Early Detection of Malignant Melanoma: Observation on Results of Educational Strategies

Rona M. MacKie

At the present time, the incidence of malignant melanoma is rising steadily in all parts of the world for which accurate data are available. For example, in Scotland between 1979 and 1989, the incidence of melanoma rose by 80%, or 7.4% per annum [1]. The present doubling time for the incidence of melanoma for men in Scotland is 8 years and for women 13.5 years. Similar steep rates of increase are observed in other European countries such as Denmark [2] and in other parts of the world as well, including New Zealand. Until recently, 5-year survival figures for malignant melanoma were approximately 50%. If, however, patients are stratified according to Clark levels or Breslow thickness, striking differences in survival are immediately obvious. For example, in the Scottish series of 1660 patients registered between 1979 and 1984, for whom 5-year follow-up figures are now available, patients with tumors less than 1.5 mm in thickness have a 5-year disease-free survival figure of 93%; those with tumors 1.5–3.49 mm thick have a 5-year survival prospect of 73%; and those with tumors thicker than 3.5 mm have a 5-year survival of less than 48% [1]. These figures suggest that if a higher proportion of patients can be educated to recognize early melanoma and present for treatment of malignant melanoma that is at a thin, early growth stage, deaths from melanoma will at least stabilize and not increase at a rate commensurate with the increasing incidence. The other approach to controlling deaths from melanoma is of course longer term public education exercises aimed at reducing the actual incidence of melanoma.

Early Exercises in Melanoma Education The earliest exercises in public education about malignant melanoma took place in Queensland, Australia, in the 1960s. Prior to that time little information was available for the entire State of Queensland, but data collected between 1960 and 1980 showed that in Queensland the annual incidence rose from 15.1/100,000 in 1966 to 25/100,000 in 1977 and 31.4/100,000 in 1982 [3,4]. In 1982, if non-melanoma skin cancer is excluded, malignant melanoma comprised 10% of all malignancies recorded in the state of Queensland. This, taken together with the fact that worldwide a high proportion of patients with melanoma are relatively young and that the average age worldwide of patients with melanoma is mid-50s, is a clear indication of the public health problem of melanoma in countries with high solar intensity. Studies from Queensland show that while public education was in progress, the mean tumor thickness fell but incidence of and mortality from melanoma continued to rise.

Current Approaches to Public Education About Early Melanoma Approaches to public education about features of early melanoma require careful preparation. Public education campaigns need to be widely disseminated to inform the general public of the features that are more commonly found in malignant melanoma at an early growth stage than in other pigmented but benign possible simulators of malignant melanoma (e.g., seborrheic keratoses). Depending on the average clinical appearance when melanomas are identified in different countries, different examples of malignant melanomas will be required for use as illustrations for public education. For example, in a country where the average malignant melanoma excised is still a relatively advanced lesion with a significant vertical growth component, the illustrations shown will need to be more advanced than those in a country in which some education has already occurred and the average melanoma excised is much smaller, with little if any vertical growth component. For this reason, in some countries such as Scotland, the approach has been to carry out a careful survey of a large number of melanomas excised in the years preceding public education activities, using the thinnest examples in this sample to illustrate the features to be recognized [5].

Preparatory Work Necessary for Public Education Campaigns Public education campaigns should by definition attract a high proportion of people with clinically suspect lesions. However, it is well recognized that even in the hands of experts, clinical diagnostic accuracy in the recognition of malignant melanoma by no means approaches 100%. Recent studies have suggested that an average of approximately 50% clinical accuracy in pre-biopsy recognition of early melanoma can be achieved and that in the hands of experts, this can increase to between 80 and 90% [6].

Some workers have both in the past and at present made use of skin-surface microscopy or the dermatoscope in an effort to increase pre-operative diagnostic accuracy. In an early study, MacKie reported 85% pre-operative diagnostic accuracy with such equipment [7], and more recently, similar rates of pre-operative diagnostic accuracy have been reported from the Austrian group [8]; however, use of even the simplified dermatoscope requires some experience, and for the foreseeable future, public education campaigns will be based on simple naked-eye recognition of the salient features of early melanoma. At present, trials are under way in a number of centers investigating the potential of computerized image analysis, both in recognition of early melanoma and in subsequent surveillance of suspect lesions.

Once the clinical features of early melanoma to be illustrated in public education material have been determined, it is necessary to organize the appropriate referral arrangements for patients who are concerned about possible early malignant melanoma. In the United States, the approach has been to use skin cancer fairs, with dermatologists or other experts available to examine self-referred individuals who have attended because of the publicity on television and local radio or in local newspapers. At these fairs, skin examination is offered and may be confined to the site requested by the patient or may be a total-body skin examination. At such fairs, advice is given on appropriate further action to be taken by the patient, but excision biopsies and follow-up are not available because of ethical considerations with regard to patient referral. Patients with worrisome lesions are advised to consult their own dermatologist without delay, and those without a dermatologist are given a list of appropriate local practitioners. This approach to screening for possible early treatable melanoma clearly depends on appropriate action by the member of the public concerned, in first attending for a free examination and in then taking further action. Follow-up of attendees at these skin cancer fairs thought to have possible early melanoma has shown that by no means all those counseled to seek further advice without delay do so [9,10]. Thus,

Department of Dermatology, University of Glasgow, Glasgow, UK

Reprint requests to: Dr. Rona M. MacKie, Robertson Building, 56 Dumbarton Road, Glasgow, Gil 6NU, UK

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the organizational details of these cancer fairs make clinical audit impractical, other than the immediate counting of number of attendees and their characteristics.

The approach to public education about melanoma in the United Kingdom has been the wide distribution of appropriate leaflets, videos, and posters illustrating the features of early melanoma as seen at present in the United Kingdom and encouraging referral first to the family doctor [11]. The family doctor then makes the decision as to the need for referral to the specialist, and if this is considered necessary, makes use in many centers of specially established pigmented-lesion clinics. These clinics work on a ''no waiting list'' basis, and surgical facilities are available for either biopsy or excision of small lesions. In the great majority, however, self-referral without prior consultation with the general practitioner is discouraged. Thus, family physician education has been undertaken with a considerable degree of success.

An approach in The Netherlands over the past 2 years has been that of a caravan established on holiday beaches offering advice to those concerned about growing or changing pigmented lesions on the skin. This approach has encouraged examination only of the area chosen by the patient, and has then encouraged consultation with the patient's own family doctor. This appears to have stimulated interest, and a large number of people consult these caravans, but as with the U.S. skin cancer fairs, follow-up is difficult.

Assessment of Public Education The four examples cited above are all illustrative of different approaches to public education aimed at encouraging earlier treatment of thinner melanomas and thus reducing melanoma-associated mortality. In the field of cancer education and screening for occult early malignancy, audit of the effects of these activities is vital. Public education requires a budget, and some of the exercises planned are expensive. It is therefore highly desirable to have some concept of the relative costs per patient identified, similar to that produced by those involved in breast and cervical cancer screening, although accurate costing and inclusion of appropriate overheads are extremely difficult. Much more important, however, is the need to document the medical success of these exercises. It cannot be assumed that all such exercises are positively beneficial, and audit measures on such studies should include measures designed to detect positive and negative effects.

Audit Measures

1. Pre-circulation developmental testing of the literature, posters, and other material to be used in public education – does it adequately inform and encourage action rather than instill fear and denial?
2. When the campaign is launched, how comprehensive was the take-up of material from press conferences? How many newspapers, radio, and television stations ran a piece on the information?
3. How widely distributed were the posters and leaflets?
4. How many people attended the designated referral center or walk-in clinic?
5. What had prompted their attendance? Television, leaflet, poster, or other?
6. Is the population attending the desired target population (e.g., adults with phenotypic risk factors for melanoma – fair hair, blue eyes, pale skin?). Some recent campaigns have had problems with a large attendance of non-whites with dark skin color on the basis that the clinic was for those with pigmented skin, not those with pigmented lesions. Similarly, a different campaign that did not clearly indicate the age range at risk resulted in attendance of large numbers of pubertal children whose parents were concerned about the appearance of totally banal nevi.
7. What is the proportion of men and women in different age groups attending relative to the local population? Most studies find that younger women are the best attenders and are relatively over-represented and that older men are difficult to target and therefore are under-represented.
8. How many melanomas are identified and treated in these referral centers or as a result of attendance at them as a result of the campaign?
9. What are the characteristics of the patients with these lesions and of the lesions themselves? For example, is it easier to encourage men or women to come forward, and are lesions on the limbs over-represented by comparison with lesions on the trunk? Are superficial spreading melanomas easier for the general public to recognize than nodular lesions?
10. What is the ratio of melanomas diagnosed in these centers to non-melanomas seen? This will give some indication of the specificity of the information disseminated and the unnecessary work generated. The figures quoted for the U.S. experience are one melanoma for 250 patients seen and in the United Kingdom, one melanoma for every 25 patients referred to a pigmented-lesion clinic.
11. Over time, is the trend in melanomas diagnosed in the target area in favor of thinner melanomas? Clearly, this requires knowledge of the trends with regard to tumor thickness for some years prior to educational intervention and will require a campaign to continue for several years.

A highly desirable but difficult to obtain additional item is information on melanoma thickness changes in a geographically adjacent but non-educated group (non-intervention group) over the same time period to control for events other than the planned educational intervention being responsible for tumor thickness changes. The practical problem with this is that if educational publicity is effective, and television, radio, and newspapers all carry information, it will be disseminated over a wide area. If the aim is to compare intervention and non-intervention areas, then leaflets delivered to individual households is a possible alternative strategy.

If Breslow thicknesses are to be measured over time, it will be necessary to have a panel of pathologists available who are experienced in the study of melanocytic lesions and whose accuracy is not in doubt. Ideally, a team of four or five pathologists should establish their consistency, both internally over time and externally with each other, with regard to reporting the salient features of malignant melanomas, and then be used to review all material excised from people whose lesions require measurement to assess the effect of the educational intervention. An alternative method is to rely on reports sent in by individual reporting pathologists in the various centers, but even if this is regarded as acceptable, some sampling of reliability and assessment by a panel of pathologists is highly desirable.

It is possible that a changing trend in Breslow thickness over time could be due to features other than the educational activity planned. Features known to be associated with thin tumors include female gender, lesions on the limbs, lentigo maligna melanomas, and a younger age at excision. It is therefore desirable to control for simultaneous changes in any or all of these features and to have information on these features in a population prior to and during education. Appropriate statistical methods will be needed to control for these possibly significant variables.

The desired end point of this type of educational exercise is a reduction in melanoma-associated mortality. Studies on large populations of melanomas suggest that the great bulk of recurrences take place within 2–3 years of excision of the primary tumor, but in the case of thinner tumors, a small but growing group of patients have recurrences as long as 7–10 years after excision of primary tumors. For these reasons, mortality will have to be followed over several years before any changes related to educational intervention can be expected and their significance with regard to the educational strategies assessed. Audit of the Scottish educational campaign shows an encouraging fall in the absolute number of melanomas greater than or equal to 3.5 mm thick and also of melanoma-related mortality in women in the entire country but not in men [12]. As with the other measures of efficacy, information on mortality trends prior to educational intervention is highly desirable. At the present time, for example, in many parts of the world, although the incidence of melanoma is rising at a rate of approximately 7–10%/year (see

Approaches to Control of Malignant Melanoma), the mortality from melanoma is rising much less rapidly, even in parts of the world where no planned educational intervention is in progress. The reasons for this are not well established but may be due to a general trend toward detection of smaller, thinner tumors. It is therefore important to have pre-educational information on this fact against which to measure any trends or any changes in trends in mortality associated with melanoma following education.

In the 1–2 years after effective public education, greater melanoma awareness may result in prevalent as well as newly incident melanomas receiving treatment. This will cause a transient rise, followed by a dip in the crude incidence rate for the geographic area concerned.

Auditing of Non-Desirable Effects of Education It has already been stated that it cannot be assumed that all educational intervention is beneficial. Examples of inappropriate education and a demand for services from a population to a medical profession that is unprepared for that demand would include a steep rise in waiting time for surgical excision of a suspect lesion, a delay in reporting of pathology, the non-availability of appropriately trained pathologists, and a very steep rise in the workload of those seeing and excising suspect pigmented lesions that were not melanomas. This last would in fact greatly increase the waiting time for a patient with a true melanoma to receive appropriate treatment and is an example of a situation in which educational intervention could create an adverse situation rather than a null situation or an improvement in that which preceded it.

For these reasons, it is highly desirable to audit the workload associated with patients stimulated to come forward as a result of educational material but who do not have melanoma. Many of these will have totally innocuous, benign pigmented lesions, such as seborrhoeic keratoses, and if they are seen at an appropriate referral center that is staffed by those with experience in examination of pigmented lesions, this should not be too time-consuming. More time-consuming is the group of patients with nevi that may be dysplastic or otherwise clinically atypical and do require surgical excision and confirmation of pathology. These patients clearly generate a minor surgery and pathology workload, and the volume of this workload relative to the background volume related to such lesions prior to education must be considered. In a country with a health care system based mainly on the private sector, an increase in non-melanoma referrals stimulated by such activities will not cause major problems, but in a country with a nationalized system where there are a limited number of dermatologists and surgeons, a rise in this proportion could cause major problems, with long waiting lists. The situation for a patient with an early melanoma could in fact be worsened by public education if large numbers of inappropriate referrals cause delays in the system.

CONCLUSIONS

The rapidly increasing numbers of patients with melanoma and the added concern that this situation will deteriorate further as a result of ozone depletion are clear indications for the need to try to reduce melanoma-related deaths. At present, there are no campaigns that have reported success in reducing the actual incidence of melanoma by encouraging the public to change their behavior with regard to sun exposure or by any other approach. Even if the exercises described above to reduce melanoma mortality are successful by encouraging treatment of thinner lesions, a higher proportion of surgical and dermatologic time and resources will still be utilized in treating the larger numbers of melanomas anticipated; however, it must still be proved without doubt that earlier recognition and treatment do in fact lead to reduced mortality. In the field of breast cancer education, earlier diagnosis has not in all studies led to the anticipated reduction in mortality. One reason advocated for this is the problem of lead-time bias, which is based on the assumption that from the outset breast cancer is a systemic disease and that earlier diagnosis increases the time during which the patient is aware of her disease but does nothing to change the eventual time span from start of growth of the malignancy to death. No similar studies have been carried out on melanoma, and early-diagnosis campaigns depend on the assumption that melanoma can be diagnosed and treated before it disseminates. Information on the numbers of patients attending designated self-referral or advice centers, or data suggesting a falling median primary tumor thickness are encouraging, but are not an end point in itself.

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