Prevalence of skin screening by general practitioners in regional Queensland

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ABSTRACT

Objective: To establish the prevalence and predictors of skin screening by general practitioners in regional Queensland.

Design: Questionnaire administered to participants by professional interviewers via telephone.

Participants and setting: Participants were 3100 adults aged ⩾ 30 years (66.9% overall response rate), selected from residents of 18 regional Queensland communities with populations of between 2000 and 10 000 (as recorded in the 1996 Australian census). Within the last 10 communities surveyed, an additional telephone survey of 727 participants evaluated mole density. The survey was conducted between January and October 1998.

Main outcome measure: Prevalence of whole-body skin examinations by GPs.

Results: 11% of participants reported a whole-body skin examination by a GP during the previous 12 months, and 20% during the previous 3 years. Men and women reported a similar prevalence of whole-body skin examinations. Factors associated with a significantly increased likelihood of having had a whole-body skin examination within the previous 3 years included a positive attitude towards skin screening, a personal history of non-melanoma skin cancer, a tendency to burn, and having more than four moles on the right upper arm.

Conclusions: A substantial proportion of Queenslanders undergo skin screening. Those at highest risk for skin cancer are more likely to be screened.

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QUEENSLAND RESIDENTS have the highest risk of melanoma in the world, carrying a lifetime estimated risk of 1 in 16 for men and 1 in 24 for women.[1] While incidence has increased in recent years, melanoma mortality has remained relatively stable,[2] due at least in part to public health campaigns encouraging increased awareness and early diagnosis.[3]

Diagnosis of melanoma depends on the clinical identification of a suspicious lesion. Population screening for melanoma by periodic whole-body skin examination can potentially lead to earlier diagnosis, thinner tumours and fewer deaths, but there is no randomised-trial evidence to support this.[4-6] Nevertheless, screening of the skin for early signs of cancer is a common clinical procedure.

It was the aim of our study to establish the current prevalence and predictors of skin examination by general practitioners in regional Queensland, in preparation for a randomised controlled trial (RCT) of a community-based screening program for melanoma.[7]

METHODS

Communities and participants

Participants in our study were adults aged ⩾ 30 years drawn from Queensland communities with populations of between 2000 and 10 000, as recorded in the 1996 Australian census. In selecting communities, we divided the state of Queensland into four regions (southern coastal, southern inland, northern coastal, northern inland) according to boundaries formed by the Tropic of Capricorn (E–W) and the Great Dividing Range (N–S). Of 107 suitable communities, we selected 44 for our RCT of melanoma screening, such that no two communities were closer than 50 km apart by road. Of these, 18 communities, representing all four geographical regions, were selected for the first phase of the RCT. The 18 communities had a total adult population aged ⩾ 30 years of 63 035.

Our survey was conducted by telephone. Telephone numbers were selected at random from a commercially available directory of all telephone numbers in the selected communities. On contacting each household, interviewers asked to speak to the man or woman aged 30 years or more with the most recent birthday. A computerised quota system ensured equal numbers of participants of each sex.

Survey questionnaire

The survey questionnaire was drafted after consultation with public-health and health-promotion experts and a review of the literature and existing

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questionnaires relating to skin examination.[8-12] The questionnaire was extensively pre-tested and refined. The reliability of the questionnaire was assessed by re-interviewing 190 participants one month after the first interview. There was good absolute agreement (P_A) for the main outcome measure "whole-body skin examination by a medical practitioner during the past three years" ($P_A = 86\%$) and for other questions, including "propensity to sunburn" ($P_A = 70\%$), "mole or spot ever removed" ($P_A = 92\%$) and "concern about skin cancer" ($P_A = 74\%$).

Interview procedure

Professional telephone interviewers administered the questionnaire between January and October 1998 (mean interview time, 13 minutes), using a computer-assisted telephone interviewing (CATI) system. A total of 9205 separate households were contacted. Of these, 4555 were ineligible (3709 households had no resident of the required age and sex present at the time of the interview, 525 of the people contacted resided outside the community, 284 could not understand English, 31 had previously completed an interview and 6 indicated that they had black skin). Of the remaining 4650 eligible residents, 987 (21.2%) refused participation, 444 (9.5%) said they would not be available within the survey period, and 109 (2.3%) did not receive scheduled callbacks, as the community-specific male/female quota was full. The overall response rate was 66.9% (range, 60%–74% across communities), with a total of 3110 completed interviews. All responses were entered into the CATI database and automatic internal range checks were conducted.

Information recorded

Interviewers recorded participants' sociodemographic characteristics, standard melanoma risk factors, degree of concern about skin cancer, perceived likelihood of developing skin cancer in the future, and attitudes towards skin cancer screening. If a participant reported that a GP had found or treated a suspicious skin lesion, details of further management were obtained.

1: Distribution of melanoma risk factors among study participants ($n = 3100$)*

	P	Percentage of participants having whole-body skin examination in previous 3 years†	Odds ratio (95% CI)
Hair colour	0.20		
Brown/black ($n = 2281$)		19.6%	1.00
Blond ($n = 663$)		21.6%	1.13 (0.85–1.52)
Red ($n = 155$)		15.3%	0.74 (0.45–1.23)
Skin colour	0.65		
Brown/olive/Asian ($n = 466$)		20.6%	1.00
Medium ($n = 764$)		18.6%	0.88 (0.59–1.32)
Fair ($n = 1868$)		20.0%	0.97 (0.64–1.47)
Eye colour	0.23		
Brown/black ($n = 924$)		16.8%	1.00
Green/grey ($n = 1105$)		21.2%	1.34 (0.90–1.99)
Blue ($n = 1057$)		21.1%	1.33 (0.91–1.94)
Tendency to burn after 30 minutes of unprotected skin exposure	0.003		
Always tan without burning ($n = 128$)		9.5%	1.00
Tan slightly without burning ($n = 642$)		18.2%	2.10 (0.97–4.55)
Burn then tan ($n = 1547$)		18.3%	2.12 (0.91–4.90)
Always burn without tanning ($n = 725$)		26.4%	3.38 (1.61–7.09)
Ability to tan	0.21		
Deep tan ($n = 846$)		18.7%	1.00
Moderate tan ($n = 1199$)		18.0%	0.95 (0.76–1.19)
Slight tan ($n = 636$)		21.5%	1.20 (0.94–1.52)
Never tan ($n = 330$)		26.5%	1.57 (0.99–2.48)
Spot/mole removed in the past	0.001		
No ($n = 1427$)		14.0%	1.00
Yes ($n = 1673$)		24.9%	2.03 (1.48–2.79)
Personal history of melanoma	0.004		
No ($n = 2985$)		19.3%	1.00
Yes ($n = 113$)		34.5%	2.20 (1.24–3.92)
Personal history of non-melanoma skin cancer	0.001		
No ($n = 2867$)		18.2%	1.00
Yes ($n = 233$)		35.5%	2.47 (1.64–3.72)
Family history of melanoma	0.31		
No ($n = 2250$)		19.1%	1.00
Yes ($n = 762$)		22.7%	1.24 (0.79–1.94)
Family history of non-melanoma skin cancer	0.10		
No ($n = 2325$)		18.7%	1.00
Yes ($n = 775$)		23.4%	1.32 (0.92–1.91)

* Numbers in column 1 categories do not always add up to 3100 because of missing responses for some questions.
† Percentages have been adjusted to correct for population and cluster sampling.

Prevalence of skin screening by GPs

To assess the prevalence of whole-body skin examination, participants were asked, "In the past 12 months/3 years, has your GP deliberately checked the skin on your whole body? Usually this would involve taking your clothes off, at least down to your underwear (ie, bra and underpants)". To assess part-body skin examination, participants were asked, "In the past 12 months, has your GP deliberately checked any part of your skin?" Answers were recorded as "yes", "no", or "don't know".

Additional information on melanoma risk factors

In the last 10 communities surveyed, all participants were asked if they would agree to participate in a second, more detailed melanoma risk-factor survey to be held within 2–3 weeks of the first. Most participants (812 [95%]) agreed, and 727 of these were recontacted within the survey period. Before their second interview, these participants were mailed a booklet containing pictures of mole density and freckling and a stencil with a 2 mm-diameter circle to measure moles on the right upper arm. Participants were asked to place the stencil over their moles and count all moles with a diameter ≥ 2 mm.

Statistical analysis

To allow for the cluster design of the study (communities being the cluster unit), all analyses were conducted using the SUDAAN statistical package.[13] SUDAAN allows for the changed variation associated with clustered or multistage sample survey data. To ensure that estimates were not unduly biased by disproportionate sampling of community, sex or age group, the data were weighted according to the population distribution (based on the 1996 Australian census).

Standard descriptive statistical analysis and bivariate logistic analyses were performed to establish the prevalence and determinants of whole-body skin examination by a GP within the previous 3 years. All variables with significant ($P < 0.05$) bivariate associations (Wald χ^2) were entered into a multivariate model, after exclusion of highly correlated measures to avoid collinearity.

2: Distribution of melanoma risk factors (additional survey of 727 study participants)*

	P	Percentage of participants having whole-body skin examination in previous 3 years†	Odds ratio (95% CI)
Some/many freckles as a child	0.19		
No (*n* = 521)		17.4%	1.00
Yes (*n* = 205)		20.1%	1.19 (0.90–1.59)
Some/many freckles as an adult	0.008		
No (*n* = 611)		16.9%	1.00
Yes (*n* = 115)		24.6%	1.60 (1.10–2.31)
Presence of moles	0.001		
None (*n* = 140)		15.0%	1.00
Few (*n* = 426)		15.8%	1.06 (0.70–1.61)
Some/many (*n* = 159)		27.8%	2.17 (1.40–3.38)
Number of moles on right upper arm	0.001		
None (*n* = 377)		14.7%	1.00
1–4 (*n* = 210)		14.5%	0.99 (0.60–1.62)
> 4 (*n* = 138)		31.8%	2.71 (1.58–4.63)

* Numbers in column 1 categories do not always add up to 727 because of missing responses for some questions.
† Percentages have been adjusted to correct for population and cluster sampling.

RESULTS

Results are based on 3100 completed interviews. (Ten of the original 3110 participants were excluded from the analysis, as their ages were unknown.) The demographic characteristics of participants were representative of the Queensland population as described in the 1996 Australian census, with the exception of some groups that were under-represented: women older than 70 years (census, 18.1%; our sample, 9.5%); people currently not working (census, 47.4%; our sample, 40.0%); and non-Australian citizens (census, 4.4%; our sample, 2.3%). (Details of demographic characteristics are available from the authors on request.)

Melanoma risk factors. The prevalence of melanoma risk factors among participants is summarised in Box 1 and Box 2: 25% of participants reported that they always burn without tanning after 30 minutes of unprotected sun exposure, 53% reported the removal of a mole or spot in the past, 3% reported a personal history of melanoma and 9% reported a personal history of non-melanoma skin cancer. A quarter of participants reported a family history of melanoma, and a similar number reported a family history of other skin cancer. In the additional, more detailed survey of melanoma risk factors ($n = 727$), 21% of participants reported having some or many moles.

Concern about skin cancer and perceived likelihood of developing skin cancer. Almost a quarter (22%) of participants reported they were concerned about a specific growth or mole at the time of the survey, 39% were very concerned about skin cancer, and almost a third (32%) thought it very likely that they would develop skin cancer in the future (Box 3).

Attitude towards skin screening. Attitudes towards skin screening were consistently positive (Box 3). Seventy-nine percent of participants had confidence in their GP's ability to diagnose skin cancer, and only 8% said that skin checks would be embarrassing.

Prevalence of skin screening. Eleven per cent (95% CI, 8.7%–13.9%) of participants reported that they had had a whole-body skin examination by their GP during the previous 12 months, and 20% (95% CI, 16.2%–23.4%) during the previous 3 years; 31% of all participants had received a part-body skin examination by their GP in the past 12

3: Attitudes and opinions about skin cancer and skin screening (n = 3100)*

	P	Percentage of participants having whole-body skin examination in previous 3 years†	Odds ratio (95.0% CI)
Concern about a specific growth or mole	0.77		
Not concerned/don't know (n = 2397)		19.7%	1.00
Very concerned (n = 703)		20.3%	1.04 (0.77–1.41)
Concern about skin cancer	0.004		
Not concerned/don't know (n = 1832)		15.8%	1.00
Very concerned (n = 1268)		26.2%	1.90 (1.29–2.78)
Perceived susceptibility to develop skin cancer	0.001		
Not likely/don't know (n = 2138)		16.6%	1.00
Very likely to develop skin cancer (n = 962)		26.5%	1.81 (1.38–2.37)
Opinions about skin cancer and skin screening			
Checking my skin regularly is a priority for me	0.001		
Strongly disagree/disagree/unsure (n = 911)		8.8%	1.00
Agree/strongly agree (n = 2189)		26.6%	3.77 (2.81–5.06)
If I saw something suspicious I would go to the doctor straight away	0.001		
Strongly disagree/disagree/unsure (n = 443)		8.5%	1.00
Agree/strongly agree (n = 2657)		22.0%	3.02 (1.82–5.02)
I am confident in my GP's ability to diagnose skin cancer	0.01		
Strongly disagree/disagree/unsure (n = 636)		11.5%	1.00
Agree/strongly agree (n = 2464)		22.0%	2.18 (1.12–4.26)
I am confident I could find something suspicious on my skin	0.45		
Strongly disagree/disagree/unsure (n = 599)		21.6%	1.00
Agree/strongly agree (n = 2501)		19.4%	0.87 (0.60–1.28)
Checking my skin would make me anxious	0.17		
Strongly disagree/disagree/unsure (n = 2436)		20.8%	1.00
Agree/strongly agree (n = 662)		15.8%	0.71 (0.42–1.21)
Having a skin check would be embarrassing	0.41		
Strongly disagree/disagree/unsure (n = 2850)		20.3%	1.00
Agree/strongly agree (n = 250)		14.2%	0.65 (0.22–1.93)

* Numbers in column 1 categories do not always add up to 3100 because of missing responses for some questions.
† Percentages have been adjusted to correct for population and cluster sampling.

months. In total, 42% had received some form of skin examination (whole- or part-body) in the previous 12 months. There was no significant difference between men and women, or between younger (30–49 years) and older (≥ 50 years) participants in the prevalence of whole-body skin examinations (Box 4). Participants 50 years or older reported a part-body skin examination by a GP more frequently than did younger people (37.6% [95% CI, 33.6%–41.6%] versus 24.9% [95% CI, 21.9%–27.9%]; P = 0.001). The difference in part-body skin examinations between older and younger participants was observed mainly in men (38.6% [95% CI, 31.5%–45.7%] in men ≥ 50 years versus 16.4% [95% CI, 11.9%–20.8%] in men 30–49 years; P = 0.01). For women, there was no significant difference in prevalence between the two age groups.

Predictors of having had a whole-body skin examination within the previous 3 years. After simultaneous adjustment for all other factors in the multivariate regression model, factors positively associated with having a whole-body skin examination during the previous 3 years were high propensity to develop sunburn, a past history of non-melanoma skin cancer, having more than four moles on the right upper arm, having a positive attitude towards skin screening, and having confidence in the GP's ability to diagnose skin cancer (Box 5). The odds ratios remained essentially unchanged when the analysis was applied to the 727 participants with complete data for moles on the right upper arm, and when age and sex were added to the model (data not shown).

Management of suspicious lesions. Among all survey participants, 657 (20.8%) reported that their GP had detected a suspicious freckle, spot or mole in the previous 12 months. This occurred relatively more frequently among people in the older age group than the younger age group (26.3% [95% CI, 21.8%–30.8%] versus 16.0% [95% CI, 12.9%–19.1%]; P < 0.001). Of the skin lesions detected, 420 were treated immediately, 133 were treated at a later date, 40 were still under surveillance at the time of the survey, 17 were handled by referral to another doctor for treatment, and 28 were still awaiting treatment (for the remaining 19 lesions, participants did not recall how the lesion was treated). Of the lesions treated immediately, 277 were removed through liquid nitrogen or similar substances and 142 were excised (there was one other treated lesion, for which the respondent could not recall the method of treatment). Of the 133 lesions treated at a later date, 30 were treated with liquid nitrogen and 103 were excised. All 40 lesions initially assigned for surveillance were later excised.

DISCUSSION

More than 11% of our participants had had a whole-body skin examination by a GP in the previous year, and 20% in the previous 3 years. In the 12 months before the survey, more than 20% of all

4: Proportion of study participants (n=3100) having skin examination by general practitioners*

	Total (%) (95% CI)	Sex (%) (95% CI)			Age (%) (95% CI)		
		Men (n=1555)	Women (n=1545)	P†	30–49 years (n=1759)	⩾50 years (n=1341)	P‡
Whole-body skin examination in previous 12 months	11.3% (8.7%–13.9%)	10.6% (7.8%–13.6%)	11.9% (8.5%–15.2%)	0.74	12.9% (10.6%–15.2%)	9.3% (5.3%-13.3%)	0.23
Whole-body skin examination in previous 3 years	19.8% (16.2%–23.4%)	19.3% (16.2%–22.4%)	20.3% (15.5%–25.0%)	0.58	20.9% (17.0%–4.8%)	18.5% (13.0–23.9)	0.44
Part-body skin examination in previous 12 months	30.9% (27.8%–34.0%)	26.9% (23.7%–30.1%)	34.9% (30.2%–39.6%)	0.01	24.9% (21.9%–27.9%)	37.6% (33.6%–41.6%)	0.001

* Percentages have been adjusted to correct for population and cluster sampling. † Cochrane–Mantel–Haenszel test for difference in proportion between men and women. ‡ Cochrane–Mantel–Haenszel test for difference in proportion between age categories.

5: Adjusted multivariate logistic regression analysis of factors predicting whole-body skin examination by a GP within the previous 3 years

	P	Adjusted odds ratio* (95% CI)
Melanoma risk factors		
Tendency to burn after 30 minutes of unprotected sun exposure	0.05	
Always tan without burning		1.00
Tan slightly without burning		1.91 (0.95–3.85)
Burn then tan		1.90 (0.85–4.23)
Always burn without tan		2.47 (1.18–5.16)
Personal history of non-melanoma skin cancer	< 0.01	
No		1.00
Yes		2.17 (1.23–3.83)
Number of moles on right upper arm	< 0.01	
None		1.00
1–4		0.83 (0.53–1.28)
> 4		2.34 (1.45–3.76)
Not recorded		1.47 (0.89–2.44)
Opinions about skin cancer and skin screening		
Perceived likelihood of developing skin cancer in the future	0.07	
Not likely, don't know		1.00
Very likely		1.42 (0.94–2.15)
Concern about skin cancer	0.10	
Not concerned, don't know		1.00
Very concerned		1.30 (0.92–1.84)
Checking my skin regularly is a priority for me	< 0.01	
Strongly disagree/disagree/unsure		1.00
Agree/strongly agree		2.82 (2.19–3.64)
If I saw something suspicious I would go to the doctor straight away	< 0.01	
Strongly disagree/disagree/unsure		1.00
Agree/strongly agree		2.47 (1.42–4.30)
I am confident in my GP's ability to diagnose skin cancer	0.05	
Strongly disagree/disagree/unsure		1.00
Agree/strongly agree		2.01 (0.93–4.37)

* Adjusted to correct for population and cluster sampling.

participants had had a suspicious lesion detected by their GP, with over 60% receiving immediate treatment. More than half of all participants had had a mole or spot removed at some time in their lives.

Our study is the first large-scale population-based survey of the prevalence of skin screening by GPs in regional Queensland, an area of high melanoma risk. Ours is one of the few Australian surveys to assess the prevalence of whole-body skin examination on a population basis — most previous surveys have not asked specifically about whole-body skin examination and thus their results are not directly comparable to ours.[14-18]

If skin screening programs are to improve early diagnosis of melanoma, they need to capture those at greatest risk of melanoma — ie, older people (particularly men), people with many moles, with fair pigmentation, who sunburn easily and are unable to tan, and those with a personal or family history of skin cancer.[19] Our results provide some indication that people with recognised melanoma risk (ie, many moles, a tendency to burn and a personal history of non-melanoma skin cancer) were more likely to have had a whole-body skin examination by a GP in the previous 3 years. However, a limitation of our analysis is that it was based on self-report, and some results suggest that participants overstated their personal risk of skin cancer and found it difficult to differentiate between a family history of melanoma and a family history of other skin cancers (a problem reported previously in the Queensland

population[20]). Our results may also overestimate the current prevalence of skin screening if those participating were more health-conscious and interested in skin screening than those who refused participation.

A survey of GPs' skin-screening practices[21] found that doctors strongly supported cancer screening by clinical skin examination and were more likely to include a skin examination as part of a dedicated health check-up for men than for women. However, we did not observe a difference in the number of whole-body skin examinations between men and women.

Part-body examinations were more frequent in the $\geqslant 50$ years age group. Not surprisingly, people aged 50 years or more were treated by a GP for skin lesions more frequently than younger people.

Overall, the high prevalence of skin screening reported in our survey is likely to reflect the high awareness of skin cancer among the public in Queensland,[22] which is consistent with the high level of concern about skin cancer and with positive attitudes towards skin screening expressed by most of our participants. Another Australian study revealed that most skin excisions for benign pigmented moles are performed to relieve the concerns of worried patients.[23]

The question of whether skin screening does in fact reduce melanoma mortality remains largely untested.

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COMPETING INTERESTS

None identified.

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