Title: Body site distribution of skin cancer, pre-malignant and common benign pigmented lesions excised in general practice

Running head: Body site distribution of skin lesions excised in general practice

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Word Count: 2,956
Tables: 4
Figures: 2
References: 27

Funding: This research was funded by National Health and Medical Research Council Project Grant 339100.

Conflict of interest: None to declare

What's already known about this topic?

- Skin cancer is the most common malignancy worldwide.
- Patients frequently present to general practitioners (GPs) with skin lesions they are concerned about.
- They often exert pressure on their GPs to excise lesions.

What does this study add?

- Nearly two-thirds of lesions excised in primary care are for skin cancer.
- After adjusting for surface area the density of malignant and pre-malignant skin lesions is highest on the more chronically sun exposed body sites.
- Women and younger patients are significantly more likely to exert pressure to excise a benign pigmented lesion.

Abstract

Background: Concern about skin cancer is a common reason for people from predominantly fair-skinned populations present to primary care doctors.

Objectives: To examine the frequency and body site distribution of malignant, pre-malignant and benign pigmented skin lesions excised in primary care.

Methods: This prospective study conducted in Queensland, Australia, included 154 primary care doctors. For all excised or biopsied lesions, doctors recorded the patient's age and sex, body site, level of patient pressure to excise, and the clinical diagnosis. Histological confirmation was obtained through pathology laboratories.

Results: Of 9,650 skin lesions, 57.7% were excised in men and 75.0% excised in patients ≥ 50 years. The most common diagnoses were basal cell carcinoma (BCC) (35.1%) and squamous cell carcinoma (SCC) (19.7%). Compared to the whole body, highest densities for SCC, BCC and actinic keratoses were observed on chronically sun exposed areas of the body including the face in men and women, the scalp and ears in men, and the hands in women. The density of BCC was also high on intermittently or rarely exposed body sites. Women, younger patients and patients with melanocytic naevi were significantly more likely to exert moderate/high levels of pressure on the doctor to excise.

Conclusions: More than half excised lesions were skin cancer which mostly occurred on the more chronically sun exposed areas of the body. Information on the type and body site distribution of skin lesions can aid in diagnosis and planned management of skin cancer and other skin lesions commonly presented in primary care.

Introduction

Skin cancer is the most common malignancy in fair-skinned populations around the world. It is estimated that 434,000 people were diagnosed with non-melanoma skin cancer (NMSC) in 2008 in Australia, [1] and nearly 84,500 individuals were diagnosed with NMSC in 2007 in the United Kingdom (UK). [2] Rates of NMSC and melanoma continue to rise in countries with predominantly fair-skinned populations. [3]

The diagnosis and management of common skin lesions represents a significant workload for General Practitioners (GPs). The UK has a similar two-tiered health service system to Australia, whereby the GP is the initial point of contact for most patients. In Australia, GPs bill for patient consultations and procedures through a universal health insurance scheme (Medicare), while GPs in the UK work under national health service contracts (General Medical Services Contract) [4] linked to payments.

Unlike specialist settings where patients are usually referred following an initial consultation in primary care, patients commonly present to GPs with a diverse range of skin lesions. In Australia about half of excised lesions are NMSC. [5,6] Other common diagnoses include actinic (solar) keratoses, thought to be a form of *in situ* SCC which in some cases can develop into invasive SCC, [7,8] and benign pigmented lesions such as melanocytic and dysplastic naevi and seborrhoeic keratosis. [9] Overall about 90% of pigmented lesions seen in general practice are melanocytic naevi. [9-11]

An understanding of patterns and the distribution of skin lesions can provide aetiological clues and may help inform possible diagnosis and appropriate management. Previous studies examining body site distribution of common skin lesions have primarily relied on retrospective data obtained through pathology services and/or extraction of data from medical records. [12,13] In contrast the

present study was conducted prospectively in primary care surgeries, thus reflecting typical day-to-day clinical practice presentations.

The aim of this study was to examine and report on the frequency and body site distribution of common skin lesions presenting to, and excised in, primary care following a skin examination, the degree of pressure by patients to excise, and factors that influence patient pressure to excise a lesion.

Materials and Methods

The study methodology has been described in detail previously. [6] Briefly, the study included 154 primary care doctors located in South-East Queensland, Australia. Participating doctors recorded the details of all consultations involving a skin examination over a specified time period including: patient's age and sex; type of skin examination (whole-body, part-body, specific lesions); and who initiated the examination (doctor, patient as primary reason for consultation or patient as the secondary reason for consultation). For excised or biopsied lesions, doctors also recorded the body site; degree of patient pressure to excise (on a scale of 1 to 5 with 1 being 'no pressure' and 5 being 'pressure was only reason for excision'); and the clinical diagnosis. Trained research personnel extracted information from histopathology reports including body site and histological diagnosis. Diagnoses were grouped into eight major categories including: melanoma (including Hutchinson's Melanotic Freckle); squamous cell carcinoma (SCC) (including keratoacanthoma and Bowen's disease); basal cell carcinoma (BCC); actinic keratosis; dysplastic naevi; melanocytic naevi; other benign pigmented lesions (such as seborrhoeic keratosis, lentigo, lichenoid keratosis); and other benign non-pigmented lesions (cysts, warts, skin tags). Due to the variety of diagnoses for other benign non-pigmented lesions it was not possible to appropriately combine them into one category, so they were excluded from this analysis (n=1,771 [15.5%]). Where a lesion was given multiple diagnoses a malignant diagnosis was selected as the primary diagnosis.

Ethical approval was obtained from the Behavioural and Social Sciences Ethical Review Committee of the University of Queensland.

Analysis

The analysis included only those lesions for which information was available on exact body site, age, sex and histology (n=9,650 [(96.8%]). Body-sites were categorised as: scalp; face; ear; neck; upper arm/shoulders; forearm; hand; chest/abdomen; back; buttocks; thigh; lower leg and foot. Logistic regression analyses were used to examine differences in the frequency distributions of histological diagnosis by sex and age group (< 50 and ≥ 50 years) and to examine differences in the body site distribution for each histological type by sex and age group with analyses adjusted for clustering by doctor and patient. To account for surface area of the skin at each body site relative to the whole body, relative tumour densities (RTD) were calculated by dividing the proportion of lesions at a specific site by the average proportion of skin surface area at that site using the formula suggested by Pearle [14] and the estimated proportion of surface area suggested by Lund and Browder. [15] For example according to Lund and Browder the back is equivalent to 13% of the body thus if 48 of 152 melanomas occurred on the back then the RTD of melanoma on the back= (48/152)/0.13=2.43. RTD's were transformed and graphed using a log scale to better reflect the differences in densities compared to the overall body density of 1. Body sites with no lesions were not graphed. Logistic regression analysis was used to analyse factors related to moderate to high levels of pressure to excise benign pigmented lesions. Variables that showed significant bivariate associations or were known or suspected confounders were included in the model. A stepwise selection approach was implemented based on the likelihood ratio of each successive model, and a significance level of 0.05 was used for the final model and was adjusted for clustering of patients and doctors. All analyses were performed using Stata Statistical Software, version 10.1 (Statacorp LP, College Station, Tex).

Results

Of 9,650 lesions excised in 7,133 patients, 57.7% were excised in men and 75.0% excised in patients 50 years and over. The most common diagnoses were BCC (35.1%), SCC (17.7%) and actinic keratoses (14.8%). Just under 11% were melanocytic naevi, 6.2% were dysplastic naevi and 1.6% were melanoma (Table 1).

BCC was more common in men (39.4% of lesions) than women (29.3%), ($p < 0.001$). Nearly 14% of lesions excised in women were melanocytic naevi compared to 8.2% in men ($p < 0.001$). Nearly two-thirds (63.1%) of excised lesions in patients ≥ 50 years were malignant (melanoma, SCC or BCC) compared to just over one-third (36.1%) for those < 50 years ($p < 0.001$). Melanocytic lesions were more commonly excised in younger patients (30.6% of all lesions) compared to older patients ($p < 0.001$) (Table 1).

Distribution of histological diagnoses by gender and age group according to body site

Melanoma was more frequently diagnosed on the back and upper arm in men (37.0% and 21.0%, respectively) and on the upper arm, back and lower legs in women (23.1%, 21.1% and 17.3%, respectively) (Table 2). SCC was more commonly excised on the face in both men and women (23.2% and 27.0%, respectively), however men had significantly more SCCs excised from the scalp and ears ($p < 0.001$). The body site distribution of dysplastic and melanocytic naevi was similar to that for melanoma with most lesions excised from the back for both men and women. Women had more benign pigmented lesions excised from the face and men had more lesions excised from the back ($p=0.02$).

Melanoma was almost twice as prevalent on the forearm in those aged < 50 years compared to patients ≥ 50 years (16.7% and 8.7% respectively). SCC was more commonly excised on the face in

both age groups, followed by the hand (16.9%) and forearm (15.6%) for patients < 50 years, and the lower leg (21.6%) and forearm (13.7%) for patients ≥ 50 years. More than half of dysplastic naevi were excised from the back for both age groups. Younger patients had significantly more melanocytic naevi excised from their chest/abdomen than older patients (16.9% and 8.0%, respectively) (Table 3).

Adjusting for surface area

Figs 1 and 2 illustrate the relative tumour density (RTD) of malignant and pre malignant lesions, and the most common benign pigmented lesions excised or biopsied for men and women and by age group according to body site plotted on a log scale.

Malignant and pre-malignant lesions excised in males and females

In men, the density of melanoma was five times as high on the face and four times as high on the ears compared to the body as a whole (RTD=5.0 and 4.0, respectively) and nearly three times higher for sites such as the neck, upper arm/shoulders and back (Fig1). For BCC, SCC and actinic keratosis the density of lesions was 12 to 15 times higher on the face and ears compared to the whole body. The RTD for BCC on the upper arm/shoulder (1.6) and the back (1.9) were more than double that observed for SCCs at the same sites (0.4 and 0.9 respectively). However the density of malignant and pre-malignant lesions was very low on sites such as the chest/abdomen and thigh.

In women, the density of excised melanoma was four times higher on the face and three times higher on the neck and upper arm/shoulders compared to the whole body. For SCC, BCC and actinic keratosis the density of lesions was 11 to 17 times higher on the face compared to the whole body (11.3; 12.8 and 17.5, respectively). High relative densities of SCC and actinic keratosis were observed on the hands (2.2 and 2.3, respectively). The density of lesions was low for the chest/abdomen and the thigh.

Benign pigmented lesions excised in males and females

In men, the density of dysplastic naevi was over four times higher on the back (4.3) compared to the whole body. The RTD of melanocytic naevi excised from the face was 4.9, 3.5 for the ears and 3.0 for the back. For benign pigmented lesions, extremely high RTDs were observed on chronically sun exposed sites such as the face (7.7), ears (5.7) and neck (2.6). For women, the density of dysplastic naevi was nearly four times higher on the back (3.7) compared to the whole body. The highest density of melanocytic naevi were observed on the face (5.5) and ear (3.5). The density of benign pigmented lesions was over 10 times higher on the face than the whole body, whereas these lesions were only rarely excised from the lower body.

Malignant and pre-malignant lesions by age group

In patients < 50 years the density of excised melanoma was highest on the face (RTD=3.4), upper arm/shoulders (3.0) and back (2.7) compared to the body as a whole. For SCC, BCC and actinic keratosis RTD's were nine to 15 times higher on the face. The RTD of SCC and actinic keratosis were three times higher on the hand (3.4 and 3.3, respectively) compared to the whole body. For patients 50 years or more, the RTD of excised melanoma was highest on the face (5.1) and then the ears (3.5) and neck (3.3). The RTD's for SCC, BCC and actinic keratosis were all nine to 12 times higher for the more chronically exposed body-sites such as the face and ear (Fig 2).

Benign pigmented lesions by age group

Compared to the body as a whole, the density of dysplastic naevi were more than four times higher on the back for both younger and older patients (Figure 4). For younger patients the RTD of excised melanocytic naevi was three to four times higher on the face (4.3) and ears (3.5) and more than twice as high on the back (2.4). In older patients, the density of excised melanocytic naevi and other benign pigmented lesions was seven to eight times higher on the face and three to four times

higher on the ears compared to the body as a whole. The density of benign pigmented lesions was low for sites such as the thigh and lower leg in both age groups.

Pressure from the patient to excise or biopsy skin lesions

We examined the degree of patient pressure to excise benign pigmented lesions (n=2,644). Overall, just over one-third (36.4%) of patients exerted a moderate to high degree of pressure on the doctor to excise a skin lesion and this was more common in women. Moderate to high pressure to excise was recorded for nearly 50% of benign pigmented lesions on the head and neck compared to 29% of lesions on the lower limbs. In multivariate analysis, factors positively associated with a moderate to high degree of pressure to excise included being female, being aged 30 to 49 years, having a lesion on the head or neck, having a melanocytic naevus and undergoing a part-body examination or a check of specific lesions (Table 4).

Discussion

This study examined the site and histological distribution of skin lesions excised or biopsied in primary care practice. Nearly two-thirds of lesions were malignant or pre-malignant. BCC accounted for over one-third and nearly two-thirds of all skin cancer diagnoses. The ratio of BCC to SCC was about 2 to 1 and this is in keeping with other studies in high incidence populations.[13,16] In populations at higher latitudes and lower risk, the occurrence of BCC can be up to five-fold higher than SCC. [12,17] Excision of any type of skin cancer was approximately 40% more common in men than women (M:F ratio=1:0.6) and about 80% more common in patients over the age of 50 years compared to younger patients.

Compared to the whole body, five sites in men had a higher than average density of melanoma (ears, face, neck, back, upper arm/shoulders) and six sites in women (face, neck, upper arm/shoulders, forearm, back and lower legs). Although our findings are based on a relatively small

number of melanomas (n=152), they are consistent with other published studies. [18] There is now growing evidence that the relationship between melanoma and patterns of sun exposure varies according to age, site, and morphology. For example, melanoma that occurs on more chronically sun exposed sites such as the face, and head and neck region is more likely to be associated with older age as we have found in this study, while melanoma occurring on intermittently exposed sites such as the trunk and upper limbs is more likely to be associated with onset at an earlier age. [19]

The relative densities of BCC and SCC for the more chronically sun exposed sites such as face, ears and scalp (in men) were high and followed a similar pattern to that reported in other studies both in high and low risk populations. [12,14,16,20]Skin lesions excised on other chronically sun exposed sites such as the forearm and hand were significantly more likely to be SCC or actinic keratosis than BCC. Interestingly men were around 30% less likely to have such a lesion excised from their hand compared to women. A similar differential was found for the lower leg, with men around 20% less likely to have a lesion excised from the lower leg compared to women.

The density of actinic keratosis followed a similar pattern to SCC. This is not surprising given that actinic keratosis is considered by some to be a precursor to SCC, or at the very least a risk factor.[21] Studies have reported 60% of incidental SCCs developed from an existing actinic keratosis, [22] while others report nearly three-quarters of SCCs were contiguous with an actinic keratotic lesion.[23]

Excisions or biopsy of benign pigmented lesions accounted for more than one-third of all lesions in this population group with melanocytic naevus accounting for the majority. Compared to the body as a whole, the density of excised melanocytic naevi followed a similar distribution to that of melanoma and was highest on the face in both men and women. This is likely to reflect both the known correlation between the development of melanocytic naevi and sun exposure, and the ready visibility to the patient of any apparent changes. [24,25]

Consistent with this, patient pressure to excise benign pigmented lesions was greater for lesions located on the head and neck. Younger patients, females and those presenting for examinations of specific lesions were more likely to exert pressure on doctors and this may suggest that cosmetic concerns contribute to high pressure to excise. In this study patients were significantly more likely to exert pressure to excise a melanocytic naevi, despite the doctor rating the chance of malignancy very low.

Implications for clinical practice

Diagnosing and managing suspicious skin lesions is a common part of primary care practice and an understanding of the pattern and body site distribution can help inform clinical practice. The consistent finding that melanoma does occur on intermittently or rarely exposed sites highlights the importance of whole-body skin examination. Similarly, we found over one-third of NMSC occurred on intermittently sun exposed sites such as the trunk and upper arms and this pattern was more pronounced for patients under the age of 50 years. Recent results from a large population-based melanoma case-control study found the risk of being diagnosed with thicker melanoma (> 0.75mm) was reduced by 14% for patients who had undergone a whole-body clinical examination within the three years prior to their melanoma diagnosis and this reduction in risk increased with increasing thickness. [26]

The finding that patients exert a significant amount of pressure to excise apparently benign lesions highlights the importance of educating patients about the early signs and symptoms of NMSC and melanoma, and should be a routine part of the general practice consultation. Currently in the UK core competencies for GPwSI in dermatology include effective communication of these topics. [27]

Limitations

While this study was a large prospective study involving 154 primary care doctors some limitations should be noted. The study only included excised or biopsied lesions found during a skin examination and therefore may not reflect the site distribution of all lesions that present in general practice. We relied on the participating doctors to record the body site where the skin lesion was to be excised and it is possible there may be some misclassification. However body site was checked against the histopathology results, and in the event of a discrepancy, the patient file was examined to ensure the correct body site was recorded. While it is possible that there may be some error in the interpretation of histopathology by the pathologist, this study was conducted in Queensland, Australia, where the incidence of skin cancer is the highest in the world and pathologists have extensive experience. Additionally, it is possible that participating doctors may have changed their behaviour (Hawthorn effect) [28] in relation to deciding whether or not to excise a lesion during the study period.

In conclusion, this study found more than half the lesions excised in general practice in Queensland, Australia, were skin cancers which for the most part occurred on the more frequently sun exposed body sites. This type of data provides GPs with an indication of the frequency and body site density of common skin lesions, thus helping to inform possible diagnoses and management strategies. These Australian data provide important benchmark information, against which other international studies can be compared to provide additional insight into the possible aetiology of skin cancers and pre-malignant lesions excised in general practice.

References

1 Australian Institute of Health and Welfare & Cancer Australia. Non-melanoma skin cancer: general practice consultations, hospitalisation and mortality. Cancer series no. 43. Cat. no. 39. Canberra: AIHW. 2008.

2 Cancer Research UK. UK skin cancer incidence statistics. Available at http://info.cancerresearchuk.org/cancerstats/types/skin/incidence/. Accessed 1/2/2010.

3 Parkin DM, Whelan SL, Ferlay J *et al.* Cancer Incidence in Five Continents, Vol I to VIII. *IARC CancerBase No. 7* 2005.

4 Department of Health National Health Services, United Kingdom. Publications, Policy and Guidance for Standard Medical Services Contracts. http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_116299. Accessed 1/9/2010. In.

5 FitzGerald KL, Buttner PG, Donovan SA. Nonpigmented skin lesions - how many are nonmelanoma skin cancer? *Aust Fam Physician* 2006; **35**: 555-7.

6 Youl PH, Baade PD, Janda M *et al.* Diagnosing skin cancer in primary care: how do mainstream GPs compare with skin cancer clinic doctors? *Med J Aust* 2007.

7 Criscione VD, Weinstock MA, Naylor MF *et al.* Actinic keratoses: Natural history and risk of malignant transformation in the Veterans Affairs Topical Tretinoin Chemoprevention Trial. *Cancer* 2009; **115**: 2523-30.

8 Rossi R, Mori M, Lotti T. Actinic keratosis. *Int J Dermatol* 2007; **46**: 895-904.

9 Del Mar CB, Green A, Cooney T *et al.* Melanocytic lesions excised from the skin: what percentage are malignant? *Aust NZ J Public Health* 1994; **18**: 221-3.

10 Bricknell MC. Skin biopsies of pigmented skin lesions performed by general practitioners and hospital specialists. *Br J Gen Pract* 1993; **43**: 199-201.

11 Fernando SS. Incidence of melanoma in surgically removed pigmented lesions. *Australas J Dermatol* 1987; **28**: 126-8.

12 Franceschi S, Levi F, Randimbison L *et al.* Site distribution of different types of skin cancer: new aetiological clues. *Int J Cancer* 1996; **67**: 24-8.

13 Raasch B, Maclennan R, Wronski I *et al.* Body site specific incidence of basal and squamous cell carcinoma in an exposed population, Townsville, Australia. *Mutat Res* 1998; **422**: 101-6.

14 Pearl DK, Scott EL. The anatomical distribution of skin cancers. *International Journal of Epidemiology* 1986; **15**: 502-6.

15 Lund CC, Browder NC. The estimation of the area of burns. *Surg Gynecol Obstet* 1944; **79**: 352-61.

16 Staples MP, Elwood M, Burton RC *et al.* Non-melanoma skin cancer in Australia: the 2002 national survey and trends since 1985. *Med J Aust* 2006; **184**: 6-10.

17 Holme SA, Malinovszky K, Roberts DL. Changing trends in non-melanoma skin cancer in South Wales, 1988-98. *Br J Dermatol* 2000; **143**: 1224-9.

18 Green A, MacLennan R, Youl P *et al.* Site distribution of cutaneous melanoma in Queensland. *Int J Cancer* 1993; **53**: 232-6.

19 Whiteman DC, Green A, Parsons PG. p53 expression and risk factors for melanoma: a case-control study. *Int J Cancer* 1998; **77**: 843-8.

20 Buettner PG, Raasch BA. Incidence rates of skin cancer in Townsville, Australia. *Int J Cancer* 1998; **78**: 587-93.

21 Ackerman AB, Mones JM. Solar (actinic) keratosis is squamous cell carcinoma. *Br J Dermatol* 2006; **155**: 9-22.

22 Marks R, Rennie G, Selwood TS. Malignant transformation of solar keratoses to squamous cell carcinoma. *Lancet* 1988; **1**: 795-7.

23 Czarnecki D, Meehan CJ, Bruce F *et al.* The majority of cutaneous squamous cell carcinomas arise in actinic keratoses. *J Cutan Med Surg* 2002; **6**: 207-9.

24 Harrison SL, Buettner PG, MacLennan R. Body-site distribution of melanocytic nevi in young Australian children. *Arch Dermatol* 1999; **135**: 47-52.

25 Gallagher RP, Rivers JK, Lee TK *et al.* Broad-spectrum sunscreen use and the development of new nevi in white children: A randomized controlled trial. *JAMA* 2000; **283**: 2955-60.
26 Aitken JF, Elwood M, Baade PD *et al.* Clinical whole-body skin examination reduces the incidence of thick melanomas. *Int J Cancer* 2010; **126**: 450-8.
27 Department of Health United Kingdom. Guidance and competancies for the provision of services using GPs with Special Interests (GPwSPs). *Available at: http://www.pcc.nhs.uk/uploads/pwsis/March%202009/dermatology.pdf. Accessed 1/9/2010.* 2007.
28 Fletcher RH, Fletcher SW, Wagner EH. Clinical epidemiology: the essentials. 3rd ed. 1998: 129-56.

Table 1: Histological distribution of 9,650 excised or biopsied skin lesions according to sex and age group

	Total	**Gender**			**Age group**		
	n (%)	Male n (%)	Female n %	p-value[a]	< 50 years n (%)	50+ years n (%)	p-value[a]
Melanoma	152 (1.6)	100 (1.8)	52 (1.3)	0.01	37 (1.5)	115 (1.6)	0.83
Squamous cell carcinoma [b]	1,897 (19.7)	1,139 (20.5)	758 (18.6)	0.02	160 (6.6)	1,737 (24.0)	< 0.001
Basal cell carcinoma	3,391 (35.1)	2,194 (39.4)	1,197 (29.3)	< 0.001	675 (28.0)	2,716 (37.5)	< 0.001
Actinic keratosis	1,424 (14.8)	787 (14.1)	637 (15.6)	0.09	181 (7.5)	1,243 (17.2)	< 0.001
Dysplastic naevus	595 (6.2)	325 (5.8)	270 (6.6)	0.07	375 (15.5)	220 (3.0)	< 0.001
Melanocytic naevus	1,026 (10.6)	458 (8.2)	568 (13.9)	< 0.001	738 (30.6)	288 (4.0)	< 0.001
Other benign pigmented [c]	1,165 (12.1)	563 (10.1)	602 (14.7)	< 0.001	248 (10.3)	917 (12.7)	0.008
TOTAL	**9,650 (100)**	**5,566 (100)**	**4,084 (100)**		**2,414 (100)**	**7,236 (100)**	

[a] p-value reflects the difference in proportions and was adjusted for clustering of doctor and patient; [b] includes Bowen's disease and keratoacanthoma;
[c] includes seborrhoeic keratosis, lentigo, lichenoid keratosis

Table 2: Percent of excised or biopsied skin lesions by histology and body site for males and females

Body site	Melanoma / HMF [a]		SCC		BCC		Actinic keratosis		Dysplastic naevi		Melanocytic naevi		Other benign pigmented	
	Male n (%)	Female n (%)	Male n (%)	Female n (%)	Male n (%)	Female n (%)	Male n (%)	Female n (%)	Male n (%)	Female n (%)	Male n (%)	Female n (%)	Male n (%)	Female n (%)
Scalp	0 (0.0)	0 (0.0)	37 (3.3)	3 (0.4)	24 (1.1)	13 (1.1)	24 (3.1)	6 (0.9)	0 (0.0)	0 (0.0)	13 (2.8)	5 (0.9)	18 (3.2)	13 (0.5)
Face	12 (12.0)	5 (9.6)	264 (23.2)	205 (27.0)	567 (25.8)	367 (30.7)	236 (30.0)	267 (41.9)	4 (1.2)	1 (0.4)	54 (11.8)	75 (13.2)	104 (18.5)	145 (24.1)
Ears	2 (2.0)	0 (0.0)	71 (6.2)	5 (0.7)	142 (6.5)	17 (1.4)	60 (7.6)	8 (1.3)	2 (0.6)	1 (0.4)	8 (1.8)	10 (1.8)	16 (2.8)	5 (0.8)
Neck	7 (7.0)	4 (7.7)	52 (4.5)	40 (5.3)	166 (7.6)	79 (6.6)	58 (7.4)	29 (4.6)	7 (2.2)	7 (2.5)	17 (3.7)	23 (4.0)	35 (6.2)	41 (6.8)
Upper arm	21 (21.0)	12 (23.1)	89 (7.8)	63 (8.3)	274 (12.5)	192 (16.0)	52 (6.6)	43 (6.7)	35 (10.8)	35 (13.0)	58 (12.7)	75 (13.2)	62 (11.0)	63 (10.5)
Forearm	7 (7.0)	5 (9.6)	156 (13.7)	107 (14.1)	101 (4.6)	45 (3.8)	91 (11.6)	56 (8.8)	3 (0.9)	3 (1.1)	8 (1.7)	12 (2.1)	37 (6.6)	49 (8.1)
Hand	0 (0.0)	0 (0.0)	90 (7.9)	82 (10.8)	14 (0.6)	17 (1.4)	61 (7.7)	73 (11.5)	0 (0.0)	1 (0.4)	3 (0.7)	9 (1.6)	11 (1.9)	15 (2.5)
Thigh	1 (1.0)	4 (7.7)	50 (4.4)	17 (2.2)	37 (1.7)	18 (1.5)	26 (3.3)	9 (1.4)	20 (6.2)	21 (7.8)	22 (4.8)	49 (8.6)	19 (3.4)	24 (4.0)
Lower leg/foot	7 (7.0)	9 (17.3)	206 (18.1)	182 (24.0)	140 (6.4)	113 (9.4)	75 (9.5)	92 (14.4)	14 (4.3)	24 (8.9)	37 (8.1)	51 (9.0)	64 (11.4)	67 (11.1)
Chest/abdomen	6 (6.0)	2 (3.9)	63 (5.5)	36 (4.8)	197 (9.0)	92 (7.7)	37 (4.7)	31 (4.9)	56 (17.2)	44 (16.3)	57 (12.4)	91 (16.0)	73 (13.0)	99 (16.4)
Back/buttock	37 (37.0)	11 (21.1)	61 (5.4)	18 (2.4)	532 (24.2)	244 (20.4)	67 (8.5)	23 (3.6)	184 (56.6)	133 (49.3)	181 (39.5)	168 (29.6)	124 (22.0)	91 (15.1)
TOTAL	**100 (100.0)**	**52 (100.0)**	**1,139† (100.0)**	**758† (100.0)**	**2,194† (100.0)**	**1,197† (100.0)**	**787† (100.0)**	**637† (100.0)**	**325 (100.0)**	**270 (100.0)**	**458* (100.0)**	**568* (100.0)**	**563† (100.0)**	**602 (100.0)†**

[a] Hutchinson's Melanotic Freckle; † $P < 0.01$; * $0.01 \leq P < 0.05$; P is the test of association between body sites and sex for each histology group and has been adjusted for clustering of doctor and patient.

Table 3: Number and percent of excised or biopsied skin lesions by histology and body site for ages < 50 years and ≥ 50 years

Body site	Melanoma / HMF [a]		SCC		BCC		Actinic keratosis		Dysplastic naevi		Melanocytic naevi		Other benign pigmented	
	<50 n (%)	≥ 50 n (%)	<50 n (%)	≥ 50 n (%)	<50 n (%)	≥ 50 n (%)	<50 n (%)	≥ 50 n (%)	<50 n (%)	≥ 50 n (%)	<50 n (%)	≥ 50 n (%)	<50 n (%)	≥ 50 n (%)
Scalp	0 (0.0)	0 (0.0)	1 (0.6)	39 (2.3)	12 (1.8)	25 (0.9)	4 (2.2)	26 (2.1)	0 (0.0)	0 (0.0)	13 (1.8)	5 (1.7)	4 (1.6)	17 (1.9)
Face	3 (8.1)	14 (12.2)	43 (26.9)	426 (24.5)	148 (21.9)	786 (28.9)	69 (38.1)	434 (34.9)	0 (0.0)	5 (2.3)	76 (10.3)	53 (18.4)	59 (23.8)	190 (20.7)
Ears	0 (0.0)	2 (1.7)	4 (2.5)	72 (4.1)	14 (2.1)	145 (5.3)	11 (6.1)	57 (4.6)	3 (0.8)	0 (0.0)	13 (1.8)	5 (1.7)	4 (1.6)	17 (1.9)
Neck	2 (5.4)	9 (7.8)	10 (6.3)	82 (4.7)	53 (7.8)	192 (7.1)	5 (2.8)	82 (6.6)	11 (2.9)	3 (1.4)	27 (3.7)	13 (4.5)	16 (6.4)	60 (6.5)
Upper arm	9 (24.3)	24 (20.9)	14 (8.7)	138 (7.9)	120 (17.8)	346 (12.7)	4 (2.2)	91 (7.3)	39 (10.4)	31 (14.1)	98 (13.3)	35 (12.2)	30 (12.1)	95 (10.4)
Forearm	2 (16.7)	10 (8.7)	25 (15.6)	238 (13.7)	38 (5.6)	108 (4.0)	20 (11.0)	127 (10.2)	3 (0.8)	3 (1.4)	17 (2.3)	3 (1.0)	15 (6.1)	71 (7.7)
Hand	0 (0.0)	0 (0.0)	27 (16.9)	145 (8.4)	9 (1.3)	22 (0.8)	30 (16.6)	104 (8.4)	1 (0.3)	0 (0.0)	10 (1.4)	2 (0.7)	7 (2.8)	19 (2.1)
Thigh	2 (5.4)	3 (2.6)	4 (2.5)	63 (3.6)	12 (1.8)	43 (1.6)	1 (0.6)	34 (2.7)	26 (6.9)	15 (6.8)	55 (7.4)	16 (5.5)	15 (6.1)	28 (3.1)
Lower leg/foot	4 (10.8)	12 (10.4)	13 (8.1)	375 (21.6)	29 (4.3)	224 (8.3)	9 (5.0)	158 (12.7)	22 (5.9)	16 (7.3)	58 (7.9)	30 (10.4)	22 (8.9)	109 (11.9)
Chest/abdomen	2 (5.4)	6 (5.2)	13 (8.1)	86 (5.0)	93 (13.8)	196 (7.2)	14 (7.7)	54 (4.3)	68 (18.1)	32 (14.5)	125 (16.9)	23 (8.0)	39 (15.7)	133 (14.5)
Back/buttock	13 (35.1)	35 (30.4)	6 (3.8)	73 (4.2)	147 (21.8)	629 (23.2)	14 (7.7)	76 (6.1)	202 (53.9)	115 (52.3)	246 (33.3)	103 (35.8)	37 (14.9)	178 (19.4)
TOTAL	**37 (100.0)**	**115 (100.0)**	**160 (100.0)**	**1,737 (100.0)** †	**675 (100.0)**	**2,716 (100.0)** †	**181 (100.0)**	**1,243 (100.0)** †	**375 (100.0)**	**220 (100.0)**	**738 (100.0)**	**288 (100.0)***	**248 (100.0)**	**917 (100.0)**

[a] Hutchinson's Melanotic Freckle; † $P < 0.01$; * $0.01 \leq P < 0.05$. P is the test of association between body sites and age group for each histology group and has been adjusted for clustering by doctor and patient.

Table 4: Factors associated with moderate to high levels of patient pressure to excise benign pigmented skin lesions in primary practice

	% moderate/high patient pressure to excise	Adjusted odds ratio* (95% CI)	P-value
Sex			< 0.001
Male (n=1,278)	27.9	1.0	
Female (n=1,366)	44.4	2.07 (1.74-2.45)	
Age group			0.01
< 30 years (n=459)	40.3	1.18 (0.87-1.59)	
30-49 years (n=852)	41.2	1.28 (1.01-1.66)	
50-69 years (n=934)	31.0	0.87 (0.68-1.11)	
70+ years (n=399)	34.3	1.0	
Body site			< 0.001
Head & neck (n=568)	49.7	1.72 (1.40-2.10)	
Upper limbs (n=455)	32.7	0.90 (0.72-1.12)	
Lower limbs (n=393)	29.3	0.73 (0.59-0.90)	
Trunk (n=1,228)	34.0	1.0	
Histology			< 0.001
Dysplastic naevus (n=562)	21.2	0.58 (0.42-0.79)	
Melanocytic naevus (n=992)	48.1	1.72 (1.36-2.18)	
Other benign pigmented (n=1,090)	33.7	1.0	
Type of clinical skin examination			< 0.001
Whole body (n=1,285)	28.7	1.0	
Part body (n=266)	38.4	1.43 (1.01-2.06)	
Specific lesions (n=1,047)	45.5	2.02 (1.55-2.63)	

* model adjusted for all factors within the table and for clustering by doctor and patient