening test ($\chi^2 = 5.41$, df = 2, $P = 0.06$); between close family history of cancer and screening test ($\chi^2 = 0.23$, df = 2, $P = 0.89$). FOBT = faecal occult blood test. OR = odds ratio. PSA = prostate specific antigen. ◆

PSA test, the prostate cancer screening encounter may present an opportunity to promote FOBT for early detection of colorectal cancer.[16] Given the associations of being married and older age with cancer screening, promotional programs could also seek to involve these men's partners to increase participation in cancer screening by FOBT.

Several explanations are plausible for the large proportion of men being screened by PSA testing. Even though population-based screening of asymptomatic men is not currently recommended in Australia, a decision by individual men based on informed choice (including understanding risks, benefits and uncertainties) is advocated by most guidelines.[2,19] Personal vulnerability and perceived seriousness of the disease influence men's decisions about whether to be screened,[20] and it may be that increasing awareness of prostate cancer as a men's health issue or the high prevalence of urinary symptoms among men over 50 years is raising these perceived concerns. The test's low cost and ease of the procedure are also possible facilitators of increased use, and medicolegal concerns may act more as an incentive for general practitioners to screen rather than not to screen.[21]

Men in Queensland are at very high risk of developing skin cancer, including its deadliest form, melanoma.[22] There is a high awareness of skin cancer risk among the Queensland public,[23] and a relatively high prevalence of screening for skin cancer has been reported previously.[24] A recent study found that detection of melanomas during a deliberate skin examination by a doctor is associated with diagnosis of thinner melanomas,[25] which is a strong prognostic determinant of the treatment outcome.

Of the three screening tests reported here, the FOBT has the best evidence for reducing mortality, but is the least frequently used by Queensland men. Evaluation of the factors influencing cancer screening behaviours and effective interventions to improve adherence with public health recommendations are important directions for future research.

ACKNOWLEDGEMENTS

We gratefully acknowledge Dr Katrin Hausdorf for her assistance with the Queensland Cancer Risk Study data analyses, and the Cancer Council Queensland for funding the Queensland Cancer Risk Study.

COMPETING INTERESTS

None identified.

AUTHOR DETAILS

Philippe Carrière, MD, MSc, Epidemiologist[1]
Peter Baade, PhD, AStat, Biostatistician and Senior Research Fellow[1]
Beth Newman, PhD, Professor, and Director, Centre for Health Research – Public Health, and Principal Researcher[2]
Joanne Aitken, PhD, Director of Cancer Registries[1]
Monika Janda, PhD, Senior Research Fellow[2]
1 Viertel Centre for Research in Cancer Control, Cancer Council Queensland, Brisbane, QLD.
2 School of Public Health, Queensland University of Technology, Brisbane, QLD.
Correspondence:
philippecarriere@bigpond.com

REFERENCES

1 Neal DE, Donovan JL. Prostate cancer: to screen or not to screen? *Lancet Oncol* 2000; 1: 17-24.
2 Harris M, Bailey L, Bridges-Webb C, et al. Guidelines for preventive activities in general practice. 6th ed. Melbourne: Royal Australian College of General Practitioners, 2005.
3 Slevin TJ, Donnelly N, Clarkson JP, et al. Prostate cancer testing: behaviour, motivation and attitudes among Western Australian men. *Med J Aust* 1999; 171: 185-188.
4 Australian Cancer Network Colorectal Cancer Guidelines Revision Committee. Guidelines for the prevention, early detection and management of colorectal cancer. Sydney: Cancer Council Australia and ACN, 2005. http://www.cancer.org.au/content.cfm?randid=408243 (accessed Mar 2007).
5 Australian Government Department of Health and Ageing. The National Bowel Cancer Screening Program. Canberra: Department of Health and Ageing, 2006. http://www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/bowel-1lp (accessed Feb 2007).
6 Cancer Council Australia. National cancer prevention policy 2004–06. Sydney: Cancer Council Australia, 2004. http://www.cancer.org.au/content.cfm?randid=988667 (accessed Mar 2007).
7 Lemon SC, Zapka JG, Puleo E. Comprehensive cancer screening in a primary care population: gender differences in the impact of ambulatory care system factors. *J Ambul Care Manage* 2005; 28: 86-97.
8 Queensland Cancer Fund. Queensland Cancer Risk Study. Brisbane: QCF, 2005.
9 Morton LM, Cahill J, Hartge P. Reporting participation in epidemiologic studies: a survey of practice. *Am J Epidemiol* 2006; 163: 197-203.
10 Baade PD, Balanda KP, Stanton WR, et al. Community perceptions of suspicious pigmented skin lesions: are they accurate when compared with general practitioners? *Cancer Detect Prev* 2005; 29: 267-275.
11 Australian Bureau of Statistics. Socio-economic indexes for areas 2001. Canberra: ABS, 2003. (ABS Cat. No. 2039.0.)
12 Curtin R, Presser S, Singer E. The effects of response rate changes on the index of consumer sentiment. *Public Opin Q* 2000; 64: 413-428.
13 Keeter S, Miller C, Kohut A, et al. Consequences of reducing nonresponse in a national telephone survey. *Public Opin Q* 2000; 64: 125-148.
14 Groves RM, Cooper MP, Presser S, et al. Experiments in producing nonresponse bias. *Public Opin Q* 2006; 70: 720-736.
15 DiSipio T, Rogers C, Newman B, et al. The Queensland Cancer Risk Study: behavioural risk factor results. *Aust N Z J Public Health* 2006; 30: 375-382.
16 Carlos RC, Underwood W, Fendrick AM, Bernstein SJ. Behavioral associations between prostate and colon cancer screening. *J Am Coll Surg* 2005; 200: 216-223.
17 Lemon S, Zapka J, Puleo E, et al. Colorectal cancer screening participation: comparisons with mammography and prostate-specific antigen screening. *Am J Public Health* 2001; 91: 1264-1272.
18 Sirovich BE, Schwartz LM, Woloshin S. Screening men for prostate and colorectal cancer in the United States: does practice reflect the evidence? *JAMA* 2003; 289: 1414-1420.
19 Commonwealth Department of Health and Family Services. Prostate cancer screening: summary of the review prepared by the Australian Health Technology Advisory Committee. Canberra: CDHFS, 1996.
20 Wolf AM, Philbrick JT, Schorling JB. Predictors of interest in prostate-specific antigen screening and the impact of informed consent: what should we tell our patients? *Am J Med* 1997; 103: 308-314.
21 Pinnock CB. PSA testing in general practice: can we do more now? *Med J Aust* 2004; 180: 379-381.
22 Baade P, Coory M. Trends in melanoma mortality in Australia: 1950–2002 and their implications for melanoma control. *Aust N Z J Public Health* 2005; 29: 383-386.
23 Del Mar C. Slip, slop, slap and wrap. Should we do more to prevent skin cancer? *Med J Aust* 1995; 163: 511-512.
24 Janda M, Elwood M, Ring IT, et al. Prevalence of skin screening by general practitioners in regional Queensland. *Med J Aust* 2004; 180: 10-15.
25 McPherson M, Elwood M, English DR, et al. Presentation and detection of invasive melanoma in a high-risk population. *J Am Acad Dermatol* 2006; 54: 783-792.

(Received 29 Oct 2006, accepted 5 Feb 2007) ❑