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Title: Diagnosis and clinical management of melanoma patients at higher risk of a new primary melanoma: a population-based study in New South Wales, Australia.

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ABSTRACT

Objectives: To describe the method of diagnosis, clinical management and adherence to clinical practice guidelines for melanoma patients at higher risk of a subsequent primary melanoma, and compare this with melanoma patients at lower risk.

Methods: The Melanoma Patterns of Care study was a population-based, observational study based on doctors' reported clinical management of melanoma patients in New South Wales, Australia, diagnosed with in situ or invasive melanoma over a 12-month period from October 2006. Of 2,605 patients with localised melanoma, 1,019 (39%) were defined as higher risk due to the presence of one or more of the following risk factors: family history of melanoma (11%), multiple primary melanomas (17%), or many naevi (24%).

Results: Compared to patients at lower risk, higher risk patients were more likely to receive their initial care from a primary care physician (56% vs 50%, $P=0.002$), have their melanoma detected during a routine skin check (40% vs 33%, $P<0.001$), their lesion assessed with dermoscopy (63% vs 56%, $P=0.002$), and be encouraged to have skin surveillance (84% vs 77%, $P<0.001$) and skin self-examination (87% vs 83%, $P=0.03$). Higher socio-economic status and urban residence were associated with higher risk patients receiving initial treatment from a specialist doctor.

Conclusions: Clinical management of higher risk patients was more likely to conform to clinical practice guidelines for diagnosis and skin surveillance than that of melanoma patients at lower risk.

INTRODUCTION

Melanoma is the third most common cancer in Australia for both males and females.¹ Once a person has been diagnosed with invasive or in situ melanoma, they have approximately 5 to 10-fold higher

risk of subsequent melanomas compared to the general population² and there are a number of environmental and genetic factors which further influence melanoma risk.^{3,4}

Australian⁵ and international⁶ clinical practice guidelines for management of cutaneous melanoma recommend that people at higher risk of new primary melanoma be considered for a surveillance program, and educated about suspicious skin changes, skin self-examination and appropriate sun protection. In addition, training in and use of dermoscopy is recommended for clinicians routinely examining suspicious lesions.^{5,6} Risk factors for future primary melanomas identified in the Australian guidelines⁵ include common and dysplastic naevi, family history of melanoma, history of previous melanoma or non-melanoma skin cancer, as well as age, sex, skin and hair pigmentation, and evidence of actinic skin damage.

There is limited population-level evidence describing how melanoma patients at higher risk of a new primary melanoma are diagnosed and managed in the population, and whether their clinical management adheres to clinical practice guidelines. To address this question, we used the Melanoma Patterns of Care study, which documented clinical care for all patients diagnosed with melanoma in New South Wales (NSW), Australia, over a 12-month period. We compared the diagnosis and clinical management of a higher risk group (having either a family history of melanoma, multiple primary melanomas, or many naevi) with that for melanoma patients at lower risk of a new melanoma (melanoma patients without these risk factors), and examined factors associated with higher risk patients receiving initial care from a specialist.

MATERIALS AND METHODS

Study sample

The Melanoma Patterns of Care study was a population-based, observational study based on doctors' reported management of melanoma patients residing in NSW, Australia, who had a new histopathologically confirmed primary in situ or invasive cutaneous or unknown primary site melanoma (ICD-O-3 site codes C44.0 to C44.9 and C80.9; morphology codes 8720-8790, /2 or /3)⁷ reported to the NSW Central Cancer Registry between 23 October 2006 and 22 October 2007. NSW is the largest state in Australia and includes about a third of the Australian population. Patients' demographic information and degree of spread of the melanoma was obtained from the registry. Human Research Ethics Committees of The University of Sydney and the Cancer Institute NSW approved the project.

Data collection

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The ‘doctor providing initial care following diagnosis’ for this study was the referring doctor on the diagnostic pathology report on which the cancer registration was based. It is mandatory for pathologists in NSW to notify every newly diagnosed cancer to the Central Cancer Registry. For each new melanoma reported during this period, the doctor providing initial care was contacted by the study team and asked to complete a questionnaire regarding the clinical management of their patient. Doctors to whom the initial doctor referred a melanoma patient were also contacted by the study team and asked to complete a questionnaire. Figure 1 describes this process. Whilst all invasive melanomas were captured and followed during the study period, questionnaire responses were sought only for the first 450 notifications of in situ melanomas, to minimise workload. Trained field workers assisted with completion of questionnaires using documented patient records, when requested by doctors with large numbers of patients.

One or more questionnaires were completed for 2,758 patients diagnosed with melanoma during the study period. Patients with disease that had spread to regional or distant sites (153/2,758, 6%) were excluded from this analysis in order to focus on management of localised disease. Of those with localised disease, 1,019/2,758 (39%) were defined as being at higher risk of a new primary melanoma, based on their questionnaires indicating either: 1) multiple primary melanomas (i.e. a previous melanoma before the study period), and/or 2) a family history of melanoma, and/or 3) many naevi. Melanoma patients without any of these risk factors were defined as lower risk (1,586/2,758, 61%). For 22 patients who were diagnosed with multiple primary melanomas during the study period, the melanoma with the greatest Breslow thickness was chosen for analysis. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist was used to guide the reporting of this study.⁸

Statistical analysis

Chi-square and Wilcoxon rank sum tests were used to compare diagnosis and clinical management between higher and lower risk groups, and between higher risk patients according to type of risk factor. To examine factors associated with higher risk patients receiving their initial care from a specialist compared to a primary care physician, prevalence ratios and 95% confidence intervals (CI) were calculated from a log binomial regression model⁹ using the variables: age at diagnosis, sex, residence location classified from postcode into urban or rural locations (based on the Rural, Remote and Metropolitan Areas classification),¹⁰ socio-economic status (measured using the Index of Relative Social-Economic Disadvantage,¹¹ which ranks social and economic well-being based on area of residence), many naevi (yes, no), histopathology of the melanoma, spread of disease at diagnosis, and patients’ travel distance between their home and initial doctor calculated using

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geographical information system software (ArcGIS, Release 10.1). All analyses were conducted using SAS 9.3 (SAS Institute Inc.), with statistical significance inferred at $P < 0.05$.

RESULTS

Patients' and melanomas' characteristics for those at higher risk of subsequent primary melanoma

Of the 1,019 (39%) patients classified as being at higher risk of subsequent primary melanoma, the majority (63%) were males (Table 1). Many naevi was the most commonly reported high risk characteristic (24% of the whole sample, 62% of those in the high-risk subgroup), followed by personal history of melanoma (17% of the whole sample, 42% of those in the high-risk subgroup) and family history (11% of the whole sample, 28% of those in the high-risk subgroup). The median age at diagnosis was 67 years for males and 55 years for females. About half (547/1,019; 54%) lived in the capital city, Sydney, 23% (232/1,019) lived in other metropolitan or large rural cities, and (240/1,019) 23% were from rural areas. The predominant type of melanoma was superficial spreading melanoma, and the median Breslow thickness of invasive melanomas was 0.6 mm (interquartile range 0.4-1.2).

Diagnosis and clinical management of melanoma patients at higher risk compared with those at lower risk of a new primary melanoma

Table 2 compares the diagnosis and management of melanoma patients at higher risk and lower risk. Melanomas of higher risk patients were more likely to be detected during a routine skin check (385/951; 42% vs 469/1,440; 33%) and less likely to be patient-reported (399/951; 42% vs 695/1,440; 48%), but higher risk and lower risk patients had a similar proportion detected incidentally by a doctor (121/651; 13% vs 173/1,440; 12%). Higher risk patients were more likely to receive their initial melanoma care from a primary care physician, either at a general practice (387/1,013; 37%) or skin cancer clinic (188/1,013; 19%), than were lower risk patients (552/1,584; 35% and 254/1,584; 16% respectively). Higher risk patients were more likely to have their lesions assessed using dermoscopy (540/861; 63% vs 758/1,354; 56% $P=0.002$), to have follow-up skin surveillance recommended by a clinician (680/809; 84% vs 951/1235; 77% $P < 0.001$), and to be encouraged to conduct skin self-examination (731/844; 87% vs 1,065/1,281; 83% $P = 0.03$).

Dermatologists were more likely than primary care physicians to use dermoscopy, both for higher risk patients (199/226; 88% and 318/524; 61% respectively, $P < 0.001$) and lower risk patients (290/348; 83% and 427/742; 58% respectively, $P < 0.001$). Primary care physicians working in skin cancer clinics were much more likely to be using dermoscopy than primary care physicians working in general practice. This article is protected by copyright. All rights reserved

in general practice settings, and again this was seen for both higher risk patients (164/168;98% and 156/363;43% respectively, $P < 0.001$) and lower risk patients (220/236;93% and 215/519;41% respectively, $P < 0.001$).

For the higher risk group, the reason for excision was most commonly listed as 'a change in colour' (509/1,013;50%) and only 5% of lesions had been reviewed previously and reported as 'under observation'. Melanomas detected by doctors were, on average, thinner than patient-detected melanomas (median: 0.5 mm vs 0.8 mm, $P < 0.001$). The anatomical location also varied according to who detected the melanoma; patient-detected melanomas tended to be on the head, neck and lower limbs, whereas melanomas detected by doctors were more likely to be on the trunk and upper limbs ($P < 0.001$).

Factors associated with higher risk patients receiving their initial care from a specialist rather than a primary care physician

In a multivariate regression model, greater travel distance, urban residence, and residence in a more socio-economically advantaged area were associated with initial care by a specialist (Table 3). The association between greater travel distance and initial specialist care was stronger for patients who lived in rural locations than urban locations (P -interaction < 0.001). Tumour characteristics including histological subtype and Breslow thickness were not significantly associated with receiving initial specialist care, and thus were not retained in the multivariate regression model.

Differences in clinical management of higher risk patients according to type of risk factor

Among higher risk patients, the type of risk factor influenced clinical management. Patients with many naevi were less likely than patients with a family history or multiple primary melanomas to receive initial care of their melanoma from a dermatologist (120/695;17% vs 171/834; 21% respectively, $P < 0.001$). However, patients with many naevi were more likely than patients with other risk factors to have their melanoma assessed using dermoscopy (315/682;41% vs 254/768;37%, respectively $P < 0.001$), to be encouraged to perform skin self-examination (541/589;90% vs 483/573; 84% respectively $P = 0.004$), and to be advised on skin changes (541/589;92% vs 483/573;84% respectively $P = 0.002$). For patients with many naevi, dermatologists were more likely than primary care physicians to be using dermoscopy (109/118;92% vs 224/357; 63% respectively, $P < 0.001$). However, the use of dermoscopy by primary care physicians varied according to the practice setting in which they worked; 100% (118/119) of primary care physicians in skin cancer clinics reported using dermoscopy for patients with many naevi, whereas the proportion dropped to 44% (107/241) of primary care physicians working in general practice ($P < 0.001$).

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DISCUSSION

This population-based study of 2,605 patients with localised melanoma identified differences in diagnosis and clinical management according to the presence of additional risk factors (many naevi, family history or multiple primaries) for the development of subsequent primary melanoma. These differences included the detection of melanoma, practice setting, use of dermoscopy and skin surveillance recommendations, and in general demonstrated better adherence to clinical practice guidelines for melanoma patients at higher risk compared to those at lower risk.

Australian and international clinical practice guidelines recommend training in the use of dermoscopy for doctors who routinely examine pigmented skin lesions, based on high levels of evidence that dermoscopy increases the diagnostic accuracy of melanoma and reduces the number of unnecessary excisions.^{12,13} A 2011 survey of Australian dermatologists reported that 98% used dermoscopy.¹⁴ In our study, only 49% of doctors providing the initial care to higher risk patients used dermoscopy to assess the melanoma, however when examined by clinician subgroup, the proportion was 88% for dermatologists and 98% for primary care physicians in skin cancer clinics. Patients with many naevi were more likely to receive dermoscopy compared to patients with a family history of melanoma or multiple primaries; however patients with many naevi were less likely to be under the care of a dermatologist. The management of suspicious pigmented skin lesions is an important part of general practice.¹⁵ Improving skills in dermoscopic techniques not only assists with detection of melanomas at an early stage^{13,16} but also improves the specificity of the clinical diagnosis for all suspicious pigmented skin lesions;¹² both have clear health system benefits.¹⁷ Counting number of naevi on the arms can be used as a proxy for total naevus count to identify high risk patients.¹⁸ Higher naevus counts have been associated with earlier age at diagnosis and male gender.¹⁹ It is unclear if the number of naevi is related to prognosis, as studies have shown conflicting associations with melanoma-specific survival.^{19,20}

Current Australian and international guidelines^{5,6} recommend that patients at high-risk of melanoma (and their partner or carer) receive education about checking and documenting suspicious lesions, to aid in the early detection of melanoma, although the scientific evidence in support of this recommendation is limited.^{6,21} Our data suggest that in NSW, these guideline recommendations for skin self-examination were largely being followed, with over 80% of all patients receiving encouragement to do this, and the proportion was higher for those at higher risk.

Just over half of the melanomas excised from patients in the higher risk group were detected by doctors and on average were thinner than patient-detected melanomas. This finding is similar to a study in Queensland, Australia, which found that melanomas were thinner when detected by a doctor and when discovered as part of a routine skin check.²² Higher risk patients were more likely than lower risk patients to have their melanoma detected during a routine skin check. Barriers to performing full skin examinations in general practice include lack of skill in the use of dermoscopy²³ and short consultation times.¹⁵ About one in eight melanomas was detected incidentally whilst visiting a doctor. Opportunistic screening of patients remains a challenge given appointment scheduling constraints, and emphasises the value of patient education²¹ particularly for older males in regional areas who have been found to present with later stage disease compared with males in metropolitan areas.²⁴ Our study found that higher risk patients who lived in rural and socio-economically disadvantaged areas were less likely to have a specialist as their initial doctor and that travel distance was likely to affect the patient's choice of initial doctor. However, we did not find any difference between rural and urban high risk patients in method of detection or Breslow thickness at diagnosis.

Over a third of patients enrolled in the Melanoma Patterns of Care study were identified as having high-risk characteristics. This proportion is reflective of Australia's high melanoma incidence rates.²⁵ A limitation of the questionnaire was that it did not provide sufficient detail to quantify the number of naevi or the relationships and number of family members affected by melanoma, limiting our ability to separate patients into more refined risk categories. It was also not possible to identify if patients were already under regular surveillance prior to the diagnosis of melanoma. This study had a high response rate, with questionnaire data collected for 72% of all patients diagnosed over a 1-year period, and a 78% questionnaire completion rate. However, some questionnaires were completed by trained field workers, who depended on the information being recorded in the patients' medical notes. The proportion of questionnaires completed by doctors rather than field-workers varied by clinician specialty; 94% of questionnaires from general practice and skin cancer clinics were doctor-completed, whereas 53% of specialist questionnaires were doctor-completed. In addition, we included questionnaires from initial and referral doctors in our study and were able to assess plans for follow-up, but because the study was not longitudinal we could not document what follow-up actually occurred over a longer period of time. Finally, in this study, we defined higher risk patients as those with a personal or family history of melanoma, or with many naevi, which are factors that could indicate a genetic susceptibility to melanoma.⁴ However, there are other risk factors for melanoma which we did not measure, such as excessive sun exposure, sunburn, pigmentary

characteristics,³ indoor tanning,²⁶ immunosuppression,²⁷ and history of childhood cancer and radiation treatment.²⁸

This population-based study on the diagnosis and management of patients at higher risk of a new primary melanoma, suggests that management of higher risk melanoma patients was more likely to conform to clinical practice guidelines for diagnosis and ongoing skin surveillance when compared to melanoma patients at lower risk. These data will be helpful for guiding strategies for further improving population-level melanoma care and outcomes.

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REFERENCES

1. Australian Institute of Health and Welfare. Cancer in Australia 2012: an overview. Canberra: AIHW, 2012.
2. Bradford PT, Freedman DM, Goldstein AM, et al. Increased risk of second primary cancers after a diagnosis of melanoma. *Arch Dermatol* 2010;**146**:265-72.
3. Gandini S, Sera F, Cattaruzza MS, et al. Meta-analysis of risk factors for cutaneous melanoma: II. Sun exposure. *Eur J Cancer* 2005;**41**:45-60.
4. Law MH, MacGregor S, Hayward NK. Melanoma genetics: Recent findings take us beyond well-traveled pathways. *J Invest Dermatol* 2012;**132**:1763-74.
5. Australian Cancer Network Melanoma Guidelines Revision Working Party. Clinical practice guidelines for the management of melanoma in Australia and New Zealand. Cancer Council Australia and Australia Cancer Network, Sydney and New Zealand Guidelines Group, Wellington; 2008.
6. Watts CG, Dieng M, Morton RL, et al. Clinical practice guidelines for identification, screening and follow-up of individuals at high risk of primary cutaneous melanoma: A systematic review. *Br J Dermatol* 2015;**172**:33-47.
7. Fritz A, Percy C, Jack A, et al., editors. International Classification of Diseases for Oncology. Third ed. Geneva: World Health Organization; 2000.
8. von Elm E, Altman DG, Egger M, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies. *Int J Surg* 2014;**12**:1495-9.
9. McNutt LA, Wu C, Xue X, et al. Estimating the relative risk in cohort studies and clinical trials of common outcomes. *Am J Epidemiol* 2003;**157**:940-3.
10. Australian Institute of Health and Welfare. Rural, Regional and Remote Health: A Guide to Remoteness Classifications. Canberra: Australian Institute of Health and Welfare 2004.

11. Pink B. (2013) Socio-economic Index for Areas (SEIFA) 2011 www.ausstats.abs.gov.au [accessed on 22 January 2016].
12. van der Rhee JJ, Bergman W, Kukutsch NA. Impact of dermoscopy on the management of high-risk patients from melanoma families: A prospective study. *Acta Derm Venereol* 2011;**91**:428-31.
13. Vestergaard M, Macaskill P, Holt P, et al. Dermoscopy compared with naked eye examination for the diagnosis of primary melanoma: a meta-analysis of studies performed in a clinical setting. *Br J Dermatol* 2008;**159**:669-76.
14. Venugopal SS, Peter Soyer H, Menzies SW. Results of a nationwide dermoscopy survey investigating the prevalence, advantages and disadvantages of dermoscopy use among Australian dermatologists. *Australas J Dermatol* 2011;**52**:14-8.
15. Britt H, Miller G, Henderson J, et al. A decade of Australian general practice activity 2004–05 to 2013–14. . Sydney: Sydney University Press, 2014.
16. Menzies SW, Emery J, Staples M, et al. Impact of dermoscopy and short-term sequential digital dermoscopy imaging for the management of pigmented lesions in primary care: A sequential intervention trial. *Br J Dermatol* 2009;**161**:1270-7.
17. Doran CM, Ling R, Byrnes J, et al. Estimating the economic costs of skin cancer in New South Wales, Australia. *BMC Public Health* 2015;**15**:952.
18. Ribero S, Zugna D, Osella-Abate S, et al. Prediction of high naevus count in a healthy UK population to estimate melanoma risk. *Br J Dermatol* 2015;**174**:312-8.
19. Taylor NJ, Thomas NE, Anton-Culver H, et al. Nevus count associations with pigmentary phenotype, histopathological melanoma characteristics and survival from melanoma. *Int J Cancer* 2016;**Accepted Article**, doi: **10.1002/ijc.30157**:
20. Ribero S, Davies JR, Requena C, et al. High nevus counts confer a favorable prognosis in melanoma patients. *Int J Cancer* 2015;**137**:1691-8.
21. Geller AC, Swetter SM, Oliveria S, et al. Reducing mortality in individuals at high risk for advanced melanoma through education and screening. *J Am Acad Dermatol* 2011;**65**:S87-S94.
22. 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**:783-92.
23. Rosendahl C, Williams G, Eley D, et al. The impact of subspecialization and dermatoscopy use on accuracy of melanoma diagnosis among primary care doctors in Australia. *J Am Acad Dermatol* 2012;**67**:846-52.
24. McCracken JA, Gin AD, Campbell I, et al. Melanoma in a rural Australia, a retrospective 10 year audit of diagnosis and management in the Wimmera. *Asia-Pacific Journal of Clinical Oncology* 2014;**10**:149.
25. International Agency for Research on Cancer. (2015) GLOBOCAN 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012. on 9 February 2016].
26. Wehner MR, Chren MM, Nameth D, et al. International prevalence of indoor tanning a systematic review and meta-analysis. *JAMA Dermatology* 2014;**150**:390-400.
27. Kubica AW, Brewer JD. Melanoma in Immunosuppressed Patients. *Mayo Clin Proc* 2012;**87**:991-1003.

28. Pappo AS, Armstrong GT, Liu W, et al. Melanoma as a subsequent neoplasm in adult survivors of childhood cancer: A report from the childhood cancer survivor study. *Pediatric Blood and Cancer* 2013;**60**:461-6.

Table 1. Patient and melanoma characteristics for patients at high-risk of developing a new primary melanoma

Characteristics	Higher risk ^a N=1,019 N (%) ^b	Lower risk N=1,586 N (%) ^b
Higher risk characteristics		
Family history only	133 (13)	0
Many naevi only	362 (36)	0
Personal history of melanoma only	225 (22)	0
Family history and personal history	28 (3)	0
Many naevi and personal history	144 (14)	0
Family history and many naevi	94 (9)	0
Family history, many naevi, and personal history	33 (3)	0
Age at diagnosis		
<40	103 (10)	108 (7)
40-49	141 (14)	142 (9)
50-59	191 (19)	301 (19)
60-69	206 (20)	370 (23)
70-79	232 (23)	377 (24)
80+	146 (14)	288 (18)
Sex		
Male	637 (63)	959 (60)
Female	382 (37)	627 (40)
Histological subtype		
Superficial spreading	508 (50)	738 (47)
Nodular	104 (10)	188 (12)
Lentigo maligna melanoma	123 (12)	250 (16)

Other	33 (3)	73 (5)
Not defined	251 (25)	337 (21)

Breslow thickness (mm)

In-situ ^c	99 (10)	211 (13)
0-1.00	634 (62)	904 (57)
1.01-2.00	166 (16)	221 (12)
2.01-4.00	78 (8)	154 (10)
>4.00	37 (4)	87 (6)
Not otherwise specified	5 (0)	9 (0)

^a Higher-risk patients were identified as having one or more high-risk features: many naevi, family history or personal history of melanoma.

^b Percentages may not sum to 100 due to rounding.

^c In situ melanoma reports were collected during a limited period.

Table 2. Diagnosis and clinical management of melanoma patients at high-risk compared to those at lower risk of developing a new primary melanoma

	Higher-risk ^a	Lower risk	P-value ^b
Diagnosis and management factors	N=1,019	N=1,586	
	N (%) ^c	N (%) ^c	
Specialty of initial clinician			
General Practice	566 (56)	806 (51)	
Dermatology	264 (26)	418 (26)	
Surgery	116 (11)	231 (15)	
Plastic surgery/other	67 (7)	129 (8)	0.002
Unrecorded	6	2	
Practice setting of initial clinician			
General Practice	378 (37)	552 (35)	
Skin Cancer Clinic	188 (19)	254 (16)	
Dermatology	264 (26)	418 (26)	
Surgery	116 (11)	231 (15)	
Plastic surgery	51 (5)	124 (8)	

Melanoma Unit	16 (2)	5(0)	< 0.001
Unrecorded	6	2	
Detection of melanoma			
Patient reported	399 (42)	696 (48)	
Found incidentally by doctor	121 (13)	173 (12)	
Routine skin check	385 (40)	469 (33)	
Other	46 (5)	102 (7)	< 0.001
<i>Don't know</i>	55	121	
Unrecorded	13	25	
Assess lesion with dermoscopy			
Yes	540 (63)	758 (56)	
No	321 (37)	596 (44)	0.002
<i>Don't know</i>	132	190	
Unrecorded	26	42	
Practice setting of follow-up clinician			
General Practice	145 (16)	265(19)	
Skin cancer clinic	137 (15)	194 (14)	
Dermatology	233 (25)	362 (26)	
Surgeon	337 (37)	517 (37)	
Other	73 (0)	75 (5)	0.08
Unrecorded	94	173	
Advise patient on changes			
Yes	775 (88)	1,166 (88)	
No	101 (12)	161 (12)	0.67
Unrecorded	143	259	
Encourage skin self-exam			
Yes	731 (87)	1,065 (83)	
No	113 (13)	216 (17)	0.03
Unrecorded	175	305	
Recommend skin surveillance			
Yes	680 (84)	951 (77)	

No	129 (16)	284 (23)	< 0.001
Unrecorded	210	351	

^a Higher-risk patients were identified as having one or more high-risk features: many naevi, family or personal history of melanoma.

^b Don't know and unrecorded values were excluded from the P-value estimations.

^c Percentages may not sum to 100 due to rounding.

Table 3. Multivariate prevalence ratios for higher risk patients consulting a specialist rather than a general practitioner as the initial doctor following melanoma diagnosis

Characteristics	General Practice/ Skin clinic N=563 ^a N (%)	Specialist N=441 ^a N (%)	Prevalence ratio ^a (95% confidence interval)	P-value
Age at diagnosis				
<40	61	42	1.00	
40-49	90	50	0.99 (0.91-1.07)	
50-59	111	79	1.01 (0.93-1.09)	
60-69	106	96	1.03 (0.95-1.11)	
70-79	120	108	1.03 (0.95-1.11)	
80+	75	66	1.05 (0.96-1.14)	0.76
Sex				
Male	360	266	1.00	
Female	203	175	1.03 (0.99-1.07)	0.19
Patient location				
Urban	355	357	1.00	
Rural	208	84	0.93 (0.88-0.98)	0.009
Socio economic status ^b				
1 st Quintile (least advantaged)	67	42	1.00	
2 nd Quintile	137	49	0.94 (0.87-1.03)	
3 rd Quintile	157	95	1.00 (0.93-1.07)	
4 th Quintile	93	75	1.02 (0.94-1.10)	

5 th Quintile (most advantaged)	109	180	1.07 (0.99-1.15)	0.01
Many naevi				
No	187	187	1.00	
Yes	376	254	0.97 (0.93-1.01)	0.18
Travel distance (km) to initial doctor				
<10	291	176	1.00	
10-19	67	82	1.05 (0.99-1.11)	
20-49	59	62	1.06 (0.99-1.13)	
50+	23	76	1.17 (1.10-1.24)	
Unrecorded	123	45	0.97 (0.91-1.03)	<0.001

^a Analysis excluded 15 higher-risk patients who were missing one or more values for these variables.

^b Prevalence ratio calculated from log binomial regression model

^c Index for Relative Socioeconomic Disadvantage quintiles, based on postcode of residence. People in the 1st quintile live in areas of most social disadvantage and in the 5th quintile in areas of least social disadvantage.

Figure 1 legend. Flow chart describing data collection in the Melanoma Patterns of Care study, and the categorisation of higher risk and lower risk groups. Follow-up for in situ melanomas was ceased after 450 notifications were received. Patients were defined as high-risk based on questionnaire data indicating either 1) a history of a previous melanoma before the study period, and/or 2) a family history of melanoma, and/or 3) many naevi.

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