The management of primary cutaneous melanoma in Victoria in 1996 and 2000

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ABSTRACT

Objective: To describe tumour characteristics and clinical management of melanomas newly diagnosed in 1996 and in 2000 — before and after publication of the clinical practice *Guidelines for the management of cutaneous melanoma* by the Australian Cancer Network (1997), and their endorsement by the National Health and Medical Research Council (NHMRC) and republication (1999).

Design and setting: Survey of clinicians involved in the management of patients with melanoma sampled from the Victorian Cancer Registry. The Registry is notified of all cases of cancer diagnosed by pathology laboratories and hospitals in both the public and private health sectors in the state of Victoria.

Patients: People with a cutaneous melanoma newly diagnosed in 1996 and 2000. All invasive melanomas > 1.50 mm in thickness were included, and for each year random samples were selected of 100 each of invasive melanomas 0.76–1.50 mm in thickness, invasive melanomas ⩽ 0.75 mm, and in-situ melanomas, plus 50 melanomas of unknown thickness.

Main outcome measures: Biopsy method, adequacy of pathology reporting, adequacy of definitive excision (compared with margins recommended by the Guidelines), and follow-up procedures.

Results: The use of partial biopsies increased between 1996 and 2000. Recommended margins of definitive excision were used in only 33.6% of cases. Margins were smaller than recommended for 36% of in-situ melanomas, risking recurrence of primary melanoma. Documented follow-up examinations for subsequent primary skin malignancy were uncommon (6%).

Conclusions: Many aspects of the management of primary cutaneous melanoma appear not to meet the recommendations of the published Guidelines. Further studies to explore the reasons for failure to meet the Guideline recommendations are needed.

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Clinical practice guidelines developed according to the principles of evidence-based medicine are now available from multiple sources for many cancers. The Australian Cancer Network's *Guidelines for the management of cutaneous melanoma*[1] were initially introduced in 1997, and subsequently endorsed and republished by the National Health and Medical Research Council (NHMRC) in 1999.[2] The practical impact of the availability of such guidelines on cancer management is unknown.

We performed a population-based survey of melanoma management using data from the Victorian Cancer Registry at the Cancer Council Victoria. Our aims were:

- to assess prevailing practice in the management of primary cutaneous melanoma before and after publication of the Guidelines;
- to compare practice with that recommended in the Guidelines; and
- to evaluate changes in practice over the study period for possible effects of the availability of published guidelines on patient management.

METHODS

Sample selection

Population-based samples of all cases of in-situ and invasive cutaneous melanoma diagnosed in 1996 and 2000 were identified by the Victorian Cancer Registry. Under the *Cancer Act 1981* (Vic), all cancers except non-melanoma skin cancers diagnosed in pathology laboratories or hospitals in both the public and private sectors must be reported to the Registry. To achieve a sample representing the full spectrum of disease, the survey for each year included all melanomas diagnosed with thickness > 1.50 mm ($n = 611$); 100 each of melanomas 0.76–1.50 mm, melanomas ⩽ 0.75 mm and in-situ melanomas; and 50 melanomas of unknown thickness. The melanomas ⩽ 1.50 mm and of unknown thickness were randomly sampled across each year to avoid any bias caused by possible seasonal patterns in diagnosis or referral. Only first primary melanomas were included. All cases in each thickness category were allocated a number by a random number generator. These numbers were sorted in ascending order, and the first 100 cases (or 50 cases for the unknown thickness category) were selected.

Data collection and analysis

The referring doctor named on the diagnostic pathology report was sent a questionnaire on each patient asking for information on clinical management of the melanoma, including initial approach (definitive wide excision or biopsy), planned margins of excision, other therapy and follow-up. If more than one doctor was involved in diagnosis, treatment and follow-up of a patient, then the relevant sections of the questionnaire were sent to the appropriate doctor. No payment was offered for participation, and participants were fully advised of the purpose of the study. Questionnaires were mailed in April 2002, and data collection closed in May 2003.

All relevant and available pathology reports for each melanoma were reviewed by Registry staff under the supervision of the study pathologist (JS) to assess the completeness of pathology reporting and margins of excision.

Adequacy of excision was assessed using the measured histological margins or, when these were not available, margins measured macroscopically from the formalin-fixed tissue specimen. These were compared with acceptable ranges based on the Guideline recommendations for each tumour (T) category (American Joint Committee on Cancer staging system for cutaneous melanoma[3]). We calculated minimum acceptable margins by reducing the Guideline-recommended margin by 25% to allow for shrinkage during histological processing and a further 2-mm

1 Recommended excision margins according to National Health and Medical Research Council (NHMRC) guidelines[2] and definitions used to assess adequacy of excision in the study

Tumour category (thickness)*	NHMRC recommended margins		Study definitions of margin adequacy†		
	Minimum	Maximum	Less than recommended	Recommended	More than recommended
In-situ melanoma (pTis)	5 mm	nr	< 3 mm	3–7 mm	> 7 mm
Invasive melanoma					
pT1 or 2 (0–1.5 mm)	1 cm	nr	< 0.8 cm	0.8–1.2 cm	> 1.2 cm
pT3 (> 1.5–4.0 mm)	1 cm	2 cm	< 0.8 cm	0.8–2.2 cm	> 2.2 cm
pT4 (> 4.0 mm)	2 cm	3 cm	< 1.8 cm	1.8–3.2 cm	> 3.2 cm

* American Joint Cancer Committee staging system for cutaneous melanoma. † Classification of the actual margins was based on the size of the smallest margin less 25% allowance for specimen shrinkage and a leeway of ±2 mm. nr = no recommendation. ◆

2 Characteristics of in-situ and invasive melanomas in the survey sample*

	In situ		Invasive	
	1996	2000	1996	2000
Total no.	55	78	288	325
Patient sex				
Male	28	39	164	163
Female	27	39	124	162
Mean patient age in years (SE)	67.1 (1.7)	59.3 (1.8)	60.6 (1.1)	62.7 (1.0)
Tumour thickness (mm)				
⩽ 1.00	na	na	103	99
1.01–2.00	na	na	67	62
2.01–4.00	na	na	71	92
> 4.00	na	na	43	66
Not stated	na	na	4	6
Histopathological type				
Melanoma, NOS†	5	14	114	119
Superficial spreading	2	13	77	86
Lentigo maligna	48	51	30	37
Nodular	na	na	60	72
Initial approach				
Definitive wide excision	11	14	57	69‡
Biopsy	44	64	231	256
Wider excision after biopsy				
Yes	25	46	187	209
No, not necessary	16	11	12	9
Referred§	3	6	28	32
Declined	0	1	3	4
No information	0	0	1	2

* Note that figures are for melanomas in the survey sample — proportions of lesions by thickness reflect the sampling of thinner lesions and do not represent population proportions.
† Also included small numbers of acral lentiginous and desmoplastic melanomas and melanomas of unspecified type.
‡ Included one toe amputation. § Referred for wider excision, but no information received about this.
na = not applicable. NOS = not otherwise specified. SE = standard error. ◆

leeway for inaccuracies in clinical measurement.[4] Definitions of acceptable excision margins by T category are shown in Box 1.

To estimate the adequacy of margins across the state of Victoria, the proportions observed for each year and T category in the survey sample were applied to Victorian population data for melanomas of known T category. However, except where specifically stated otherwise, the results we present relate to the survey sample.

The Cancer Council Victoria Human Research Ethics Committee approved the survey proposal. Data were analysed using SPSS statistical software, release 9.0.1 (SPSS Inc, Chicago, Ill, USA). Age-standardised rates per 100 000 population, standardised using the direct method to the World Standard Population (Segi), are presented with 95% confidence intervals. Rates were considered significantly different with $P < 0.05$ if there was no overlap between the 95% confidence intervals; χ^2 tests were used to examine differences in proportions.

RESULTS

In 1996 and 2000, 1711 in-situ and 3406 invasive melanomas were reported to the Victorian Cancer Registry. Over the 5-year interval, there was no significant change in the age-standardised annual incidence per 100 000 people of in-situ or invasive melanoma. No change was observed in the rates of thicker tumours, although there was a significant decrease in rates of tumours < 1 mm thick, with age-standardised rates of 18.4 (17.3–19.5) per 100 000 in 1996 and 15.8 (14.8–16.8) per 100 000 in 2000 ($P < 0.05$).

The sampling technique identified 1290 first primary in-situ and invasive melanomas as eligible for the study (635 from 1996 and 655 from 2000). Questionnaires were mailed for these, and 785 (61%) were returned. Of these, 746 contained sufficient information for analysis and were included in the survey. Characteristics of these cases are shown in Box 2. The 2000 sample contained 9% more melanomas > 2.00 mm, but there were no other significant differences in tumour level, histopathological type, anatomical site, or patient sex and age distribution between the samples for the two years.

Diagnostic procedure

In both 1996 and 2000, about 80% of the in-situ and invasive melanomas were treated

3 Adequacy of actual excision margins by year and tumour thickness (for 541 cases for which margins were available)

Tumour category* (thickness)	1996				2000				Both years			
	Smaller†	Adequate	Greater‡	Total	Smaller†	Adequate	Greater‡	Total	Smaller†	Adequate	Greater‡	Total
pTis (in-situ)	15	15	7	37	20	21	19	60	35 (36%)	36 (37%)	26 (27%)	97
pT1, 2 (0–1.5 mm)	37	21	40	98	31	25	35	91	68 (36%)	46 (24%)	75 (40%)	189
pT3 (> 1.5–4.0 mm)	19	36	28	83	28	47	16	91	47 (27%)	83 (48%)	44 (25%)	174
pT4 (> 4.0 mm)	20	8	4	32	32	9	8	49	52 (64%)	17 (21%)	12 (15%)	81
Total	**91**	**80**	**79**	**250**	**111**	**102**	**78**	**291**	**202 (37%)**	**182 (34%)**	**157 (29%)**	**541**

* American Joint Cancer Committee staging system for cutaneous melanoma. † Smaller = less than recommended by the Guidelines.
‡ Greater = more than recommended by the Guidelines. ◆

by excisional or partial biopsy followed by definitive excision, and 20% by initial definitive wide excision. There was an overall trend towards increased use of partial biopsy (18% of cases in 1996 and 27% in 2000, $P = 0.02$). For invasive melanoma, use of partial biopsy increased from 11% in 1996 to 23% in 2000 ($P < 0.001$), but for in-situ melanoma it decreased from 57% in 1996 to 41% in 2000 ($P > 0.05$).

The increase in use of partial biopsy was greater among general practitioners (6% in 1996 to 20% in 2000; $P = 0.007$) and plastic surgeons (5% to 17%; $P = 0.02$), with little change in other doctor groups. Partial biopsies were more often used by dermatologists (48% of biopsies) than by GPs (13%), plastic surgeons (11%) and general surgeons (10%). Dermatologists were more likely to diagnose early invasive and in-situ melanomas. The increase in partial biopsies between 1996 and 2000 was due to the increased use of incisional biopsy (6% to 11%) and punch biopsy (2% to 5%).

Macroscopic descriptions, tumour thickness, Clark level,[5] completeness of excision and cross-sectional profile were documented in 90.3% of available pathology reports. Comparing the two years, there was increased reporting in 2000 of measured microscopic margins (31% to 54%; $P < 0.001$), histological classification of tumour type (64% to 76%; $P < 0.001$), presence of ulceration (28% to 40%; $P = 0.02$) and vascular invasion (50% to 59%; $P = 0.02$).

Surgical therapy

Most procedural therapy for melanoma was undertaken by plastic surgeons (alone, 26.4% of cases; in combination with other specialists, 25.5%) or by dermatologists (alone, 24.3%; in combination with other specialists, 15.9%), with smaller proportions undertaken by general surgeons alone (7.6%) and GPs (6.2%). This pattern did not change between 1996 and 2000.

Clinicians were asked to nominate the planned margin of excision for each patient. The planned margin was stated for about 75% of cases in each year. Of these, 41% in 1996 and 46% in 2000 had planned margins consistent with the Guideline recommendations according to tumour thickness. In 1996, the planned margins were smaller than recommended in 16% of cases and greater than recommended in 43%. In 2000, there was a shift to narrower planned margins, with 21% having smaller margins and 32% having greater margins than recommended.

The actual margin of excision could be ascertained from 541 of the 630 available pathology reports. Actual margins were assessed as adequate according to Guideline recommendations in 33.6% of cases, with no significant change between 1996 and 2000 (Box 3). Very thick or thin melanomas were less likely to be treated according to Guideline recommendations than those of intermediate thickness (> 4.0 mm, 25%; > 1.5–4.0 mm, 43%; and ≤ 1.5 mm, 27%). The adequacy of the definitive excision by specialty of the practitioner performing the procedure was: dermatologists, 45%; GPs, 38%; plastic surgeons, 31%; and general surgeons, 19%. Plastic surgeons and general surgeons were more likely to treat thicker melanomas than other clinicians.

Anatomical location had no significant impact on margin adequacy. However, for melanomas with inadequate margins, there was variation between anatomical sites as to whether margins were smaller or greater than recommended: they were more likely to be smaller for facial melanomas (78% of cases) and more likely to be greater for melanomas of the trunk (57%).

Excision margins were more likely to be insufficient when the initial approach was definitive wide excision rather than the Guideline-recommended initial biopsy followed by definitive excision (58% versus 31%; $P < 0.01$).

The overall adequacy of excision for all Victorian melanomas was estimated using the survey proportions and sampling weights by T category. Margins were estimated to be adequate according to the Guidelines for 29.9% of all melanomas in 1996 and 32.2% in 2000 (Box 4).

Clinical follow-up

Details of patient follow-up were difficult to obtain, as the treating doctor was often not responsible for the patient's ongoing care. Follow-up history was obtained for 518 of 746 patients (69.4%), with a further 50 patients (6.7%) failing to attend for the recommended review. The most common follow-up intervals for the first 2 years after excision were 3 months (46%) and 6 months (29%). After 2 years, the most common intervals were 6 months (31%), and 1

4 Estimated adequacy of achieved excision margins* for *all* Victorian melanomas based on survey results

Year of diagnosis	Smaller	Adequate	Greater	Total
1996	38.2%	29.9%	31.8%	100%
2000	35.0%	32.2%	32.9%	100%
Both years	36.5%	31.1%	32.4%	100%

* Compared with margins recommended by the guidelines. ◆

year (16%). No follow-up plan after the first 2 years was reported for 46% of cases. Follow-up examinations included palpation of the primary site (85% of cases), palpation of regional lymph nodes (82%), and a total-body skin examination (6%). These rates did not change between the two study years.

DISCUSSION

Our results suggest that clinical management in many cases of melanoma in Victoria fell far short of the Guideline standards in 1996 — the year before the Guidelines were published — and that this had not improved by 2000. We did observe an improvement between the two years in the completeness of pathology reporting. Even so, in 2000, about 50% of pathology reports did not contain a measurement of the margins of excision — essential information for the clinician to assess their histological adequacy margin needed for definitive re-excision.

Contrary to Guideline recommendations, the use of partial biopsies for invasive melanoma increased markedly between 1996 and 2000. Several studies have shown that partial biopsy is associated with sampling error and histological misdiagnosis,[6,7] although it has a place for cosmetically difficult locations, large lesions and cases with a low index of suspicion. The 150% increase in the use of punch biopsy over the study period is of particular concern, as this form of partial biopsy carries the highest risk of false-negative misdiagnosis of melanoma (Dr J Ng, Victorian Melanoma Service, Alfred Hospital, Melbourne, Vic, personal communication, 2007).

Furthermore, in about 20% of patients, an initial attempt at wide excision was made as the intended definitive procedure without a prior excisional biopsy, and these patients were nearly twice as likely to be left with an inadequate definitive excision margin. This finding supports the Guideline recommendation for initial excisional biopsy followed by definitive re-excision, and suggests a reluctance by treating doctors to undertake further excision when the margin proves histologically less than expected clinically.

In 1996 and 2000, 41% and 46% of clinicians, respectively, were aware of the appropriate margins of excision for cutaneous melanoma of varying thickness, but suitable margins (as defined for this study) were achieved for only 33.6% of patients, with no significant increase over the study interval.

The reasons for the low use of recommended margins were not completely explained by clinician's knowledge of best practice or other factors, such as the site of the melanoma or type of clinician. The use of a greater than recommended margin may have been a deliberate clinical decision in some cases (eg, for desmoplastic and neurotropic melanomas), and some variation in practice may have resulted from deficiencies in the evidence (narrower margins for invasive melanoma are still to be tested and may prove adequate). However, there is no legitimate clinical reason to use very narrow margins for 36% of curable in-situ melanomas, thereby risking persistence and recurrence of the primary melanoma. Further studies are needed to understand better why clinicians comply poorly with guidelines.

We found that follow-up intervals after excision were similar to those suggested by the Guidelines. Local and regional recurrence was sought at more than 80% of follow-up visits in both years. However, two findings were at variance with the Guidelines. In both years, most reported follow-up examinations (94%) omitted full-skin examination. For patients diagnosed with a thin (< 1.0 mm) or in-situ primary melanoma in Australia over the study period, the risk of developing a subsequent primary melanoma was 4.5% in the 5 years after diagnosis[8] — higher than the risk of metastatic disease. Further, there is a very high chance of cure of a subsequent primary melanoma through early detection and excision, but cure by therapeutic intervention is much less likely for metastatic disease. A second concern was the lack of any reported follow-up plan after the first 2 years for 46% of cases. Although the risk of metastatic recurrence diminishes with time, the risk of subsequent primary melanomas persists and may increase through life. Follow-up should, therefore, be continued indefinitely, often most appropriately by the patient's GP.

A limitation of this retrospective study was the time delay since melanoma diagnosis (2–7 years) which meant that responses depended on the medical record. This might not have contained all information (eg, a skin examination with negative results may not be routinely recorded). Further, questionnaires may have been completed by staff other than the treating doctor. In addition, the apparent lack of impact of the Guidelines may have been partly related to the short interval between their publication (in 1997 and again in 1999) and the assessment of practice in 2000, which may have been insufficient for their effect to become apparent in clinical practice.

Nevertheless, our findings suggest important inadequacies and variations in the care of patients with melanoma, and the failure of the Guidelines to influence these during the study period.

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COMPETING INTERESTS

None identified.

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