ABSTRACT

Despite controversy about prostate cancer screening, administrative data show that the use of prostate specific antigen (PSA) testing in Canada has increased. This study sought to determine awareness and knowledge of prostate cancer and screening, use to date, and future intentions to have a digital rectal examination (DRE) and PSA test among Canadian men aged 40 and over. Data were collected through a Canada-wide cross-sectional random digit dial telephone survey of 629 men. Awareness of DRE and PSA, use to date, and future intended use varied with age and education. Although only 9% of respondents had had PSA testing for screening, future intentions to undergo this test were higher than use to date. Knowledge of prostate cancer and screening controversies was low, and men received more information about PSA from the media than from doctors. Men would, therefore, benefit from age- and education-specific information regarding the factors to consider in making an informed choice about prostate cancer screening.

ABRÉGÉ

En dépit des controverses entourant le dépistage du cancer de la prostate, les données administratives indiquent une augmentation de l'utilisation de l'antigène prostate-spécifique (PSA) pour le dépistage de ce cancer au Canada. Cette étude visait à déterminer le niveau de sensibilisation et de connaissances des Canadiens âgés de 40 ans et plus au sujet du cancer de la prostate et de son dépistage, du recours au dépistage et des intentions futures d'avoir un toucher rectal et un dépistage par PSA. Les données ont été recueillies à l'aide d'un sondage téléphonique au hasard, transversal et pancanadien, ayant porté sur 629 hommes. Le niveau de sensibilisation et de connaissances concernant le toucher rectal et le dépistage par PSA, le recours au dépistage et les intentions futures variaient beaucoup en fonction de l'âge et du niveau d'éducation. Bien que seulement 9 % des répondants aient déjà eu un dépistage par PSA, les intentions d'avoir ce dépistage sont apparues plus élevées que son utilisation. Les connaissances concernant les controverses au sujet du cancer de la prostate et de son dépistage étaient faibles et les hommes ont dit avoir reçu davantage d'informations au sujet de l'antigène prostate-spécifique par les médias que par leurs médecins. En conséquence, il apparaît indiqué dans l'intérêt de la population masculine de lui fournir une information adaptée à l'âge et au niveau d'éducation au sujet des facteurs à prendre en compte en vue de prendre une décision éclairée en matière de dépistage du cancer de la prostate.

Prostate Cancer Screening in the Midst of Controversy: Canadian Men's Knowledge, Beliefs, Utilization, and Future Intentions

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Prostate cancer is the most commonly diagnosed cancer and the second highest cause of death from cancer in Canadian men (non-melanoma skin cancer is not included in Canadian cancer statistic summaries), with an estimated 18,200 new cases and 4,200 deaths in 1996.^{1,2} In the absence of strategies for primary prevention, attention has turned to screening.

Two modalities, both controversial, are used for prostate cancer screening. The digital rectal examination (DRE) allows palpation of only the prostate's posterior third and may miss half of existing cancers.³ Tumours detected by palpation

are usually large and have often spread.⁴ The prostate-specific antigen (PSA) test measures blood levels of PSA, a protease.^{5,6} Elevated PSA levels may indicate prostate cancer.^{5,7} However, noncancerous prostate problems also lead to high levels of PSA.^{6,8,9} Additionally, PSA varies with age and race and remains normal with some prostate cancers.^{6,8-10} Both tests have low sensitivity (DRE: 40%-77%; PSA: 43%-79%) and specificity (DRE: 50%-97%; PSA: 59%-90%) and a high false positive rate (DRE: 5%-11%; PSA: 8%-26%).^{3,4,7,8,10-17}

PSA testing finds many early tumours.^{5,7} Prostate cancer, however, may grow slowly or remain in a latent stage.¹⁸ Most men with a diagnosis of prostate cancer will actually die of something else.¹⁹ Determining which early cancers will become life-threatening is currently impossible.^{3,15,20} Also, evidence is limited regarding whether treating early prostate cancer reduces mortality.^{15,21-25} Moreover, treatment side effects include incontinence, impotence, and bowel injury.^{3,22,26}

Prostate cancer incidence rises with age. Autopsy studies show that 30% of men aged 50 and over and 90% aged 90 and over may have cancerous prostate cells.^{3,5,10} If mass PSA screening were implemented, many men with latent cancer might test positive. Some might experience anxiety, unnecessary work-up, and treatment side effects for a disease that would not have been fatal.

All Canadian and European and many U.S. expert groups recommend that PSA testing not be used for population-based screening and that patients requesting PSA

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should undergo pretest counselling and should give informed consent.^{3,4,10,15,26-28} Yet, some U.S. groups recommend annual PSA screening from age 50.⁹ Although most groups maintain that there is insufficient evidence to recommend DRE screening, several U.S. and Canadian groups recommend annual DRE from age 40.^{3,4,9,10,26-28}

Canadian administrative data show exponential increases in PSA utilization, with some reductions in 1995/1996.^{2,26,29} These sources do not differentiate screening from diagnostic tests. Few studies have considered men's awareness, knowledge, and behaviours with regard to prostate cancer screening. Most found that men had little knowledge of prostate cancer and screening.²⁹⁻³⁷ Age has been positively associated with awareness and use of DRE and PSA, and higher education has been associated with DRE and PSA awareness and DRE use.^{31,32,37-39} In one Canadian survey, 32% of men aged 45 and over "had a blood test for prostate cancer", and 38% aged 35 and over "had a rectal examination of the prostate" in the previous year.³⁹

Data on prostate screening utilization are needed to plan and evaluate public and patient education programs. With the increased use of PSA testing, programs cannot await completion of the trials examining its effectiveness.^{40,41} The purpose of this study was to determine awareness and knowledge of prostate cancer and screening, use of DRE and PSA to date, and future intentions to use DRE and PSA among Canadian men aged 40 and over.

METHODS

Data were collected through a Canada-wide cross-sectional random digit dial (RDD) telephone survey. The target population was all noninstitutionalized English or French speaking men aged 40 and over. The survey was developed and pretested for computer-assisted telephone interviewing. Since most cancer screening surveys have studied women,⁴²⁻⁴⁹ we conducted focus groups and one-on-one interviews to uncover issues and terminology relevant to men. The selection of variables was guided by the PRECEDE-PROCEED model for health planning.⁵⁰ This framework helps identify factors that predispose to, rein-

Final Disposition	n	
Total number of telephone numbers generated	3,920	
Numbers generated but call not executed because quota for region filled	128	
Total number of calls placed	3,792	
Unable to make contact to determine whether household or business number	1,046	
Business number, not in service	297	
Refused before could determine eligibility	733	
Contacted and able to determine eligibility	1,716	
Ineligible		
• No English or French speaking respondent	36	
• No men aged 40 or over in the household	1,014	
Confirmed eligible households	666	
Terminated interview after qualifying (refused or requested call back)	36	
Completed interviews	630	
Eligibility of household confirmed	Yes 1,716	No 733
Number of eligible households	666	unknown
Eligibility rate	666/ 1,716 =39%	39% assumed
(Estimated) number eligible	666	39% of 733 =286
Estimated response rate (interviews/# eligible)	630/(666+286) = 66%	

force, and enable health behaviour. The survey took up to 22 minutes and included questions on health status, health care utilization, sociodemographic factors, knowledge, beliefs, behaviours, and intentions. Clear definitions of DRE, PSA, and screening were provided. For both DRE and PSA, only those men reporting awareness were asked about use to date and future intentions.

Quotas were set for each province to approximate the national population distribution of men aged 40 and over, based on 1991 census projections. Telephone numbers were randomly drawn from a database of listed and unlisted numbers kept by the survey house that conducted the interviewing. Each number from which there was no initial response was called at least five times. Screening calls identified whether the telephone number was for a household and whether any men aged 40 or over lived there. If there was more than one, the man with the most recent birthday was selected.⁵¹ Interviews were conducted by trained interviewers in January 1995 in English or French. Quality assurance included monitoring

30% of calls and having supervisors continually present.

For men who had ever had PSA testing, we classified their last test as screening if they were not aware that they had prostate problems or symptoms before the test, and they had no history of prostate problems or cancer. Otherwise, the test was considered diagnostic. Sample size was calculated to provide reliable estimates of PSA use among Canadian men aged 40 and over. A sample of 630 men would yield an overall margin of error of $\pm 4\%$ 19 times out of 20 (95% confidence interval).⁵² Data analysis involved descriptive statistics and contingency table analyses. For both DRE and PSA, chi square tests were used to determine whether awareness, use to date, and future intended use differed by age and education.

RESULTS

Table I shows call dispositions and response rate calculations.^{53,54} The response rate was 66%. One man refused to provide his exact age, leaving a final sample of 629. The sample was similar to the overall

TABLE II
Demographic Comparison of Sample (n=629) with Census Data
for Canadian Men Aged 40 and Over

Characteristic	Study Sample (%)	Canada Census Data (%)
Age Group		1991 Census Projections for 1995
40-49	36	38
50-59	29	25
60-69	21	20
≥70	14	17
Marital Status*		1991 Census Data
Single	8	8
Married	75 †	80
Separated/Divorced	11 ‡	8
Widowed	6	4
Education**		(20% Sample of 1991 Census Data for men ≥45 years)
< High school	31 ¶	49
Completed high school	19	17
Some/completed college/other, some university	22	23
University degree	28 ¶	12

* Overall χ^2 test of goodness of fit: marital status of sample is significantly different from population ($p<0.01$)

† Significantly different from census data, $p<0.001$

‡ Significantly different from census data, $p<0.01$

** Overall χ^2 test of goodness of fit: education status of sample is significantly different from population ($p<0.0001$)

¶ Significantly different from census data, $p<0.0001$

TABLE III
Knowledge and Beliefs About Prostate Cancer (n=629)

Survey Question/Statement (Correct Response)	% Responding Correctly
Chances of a man in Canada getting prostate cancer during his lifetime* (1 in 10)	34
Risk factors for prostate cancer† (Increasing age)	8
(Family history)	10
Treatments for prostate cancer† (Surgery)	25
(Radiation)	28
(Hormonal)	6
(Watchful waiting)	2
Side effects of prostate cancer treatments† (Impotence)	17
(Incontinence)	9
Most prostate cancer can be cured if caught early enough‡ (Agree strongly or somewhat)	74
Most men who get prostate cancer will die of prostate cancer‡ (Disagree strongly or somewhat)	53
A man can have prostate cancer without pain or any other symptoms‡ (Agree strongly or somewhat)	47
The majority of prostate cancer tumours are fast growing‡ (Disagree strongly or somewhat)	35
Compared to what you know about heart disease, do you know more, about the same, or less about prostate cancer?* (Less)	49

* Multiple choice question

† Open-ended; multiple responses allowed so % not exclusive

‡ Five point Likert-type response scale

Canadian population except that there were fewer married and more separated and divorced men, and more highly educated men (Table II). Eleven men (1.7%) reported that they had prostate cancer.

Respondents' knowledge of prostate cancer, risk factors, treatment and side effects was low (Table III). There was considerable variability in beliefs. Correct responses were more common among those with

higher education and younger (aged 40 to 59) men (data not shown). Of the 17% who reported awareness of prostate screening controversies, three-quarters could identify one or more actual issues (Table IV).

Whereas 61% of respondents first heard about DRE from their doctor and 15% from the media, for PSA testing 40% first heard from their doctor and 42% from the media. When asked where they got the most information about DRE, 63% included their doctor as one of four possible choices, and 47% included the media. For PSA, 41% included their doctor, and 62% included the media.

DRE awareness was uniformly high (Table V). Compared with men aged 50 to 59 (chosen as the referent because screening advocates recommend PSA testing from age 50), those aged 40 to 49 had less use to date and less future intended use of DRE, and less awareness and fewer intentions to undergo PSA testing; men 60 and over reported greater PSA use. Fewer men intended to have DRE in the next 12 months than had had DRE to date, but more men intended to undergo PSA testing within 12 months than had done so to date. Whereas 21% who had been given DRE had also had PSA testing, only 2% never given DRE had had PSA. Among those who had ever undergone PSA testing, 50% aged 40 to 49 and 62% aged 50 and over had their last PSA test for screening. Thus, 9% of all respondents and 12% of respondents aged 50 and over had been given a PSA test for screening.

DRE awareness, use to date, and future intended use increased with education (Table VI). PSA awareness increased with education, but ever use and intended use did not.

DISCUSSION

Knowledge about prostate cancer, screening, and related controversies is low among Canadian men aged 40 and over. Our findings of greater knowledge among younger and more educated respondents have been reported for other surveys.^{30-32,35,37,46,55} Men in this study learned more about PSA from the media than from physicians. Participants in focus group

studies report that they have limited trust in the media and prefer to talk to physicians, but report difficulty getting information from them.^{26,33} A recent Saskatchewan survey found the main impediments to physicians providing PSA information were personal uncertainty about risks and benefits, and limited patient understanding.²⁶ In a U.S. survey, physicians reported that a lack of educational materials was a significant barrier to their counselling patients about cancer screening.⁵⁶ Yet, most men in the focus group studies stated that they wanted to know about controversies.^{26,33} In light of the low awareness of controversies among respondents in our study, physicians may benefit from strategies and materials to help them present controversial information to patients.

The number of men in our survey who reported ever having had a PSA test was lower than the number in the 1994 Canada Health Monitor survey³⁹ who reported having undergone PSA testing in the previous year. The question wording differed between the two surveys. As the test name was not specified in the Health Monitor survey, some men may have reported having had another blood test.

In our survey, for both PSA and DRE, awareness, use to date, and future intended use increased to age 69. This is understandable, since prostate cancer incidence increases with age, leading to greater need for diagnostic tests, and proponents advocate screening for men over the age of 50.^{5,9,10} Fewer men intended to have a DRE in the next 12 months than had had DRE to date, and more men intended to have PSA testing in the next 12 months than had done so to date. This cannot simply be explained by more men having recently undergone DRE: when men unlikely to have a test were asked why, similar proportions reported that they had "had one recently" (DRE: 5%; PSA: 4%). Among men not intending to have DRE, 7% stated that they disliked the test. A simple blood test may seem more appealing.

PSA use to date and future intended use did not vary with education. The highly educated may be more concerned about controversies. Also, people move successively through stages of becoming aware of

Survey Question (Possible Responses)	% Giving This Response*
Are you aware of any controversies...?	
(No)	81
(Not Sure)	1
(Yes)	17
If yes, specify†	
(Questions about PSA test's accuracy)	3
(Cost issue/PSA test is too costly)	3
(Test inconclusive/ineffective)	2
(Whether or not surgery is appropriate)	2
(Doesn't affect longevity/life expectancy)	2
(Tests are not reliable)	1
(Whether or not test should be done)	1
(DRE may not be effective/reliable)	1
(Intervention causes more problems than not treating)	1

* Proportion of the total sample
† Open-ended; multiple responses allowed so % not mutually exclusive; responses shown are possible correct responses

Age Group	n	Ever Heard of Test (%)	Ever Had Test* (%)	Intentions to Have a Test Within Next 12 Months* (%)		
DRE						
40-49	223	78	† 51 **	‡ 38 ¶		
50-59	183	81	68	52		
60-69	134	85	76	55		
≥70	89	87	74	46		
Total	629	82	65	47		
PSA						
		†	Last Test Screening	Last Test Diagnostic	Total	
40-49	223	25 ¶	3	3	6	6 §
50-59	183	39	10	3	13	22
60-69	134	51	14	9	23	28
≥70	89	43	11	15	26 ¶	24
Total	629	37	9	6	15	18

* These categories are not mutually exclusive; respondents were asked about both use to date and future intentions
† Overall χ^2 test for homogeneity of proportions across all age groups significant (p<0.0001)
‡ Overall χ^2 test for homogeneity of proportions across all age groups significant (p<0.005)
** Significantly different vs. age 50-59 (p<0.001)
¶ Significantly different vs. age 50-59 (p<0.01)
§ Significantly different vs. age 50-59 (p<0.0001)

and contemplating change before developing intentions and actually undergoing behaviour change.⁵⁷ The lack of association with education is not surprising, given that PSA is relatively new and awareness was low.

There were limitations to this survey. The response rate was fairly low, although comparable to or higher than that reported for various Statistics Canada and other RDD surveys.^{35,58-63} Survey response rates have declined in recent years, possibly

because people's participation is being solicited for increasing numbers of surveys.^{59,64-66} Recent studies comparing surveys with differing response rates have found similar distributions for screening variables.^{59,65} To reduce response bias, potential respondents were told that our survey dealt with "current men's health issues" rather than prostate cancer being mentioned specifically, which might have differentially increased participation by men suffering from prostate problems.⁶⁶⁻⁶⁸

TABLE VI
Awareness, Use to Date and Future Intentions to Use the DRE
and the PSA as a Proportion of the Total Number of Respondents
in Each Education Group (n=627)

Education	n	Ever Heard of Test (%)	Ever Had Test (%)	Intentions to Have a Test Within Next 12 Months (%)		
DRE						
		*	†	†		
Some high school or less	193	75	56	38		
Completed high school	121	82	64	47		
Some/completed college or some university	138	82	64	49		
University degree	175	88 ‡	74 **	55 ‡		
PSA						
		*	Last Test Screening	Last Test Diagnostic	Total	
Some high school or less	193	31	9	5	15	14
Completed high school	121	34	6	7	12	20
Some/completed college or some university	138	41	7	7	13	17
University degree	175	44 ‡	11	6	17	22

* Overall χ^2 test for homogeneity of proportions across all education levels significant (p<0.05)
† Overall χ^2 test for homogeneity of proportions across all education levels significant (p<0.01)
‡ Significantly different vs. < high school (p<0.01)
** Significantly different vs. < high school (p<0.001)

* Overall χ^2 test for homogeneity of proportions across all education levels significant ($p < 0.05$)

† Overall χ^2 test for homogeneity of proportions across all education levels significant ($p < 0.01$)

‡ Significantly different vs. < high school ($p < 0.01$)

** Significantly different vs. < high school ($p < 0.001$)

The differences between the sample and the population in marital status may reflect secular trends and question wording. Our respondents were more educated than the general population, as is typically found with mail and especially RDD surveys.^{59,66,69} This suggests that our survey may actually overestimate knowledge of prostate cancer, screening, and awareness of PSA.

The study relied on self report. Content validity was addressed through using questions from other surveys wherever possible, and involving content and questionnaire design experts throughout survey development. Recent criterion validation studies have found good agreement between self report and medical chart audit for ever having had DRE and having had DRE within the previous two years, with self report underestimating length of time since the last DRE.⁷⁰⁻⁷² Although validation data are unavailable for PSA, similar findings have been reported for other cancer screening tests, with better agreement for procedures (like PSA) that generate a test report than those (like DRE) that involve only a physician's note.⁷⁰⁻⁷⁷ We attempted to overcome recall and social desirability biases by carefully describing DRE and PSA and asking only those men reporting

awareness of them about their utilization and intentions. Relying on self report did complicate our designation of PSA as being conducted for screening or diagnosis.

Despite these limitations, the study reveals that among Canadian men, awareness, use to date, and future intended use are considerably lower for PSA than DRE. Only 9% of men aged 40 and over and 12% aged 50 and over had undergone screening PSA. PSA awareness increased with age and education. Although intentions to have PSA testing in the next 12 months were reported by only one-third of men, this was higher than the prevalence of use to date. Yet, men's knowledge of prostate cancer, screening, and related controversies was low. Men therefore require age- and education-specific information regarding the benefits and risks of personal involvement in prostate cancer screening. Given the controversies, Canadian men deserve the opportunity to make an informed choice.

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