Melanoma Outcomes for Medicare Patients

Association of Stage and Survival With Detection by a Dermatologist vs a Nondermatologist

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Objective: To determine whether a difference in melanoma outcomes exists in the United States between tumors detected by dermatologists vs those detected by non-dermatologists.

Design: Retrospective analysis of linked data from the Medicare enrollment and claims files from the Centers for Medicare and Medicaid Services and the National Cancer Institute’s Surveillance, Epidemiology, and End Results program database from 1991 to 1996. The registries are from 12 US sites.

Patients: A study sample comprised of 2020 subjects.

Main Outcome Measures: Tumor characteristics (Breslow thickness and histologic ulceration), stage at diagnosis, and survival and mortality rates.

Results: Tumor detection by a dermatologist vs non-dermatologist was associated with an earlier stage melanoma (stage 0, stage I, and stage II vs stage III and stage IV; \( \chi^2 \) test, \( P < .01 \)) and a thinner tumor (Breslow thickness, 0.86 mm vs 1.00 mm; \( P < .05 \)). At all time points (6 months, 2 years, and 5 years), patients whose melanoma was detected by dermatologists had better survival rates (98%, 87%, and 74%, respectively, for those whose melanoma was detected by dermatologists vs 95%, 79%, and 69%, respectively, for non-dermatologists; \( P < .05 \)). Non–cancer-related mortality was similar for the 2 groups, but the patients whose tumors were detected by dermatologists had lower cancer-related mortality (13% vs 21%; \( P < .01 \)) and overall mortality (29% vs 37%; \( P < .01 \)). Multivariate analysis showed that age, sex, stage at diagnosis, and melanoma detection by a dermatologist were all significantly predictive of survival.

Conclusions: Earlier stage melanoma and improved survival are associated with detection by a dermatologist rather than by a non-dermatologist. Increasing access to dermatologists, particularly for older patients, may represent one approach to improving melanoma-related health outcomes.

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MELANOMA POSES A SIGNIFICANT HEALTH THREAT TO THE US POPULATION. It is currently the fifth most common malignancy for men and sixth most common for women.\(^1\) Current estimates suggest that melanoma will afflict approximately 1 in 52 men and 1 in 77 women in the United States during their lifetime,\(^1\) a staggering increase compared with the estimated lifetime risk of 1 in 1500 persons in the 1930s.\(^2,3\) The economic burden of melanoma is similarly great: the estimated annual direct cost of treating newly diagnosed melanoma is $563 million, with the cost of treating 1 patient with stage III or stage IV melanoma being approximately 40 times the cost of treating 1 patient with stage 1 melanoma.\(^4\) However, the ease of access to the skin for both self-examinations by patients and examinations by physicians, coupled with the high curability of early-stage melanoma, offers the potential to improve outcomes through early detection and treatment of suspicious lesions. Local excision results in a cure rate that is higher than 90% for thin melanomas (Breslow thickness, <1 mm), whereas metastatic disease resists both surgery and chemotherapy and is associated with 5-year survival rates of less than 20%.\(^5\) A cornerstone of the effort to improve melanoma outcomes must be the definition of factors related to late-stage disease.

See also pages 479, 495, 525, and 543

From a health policy perspective, whether a difference in melanoma outcome is associated with a patient’s physician type (specifically, dermatologists vs nondermatologists) is of particular inter-
most to this discussion. This question assumes particular relevance in the current climate of health care reform that attempts to balance health care quality and cost. Primary care physicians, by virtue of frequent patient visits, for example, may be better positioned to detect melanoma in its early stages through regular skin examinations and possibly at a lesser cost. This advantage, however, may be offset by their lesser skill in the diagnosis and treatment of skin cancer compared with that of dermatologists.6-8 (See the meta-analysis by Chen et al9 for a full list of references.) A number of studies,10,11 have questioned the correlation between tumor thickness and provider type, but none of these used a national population database or looked at survival outcomes. This study aims to determine whether a difference in tumor characteristics, stage at diagnosis, and length of survival exists between Medicare patients whose melanoma was identified by dermatologists (hereafter, dermatologist group) vs those whose melanoma was identified by nondermatologists (hereafter, nondermatologist group) using a national cancer registry.

**METHODS**

**DATABASE DESCRIPTION**

This study analyzed data from the linkage of 2 data sources, the National Cancer Institute’s Surveillance, Epidemiology, and End Results (SEER) program database12 and the Medicare enrollment and claims files from the Centers for Medicare and Medicaid Services. This database contains clinical, demographic, and cause of death information for persons with cancer as well as the Medicare claims for covered health care services from the time of a person’s Medicare eligibility until death. The linkage was first completed in 1991 and was updated in 1995 and 1999. For each linkage, information on 93% of persons 65 years or older in the SEER files was found in the Medicare enrollment file.13

The SEER program began collecting data on cancer cases on January 1, 1973. Since that time, many registries have been added to the SEER program. At the time of the initial linkage of the SEER-Medicare data in 1991, the 9 SEER registries included the states of Connecticut, Iowa, New Mexico, Utah, and Hawaii and the metropolitan areas of Detroit, Mich; San Francisco–Oakland, Calif; Atlanta, Ga; and the Seattle–Puget Sound area in Washington. Our data set also included the metropolitan areas of Los Angeles and San Jose, Calif, as well as rural Georgia. The SEER registries collect data on each incident cancer case in their reporting areas. Reported information includes the patient’s demographic characteristics, date of diagnosis, stage at diagnosis, and date of death.11 Although the SEER database is not a probability sample of the US population, it is the only comprehensive source of population-based information in the United States that includes stage of cancer at the time of diagnosis and patient survival data.12

The Medicare enrollment files contain information about each beneficiary’s enrollment and entitlement, demographics, and health maintenance organization (HMO) membership. Medicare beneficiaries can switch in and out of HMO plans; however, our study looked only at HMO membership at the time patients were diagnosed with melanoma. Medicare claims information is available for patients who are members of fee-for-service plans and HMO plans that submit claims or encounter data for specific services received by their Medicare enrollees.13

**STUDY POPULATION**

The data for this retrospective study were obtained from the SEER data set (fiscal years 1991-1996), which contains information on 15,833 patients with melanoma, of whom 2020 ultimately met our study criteria as detailed in the Figure. We identified patients with melanoma using the site record for melanoma of the skin (44). Because we were interested in the type of physician who made the melanoma diagnosis and this information was only available beginning in 1991, we had to exclude all patients whose melanoma was diagnosed before this date. We further excluded those patients whose melanoma was diagnosed by someone other than a dermatologist or a nondermatologist physician who might perform skin cancer screenings. We did this by looking at the provider specialty code associated with the first melanoma diagnosis code (International Classification of Diseases, Ninth Revision [ICD-9] code 172.x). We defined nondermatologists to include family practitioners, internists, general practitioners (GPs), obstetrician-gynecologists, plastic surgeons, and oncologists (Health Care Financing Administration [HCFA] codes 08, 11, 01, 16, 24, 83, and 90) because these physicians are the most likely to perform skin cancer screening as part of their physical examination. This reduced our patient number to 13,086. To both confirm the melanoma diagnosis and the date of diagnosis, we included only those patients with a pathology service (HCFA code 22) within 45 days before or after their melanoma diagnosis (n = 4770) coded as melanoma (ICD-9 code 172.x) (n = 2020). Of the final study population of 2020 patients, tumor characteristics (Breslow thickness and ulceration) were not available for 628 patients, and staging information was not available or was incomplete for 80 patients.

**DETERMINATION OF PROVIDER DETECTING MELANOMA**

Three possible scenarios exist for the provider who detected the melanoma: (1) a dermatologist detected and diagnosed the...
melanoma, (2) a nondermatologist detected the lesion but then referred the patient to a dermatologist for confirmation of the diagnosis, or (3) the nondermatologist detected and diagnosed the melanoma without help from a dermatologist. To determine which scenario took place, we first identified the provider type associated with the initial melanoma diagnosis code. If it was a nondermatologist, we assumed the nondermatologist detected and diagnosed the melanoma (scenario 3). If it was a dermatologist, we then checked all nondermatologist visits in the preceding 5 months for any skin-related ICD-9 codes. We defined the 5 months preceding a dermatologist visit as the plausible wait time from a nondermatologist detecting the lesion to the patient seeing a dermatologist. If the patient had seen a dermatologist only in the 5 months prior to the melanoma diagnosis, we credited the dermatologist with the diagnosis (scenario 1). However, if the patient had seen a nondermatologist in the 5 months prior and the nondermatologist gave any skin diagnosis, we credited the nondermatologist with the diagnosis (scenario 2).

Because we allowed any skin diagnosis, it is quite possible that a cohort of patients referred from the nondermatologist to the dermatologist eventuating in a diagnosis of melanoma may have been referred for an entirely separate concern, with the melanoma diagnosed incidentally by the dermatologist. This assignment method may overestimate the melanomas detected by nondermatologists and thus makes ours a conservative estimate of the difference in survival outcomes between provider types.

STAGING

The SEER database provides tumor characteristic information in the American Joint Committee on Cancer (AJCC) staging system, Extent of Disease (EOD), and Historic Stage definitions. Because data on histologic ulceration were not available for a large number of patients, we were unable to convert the data to the 2002 AJCC staging criteria. Instead, we used the 1997 AJCC staging definitions. Some of the changes with the 2002 staging system included, among other things, using tumor thickness as the primary determinant of tumor staging, using histologic ulceration as a second determinant of tumor staging, and incorporating sentinel node results into pathologic staging definitions.

Historic stage identifies whether the melanoma was in situ, localized, regional, distant, or unstaged. Because a localized tumor could be either stage I or stage II according to the 1997 AJCC Melanoma Staging System, we combined stage I and stage II for our analysis to maximize the number of patients in our analyses and because both stages represent early diagnosis and favorable outcome relative to stage III and stage IV. Thus, we converted the historic stages as follows: in situ is stage 0, localized is stage I or II, regional is stage III, and distant is stage IV.

The EOD classification has data on Breslow thickness, Clark level, lymph node involvement, and metastases. We used this information to convert to the 1997 AJCC staging system. In several cases, the Breslow thickness and Clark level did not fall in the same primary tumor category. When this occurred, we used the Breslow thickness to determine the stage. If the Breslow thickness was not available, we then used the Clark level to stage. Unstageable tumors included any in situ tumors coded with a Breslow thickness, any tumors for which it was unknown if there were extensions or metastases, any tumors with unknown Breslow thickness and unknown Clark level, and any tumor with extension into underlying cartilage, bone, or muscle. When both historic stage and EOD stage information were available, we used the EOD stage. The historic staging often preferentially used the Clark level rather than the Breslow thickness to stage a tumor (when the 2 did not fall under the same stage). However, we relied on Breslow thickness rather than Clark level when staging using the EOD information.

SURVIVAL

We used mortality data from the SEER database to evaluate survival and mortality by cause of death for our 2 patient groups. The SEER program uses active surveillance to abstract mortality data from a variety of sources, including inpatient and outpatient records, autopsy data, and death certificates. We calculated the percentages of patients in our 2 groups who survived at least 6 months, 2 years, and 3 years, or to the end of the study period. Because we analyzed 6 years of data, we did not have enough patients with 5 years of data to evaluate this group independently. In addition, we analyzed mean survival time and mortality rates by causes of death for both patient groups.

STATISTICAL ANALYSIS

We compared stage at diagnosis between melanomas discovered by nondermatologists and dermatologists using the nonparametric chi-square test. The comparison of Breslow thickness of melanomas based on provider type was determined by the nonparametric Wilcoxon rank sums scores test. Histologic ulceration of melanomas discovered by dermatologists vs nondermatologists was analyzed using the nonparametric chi-square test. Survival and mortality were calculated as frequencies of patients who lived (or died) to the time point of interest (6 months, 2 years, or 3 years). Comparison by provider type was determined by nonparametric chi-square test. To determine which factors predicted survival at 2 years, we performed a multivariate logistic regression and reported the odds ratio (OR) with 95% confidence interval (CI) for each factor. We chose the 2-year rather than the 3-year time point because we had the most data for this end point. Statistical significance was defined as P<.05.

RESULTS

DEMOGRAPHICS

A total of 2020 patients met the criteria for inclusion in the study. Of these, the melanomas of 1467 (73%) were diagnosed by a dermatologist, and 553 (27%) were diagnosed by a nondermatologist. There were no significant differences based on age, sex, race, marital status, or type of insurance between the 2 patient groups (Table 1). In addition, the distribution by provider type was similar among the 11 geographic regions (ie, no region had only dermatologists diagnosing melanoma). However, we did find that those diagnosed by a dermatologist were more likely to live in an urban area (P<.001).

TUMOR CHARACTERISTICS

We analyzed the 2 patient groups by the main predictors of melanoma-related mortality: Breslow thickness (n=1392), AJCC stage (n=1940), and histologic ulceration (n=1392). A statistically significant difference in Breslow thickness was observed between tumors diagnosed by dermatologists vs those diagnosed by nondermatologists (Table 2). Breslow thickness, 0.86 mm vs 1.00 mm, respectively (P=.048). We also looked at melanoma stage at diagnosis and observed significant differences between provider types, with a preponderance of
thin melanoma (stage 0, or stage I or II) in the dermatologist group, and a preponderance of thick melanoma (stage III or stage IV) in the nondermatologist group (Table 2; P=.006). Considering histologic ulceration, there was no difference observed between the 2 groups.

SURVIVAL AND MORTALITY RATES

For the analysis of survival and mortality, the minimum length of follow-up was 1 year, with the average follow-up period being just over 4 years. At 6 months, 2 years, and 5 years, patients in the dermatologist group had a higher survival rate than those in the nondermatologist group (Table 3). The 2-year and 5-year survival rates were 86.5% and 78.8% for the dermatologist group compared with 78.8% and 68.7% for the nondermatologist group. When looking at mortality rates by cause of death, both groups had similar noncancer-related mortality rates. However, the dermatologist group had lower cancer-related mortality rates and a lower overall mortality rate. Although not statistically significant, there were an additional 2 months in mean overall survival time for the dermatologist group. In our multivariate analysis, we found that younger patients (those aged 65-70 years) (OR, 1.98; 95% CI, 1.47-2.68) and those diagnosed by a dermatologist (OR, 1.58; 95% CI, 1.20-2.07) were more likely to survive 2 years (Table 4). Male patients (OR, 0.60; 95% CI, 0.45-0.78) and those with higher stage melanomas (OR, 0.66; 95% CI, 0.62-0.71) were less likely to survive to the 2-year end point. Race, marital status, and living in an urban vs a nonurban area did not influence 2-year survival. Race, marital status, and living in an urban vs a nonurban area did not influence 2-year survival. With rare exceptions, only patients 65 years or older qualify for Medicare.

Table 1. Demographic Characteristics of 2020 Medicare Patients With Melanoma Diagnosed by Dermatologists and Nondermatologists*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Derm (n = 1467 [73%])</th>
<th>Nonderm (n = 553 [27%])</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at diagnosis, mean (SD), y</td>
<td>73.9 (8.0)</td>
<td>74.7 (8.8)</td>
<td>.09</td>
</tr>
<tr>
<td>Male sex</td>
<td>57.9</td>
<td>53.4</td>
<td>.07</td>
</tr>
<tr>
<td>Race: white</td>
<td>97.4</td>
<td>95.6</td>
<td>.04</td>
</tr>
<tr>
<td>Living in urban area</td>
<td>88.3</td>
<td>75.6</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Married</td>
<td>52.8</td>
<td>50.6</td>
<td>.38</td>
</tr>
<tr>
<td>Insurance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMO</td>
<td>12.5</td>
<td>12.7</td>
<td>.94</td>
</tr>
<tr>
<td>Non-HMO</td>
<td>87.5</td>
<td>87.3</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: Derm, dermatologists; nonderm, nondermatologists. *Data are given as percentages except where noted.

Table 2. Tumor Characteristics for 2020 Medicare Patients With Melanoma Diagnosed by Dermatologists and Nondermatologists, 1991-1996*

<table>
<thead>
<tr>
<th>Tumor Characteristic</th>
<th>Derm (n = 1467 [73%])</th>
<th>Nonderm (n = 553 [27%])</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breslow thickness, median, mm (n = 1392)</td>
<td>0.86</td>
<td>1.00</td>
<td>.046</td>
</tr>
<tr>
<td>Stage, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>266 (18.1)</td>
<td>86 (15.6)</td>
<td></td>
</tr>
<tr>
<td>I and II</td>
<td>990 (67.5)</td>
<td>356 (64.4)</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>118 (8.0)</td>
<td>70 (12.7)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>IV</td>
<td>36 (2.5)</td>
<td>18 (3.3)</td>
<td></td>
</tr>
<tr>
<td>Unstageable</td>
<td>57 (3.9)</td>
<td>23 (4.2)</td>
<td></td>
</tr>
<tr>
<td>Ulceration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>74 (5.0)</td>
<td>35 (6.3)</td>
<td>.30</td>
</tr>
<tr>
<td>No</td>
<td>834 (63.7)</td>
<td>349 (63.1)</td>
<td>.86</td>
</tr>
<tr>
<td>Unknown</td>
<td>169 (30.6)</td>
<td>459 (31.3)</td>
<td>.79</td>
</tr>
</tbody>
</table>

Abbreviations: Derm, dermatologists; nonderm, nondermatologists. *Data are given as number (percentage).


<table>
<thead>
<tr>
<th>Survival and Mortality</th>
<th>Derm (n = 1467 [73%])</th>
<th>Nonderm (n = 553 [27%])</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of survival, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥6 mo</td>
<td>97.5</td>
<td>95.1</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>≥2 y</td>
<td>86.5</td>
<td>78.8</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>≥5 y</td>
<td>73.9</td>
<td>68.7</td>
<td>.02</td>
</tr>
<tr>
<td>Duration of survival, mean, mo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All patients</td>
<td>28.1</td>
<td>25.9</td>
<td>.19</td>
</tr>
<tr>
<td>Died from cancer</td>
<td>25.4</td>
<td>22.6</td>
<td>.16</td>
</tr>
<tr>
<td>Mortality by cause of death, No. (%)</td>
<td>Cancer</td>
<td>191 (13)</td>
<td>116 (21)</td>
</tr>
<tr>
<td>Not cancer</td>
<td>207 (14)</td>
<td>84 (15)</td>
<td>.12</td>
</tr>
<tr>
<td>Unknown</td>
<td>20 (1)</td>
<td>6 (1)</td>
<td>.79</td>
</tr>
<tr>
<td>Total Mortality</td>
<td>418 (29)</td>
<td>206 (37)</td>
<td>&lt;.01</td>
</tr>
</tbody>
</table>

Abbreviations: Derm, dermatologists; nonderm, nondermatologists.


<table>
<thead>
<tr>
<th>Characteristic</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher vs lower stage*</td>
<td>0.66 (0.62-0.71)</td>
</tr>
<tr>
<td>Diagnosed by a derm vs nonderm</td>
<td>1.58 (1.20-2.07)</td>
</tr>
<tr>
<td>Age, y†</td>
<td></td>
</tr>
<tr>
<td>&gt;79 (reference group)</td>
<td>NA</td>
</tr>
<tr>
<td>(71-78) vs ≥79</td>
<td>1.98 (1.47-2.68)</td>
</tr>
<tr>
<td>(65-70) vs ≥79</td>
<td>2.39 (1.73-3.30)</td>
</tr>
<tr>
<td>Male vs female</td>
<td>0.60 (0.45-0.78)</td>
</tr>
<tr>
<td>Race: nonwhite vs white</td>
<td>0.65 (0.35-1.20)</td>
</tr>
<tr>
<td>Not married vs married</td>
<td>0.87 (0.66-1.14)</td>
</tr>
<tr>
<td>Nonurban vs urban</td>
<td>0.80 (0.57-1.13)</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; derm, dermatologist; nonderm, nondermatologist; NA, not applicable; OR, odds ratio.
*Stage was modeled as a linear variable. Thus, the OR reflects the incremental decrement in odds of 2-year survival as stage increases. †Patients were divided into 3 age groups (65-70, 71-78, and ≥79 years). With rare exceptions, only patients 65 years or older qualify for Medicare.
COMMENT

We found that Medicare patients whose melanomas were detected by dermatologists had higher survival rates at all time points (6 months, 2 years, and 5 years) than those patients whose melanomas were detected by nondermatologists. When we looked specifically at those patients who died from cancer, we found a significantly lower mortality rate for patients with melanomas detected by dermatologists, with no difference in noncancer-related mortality. Multivariate analysis indicated that age, stage at diagnosis, sex, and detection by a dermatologist were all predictive of improved survival. When we analyzed cancer-related mortality using multivariate analysis, only stage, sex, and detection by a dermatologist were significant variables. Age was a predictor of overall mortality but not of cancer-related mortality.

The most likely reason for the observed survival benefits is the more favorable tumor characteristics in the dermatologist group. We demonstrated a significant difference in melanoma stage by provider type, with a preponderance of early-stage melanoma (stage 0, or stage I or II) in the dermatologist group and of late-stage melanoma (stage III or stage IV) in the nondermatologist group (Table 2). The melanomas detected by nondermatologists were also thicker than those detected by dermatologists (1.00 mm vs 0.86 mm; \( P = .048 \)). Although the difference between a melanoma that is 0.86 mm thick and one that is 1.00 mm thick does not correlate with different clinical stages, 

Although many studies have demonstrated that dermatologists, as expected with their training in evaluating cutaneous lesions, are better able to diagnose and appropriately manage pigmented lesions than other types of physicians.6,7,9,11,22,24 This helps explain why dermatologist-detected melanomas are thinner than those detected by other physician types.10,11 However, physician-detected melanomas are the minority of cases. Most melanomas are either self-detected or detected by friends and family members.10,11,25-30 There may be no difference in the thickness of these self-detected lesions among patients who go to a dermatologist or nondermatologist for confirmation, or perhaps patients who go to a nondermatologist are inappropriately reassured until their melanomas are thicker and at a more advanced stage.

Alternatively, there may be inherent differences in the types of patients who go to a dermatologist rather than a nondermatologist when they have concern about a lesion, and these differences could not be assessed by looking at the available demographic characteristics in the SEER data set and Medicare files. A study by Schwartz et al22 analyzed patient characteristics associated with thinner melanomas and found that having at least 1 atypical nevus, more than 20 clinically benign nevi, or a personal history of melanoma was significantly related to thinner melanomas. This study did not find that a family history of melanoma was associated with thinner lesions, but a study by Brady et al33 found that patients with a family history of melanoma had a 2.7-fold increased likelihood of presenting with a thin lesion. These are all characteristics of patients commonly followed-up by dermatologists and perhaps make patients more aware of melanoma and more likely to notice a new or changing lesion. Unfortunately, these relevant variables are not captured by the SEER database and are unavailable for analysis.

Although it is most likely that the survival benefit we observed is due to the more favorable tumor characteristics in the dermatologist group, there may be other factors at play. There may be differences in the treatment and surveillance that the patients in the 2 groups received. Several studies have demonstrated treatment differences among different physician types. McKenna et al31 studied cases of patients with melanoma in Scotland who had been surgically treated by GPs, dermatologists, general surgeons, and plastic surgeons between 1979 and 1997. They found a significant variation in treatment, with over 90% of patients treated by a dermatologist or GP undergoing wide local excision following initial excision, compared with 43% and 23% of those treated by general surgeons and plastic surgeons, respectively. The 2-stage procedure is the recommended surgical treatment for primary cutaneous melanoma32 and has been shown to correlate with improved survival.33 After adjusting for known prognostic factors, this study also found better overall survival, disease-free survival, and recurrence-free interval for patients treated by dermatologists vs those treated by general surgeons or plastic surgeons. No significant difference in survival was noted between the dermatologist and GP groups; however, it was noted that GPs commonly work in close cooperation with dermatologists when performing skin surgery.

This heterogeneity in surgical treatment for cutaneous melanoma has also been studied in the United States. A study by Haigh and Urbach24 evaluated patients with melanoma in the SEER database between 1988 and 1997. Despite strong evidence that wide excision (a margin of \( \geq 1 \) cm) for invasive melanoma should be the standard of care,35-37 25% of patients were treated with only simple excisional, shave, or punch biopsy. A more recent study by Cormier et al18 also evaluated adherence to recommended surgical treatment for invasive melanoma, including sentinel lymph node biopsy. They found that from 1998 to 2001, about one third of patients in the SEER database received care that was nonadherent to current practice guidelines. Similar to surgical treatment, significant variability has also been observed in surveillance procedures after local excision.39 A review of the SEER database for years 1992 to 1996 found significant variation in the use of chest radiography, computed tomography of the head, liver and lactate hydrogenase enzymes, complete blood cell count, and follow-up visits to physicians. Although, to our knowledge, there has been no randomized trial to date that has examined the effect of surveillance practices on long-term survival in patients with melanoma, this could contribute to the differing survival outcomes observed in our study.
Although dermatologists are better than nondermatologists at diagnosing melanomas, not all patients have the same access to a dermatologist. The availability of dermatologists, as dictated by workforce composition or insurance coverage, has been shown to be important in survival outcomes. An analysis by Van Durme et al of Florida’s state tumor registry for 1993 to 1995 found that for each additional dermatologist per 100,000 population there was a drop in melanoma mortality of 0.19 case per 100,000. By contrast, each additional general internist per 100,000 population was associated with an increase in melanoma mortality by 0.04 case per 100,000. This correlated with their previous finding that each additional dermatologist per 10,000 population would be associated with a 39% increased odds of early diagnosis, but each additional general internist per 10,000 population would be associated with a 10% decreased odds of early-stage diagnosis.

Other studies have shown that simply going to a physician more often can result in earlier diagnosis, regardless of the provider type. A provincial cancer registry study in Canada by Di Quinzio et al found that patients who visited their family physician 2 to 5 times in 2 years were 66% less likely to be diagnosed with a thick melanoma (Breslow thickness, >0.75 mm) than patients who visited their family physician fewer times or not at all. Patients who had visited a dermatologist during this time period did not have a decreased likelihood of being diagnosed with a thick melanoma.

Insurance type is also an important predictor of melanoma survival outcomes. A recent SEER-Medicare study (1985-1994) by Kirsner et al reported earlier melanoma stage and greater overall survival in patients affiliated with HMOs than those affiliated with fee-for-service health care plans. This study posits that increased access to dermatologists in HMO plans or coverage of preventive services are possible explanations for the more favorable outcomes. Our multivariate analysis findings that melanoma detection by a dermatologist but not HMO membership was predictive of improved survival support the hypothesis that greater access to dermatologists in HMO plans contributes to the improved melanoma survival among plan participants.

The strength of the current study, compared with other studies of the differences in melanoma diagnosis and outcome between dermatologists and nondermatologists, is that it is population based. Use of the SEER-Medicare database, however, also implies several limitations to the external validity of our findings. By definition, the study population was 65 years or older, and the results of our study may thus not be generalizable to the younger population. Furthermore, the SEER data do not constitute a probability sample of the United States, with higher rates of HMO enrollment, lower rates of cancer mortality, and an overrepresentation of urban dwellers, as well as an underrepresentation of white individuals and persons living in poverty compared with the national average. Besides limitations inherent to use of the SEER-Medicare linked data, our definition of provider type responsible for detecting melanoma may overrepresent those detected by nondermatologists. We assumed nondermatologists detected the melanoma if he or she had documented any skin-related diagnosis code within 5 months of diagnosis by a dermatologist. This definition was thought to be necessary to most accurately define the physician who was ultimately responsible for the initial melanoma detection, to account for the fact that patients are often referred to dermatology departments for clinically suspicious lesions originally identified by other practitioners. At one extreme, if most of these patients were referred for an unrelated skin disease but possessed an occult, advanced melanoma, this finding would skew the outcome measures in favor of dermatologists (as observed in our study). At the other extreme, however, if referred patients possessed predominantly thin lesions, this finding would skew the results in favor of nondermatologists. Furthermore, use of the 1997 AJCC staging system may not be the most accurate reflection of patient prognosis given the recent 2002 revision. These limitations to our study were a consequence of the data points captured by SEER-Medicare but nevertheless must be considered when applying the current study results in health policy planning.

In conclusion, our study provides evidence from a population-based perspective that detection of earlier stage melanoma and improved patient survival is associated with care by a dermatologist rather than a nondermatologist. These results suggest that increasing access to dermatologists, particularly for older patients who have higher rates of melanoma, may represent one approach to improving melanoma-related health outcomes from a health policy perspective. The results of this study are especially important in light of the recent editorial by Geller et al highlighting the need for a targeted national melanoma screening program, including legislation that would increase patient access to dermatologists. We hope our findings will strengthen these efforts by providing evidence of the benefits of dermatologist care for patients at higher risk for melanoma, such as those who are 65 years or older.

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