The Association of Medicare Health Care Delivery Systems With Stage at Diagnosis and Survival for Patients With Melanoma

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Objective: To evaluate differences in the stage at diagnosis and survival for melanoma between the 2 most common types of Medicare health care delivery systems, fee-for-service (FFS) and managed care (health maintenance organizations [HMOs]), in the United States during the period from January 1, 1985, through December 31, 1994.

Design: We used a linkage of 2 national databases, ie, the Medicare database from the Centers for Medicare and Medicaid Services (formerly the Health Care Financing Administration) and the National Cancer Institute Surveillance, Epidemiology, and End Results program database, to evaluate differences in demographic data, stage at diagnosis, and survival for melanoma between the HMO and FFS groups.

Patients: A population of 4608 patients (62% men; 92% white).

Results: We found an earlier stage of diagnosis for the HMO group compared with the FFS group for melanoma as the first cancer diagnosis, but this did not persist when melanoma was the second or a later cancer diagnosis. For patients with melanoma as the first cancer diagnosis, improved survival was related to earlier stage at diagnosis.

Conclusions: Differences exist in stage at diagnosis between patients in HMOs compared with those in FFS health care plans. This is likely due in part to utilization of services or access to care for patients in HMOs, and may be similar to that of patients in FFS plans with a previous cancer diagnosis before their diagnosis of melanoma. We did not find an increased risk of diagnosis with a late-stage cancer among patients with vs those without a previous cancer diagnosis. Improved survival appears to be related to earlier stage at diagnosis.

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MELANOMA IS INCREASING at an alarming rate. From an incidence of 1 in 1500 in the 1930s, it is currently predicted that melanoma will develop in 1 in 70 Americans in their lifetimes. Melanoma currently ranks as the sixth most common cancer and is a leading cause of cancer deaths among young adults. Early detection can alter the clinical outcome; when melanoma is detected early, lesions are thin and have a 99% cure rate. When detected later, lesions may be thicker and, if so, have a more than 50% mortality rate. Screening and early detection is therefore essential in optimizing patient outcomes.

Two of the most common types of health care delivery systems in the United States are fee-for-service (FFS) and managed care systems (including the health maintenance organizations [HMOs]). The health care delivery system in which patients participate may affect patient care. Managed care systems have been developed to reduce costs, but their effect on quality of care has not been clearly established. Some evidence exists that differences in patient outcomes are associated with the type of health care delivery system in which they are enrolled. One report found earlier stages of cancer at diagnosis, including melanoma, among patients enrolled in Medicare HMOs compared with age-matched patients in an FFS program during a 5-year period. It was suggested that these differences may be related to the “HMO effect,” ie, HMO patients are more likely to see their general physician than are patients in an FFS system.

Using national databases, the present study also evaluated differences in stage of melanoma at diagnosis and differences in melanoma survival between the 2 health
care delivery systems (Medicare FFS and Medicare HMO) during the 10 years from January 1, 1985, through December 31, 1994. In addition, we hypothesized that patients with a previous diagnosis of any cancer might have increased access to and utilization of health care services, including melanoma screening. Therefore, we also evaluated the role of previous cancer diagnosis as a possible contributing factor to melanoma stage at diagnosis.

**METHODS**

This study represents an analysis of the linkage of the following 2 national databases: Medicare data from the Centers for Medicare and Medicaid Services (formerly the Health Care Financing Administration) database and the National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) program database. We analyzed available data from 1985 through 1994. Data from the SEER files were matched to the Medicare enrollment files; on an individual basis, this linkage has a 94% match rate.

Medicare enrollment files contain entitlement dates to Part A and Part B, ZIP code of residence, health care delivery type, and months in which the beneficiary was enrolled under a Medicare HMO risk or cost contract.

Data collection for the SEER program began in January 1, 1973. The number of registries included in the SEER program has expanded over time. At the time of the initial linkage of the SEER-Medicare data in 1991, the SEER areas included the states of Connecticut, Hawaii, Iowa, New Mexico, and Utah and the metropolitan areas of Detroit, Mich; San Francisco and Oakland, Calif; Atlanta, Ga; and Seattle and Puget Sound, Wash. These areas represented approximately 10% of the US population. In 1992, Los Angeles County and the San Jose and Monterey metropolitan areas in California joined the SEER program. Inclusion of these areas expanded the SEER representation to approximately 14% of the US population.

The SEER participants collect information on each incident cancer case in their reporting areas for the population-based registries. Although SEER data do not constitute a probability sample of the nation, they are the primary source of national information on cancer incidence and survival. Initially, SEER areas were concentrated in western states and involved a lower proportion of African American subjects and a higher proportion of other races than the average US population. Reported information includes month and year of diagnosis, stage at diagnosis, date of death, and county and census tract of residence.

**PATIENT SELECTION**

We first selected all cases of melanoma of the skin diagnosed from 1985 through 1994 in patients 65 years or older who were entitled to Medicare Part A and Part B (Medicare HMO) at the time of diagnosis. Because the number of Medicare FFS patients was substantially greater than the number of HMO patients, we randomly match 2 FFS patients with each HMO patient, with matching performed by age (±2 years); sex; year of diagnosis; melanoma as the primary, secondary, or later diagnosed cancer; and health service area of residence. A health service area is a geographic area composed of 1 or more counties that is relatively self-contained with respect to the provision of routine hospital care for Medicare beneficiaries. This latter variable was selected as a method of controlling for geographic differences in provider practice patterns. We chose to match on the order of melanoma diagnosis (among other cancers) because we hypothesized that patients with a preexisting cancer diagnosis before their diagnosis with melanoma were more likely to be actively followed up in the health care delivery system where they were enrolled at the time of their first diagnosed cancer. Therefore, we were able to evaluate the previous utilization of health care as a potential modifying variable of stage at diagnosis.

**CANCER STAGING**

For staging of the melanomas, we used the National Cancer Institute staging system, which is based on the extent of disease as reported by the individual SEER registries. These registries abstract information from a variety of sources, including inpatient hospital records, outpatient records, and pathology reports. The National Cancer Institute staging system consists of the following 4 tumor stages: in situ, indicating a noninvasive malignancy; local, indicating an invasive cancer confined to the site/organ of origin; regional, indicating tumor spread by direct extension to adjacent organs or regional lymph nodes; and distant, indicating tumor spread to distant organs or lymph nodes.

**PATIENT MORTALITY**

We evaluated the mortality data provided from the SEER program database, which uses active surveillance of mortality data to abstract data from a variety of sources. These sources included inpatient and outpatient records, autopsy data, and death certificates. Patients for whom the diagnosis of melanoma was made solely through death certificates or through autopsy findings were excluded. We calculated the time from diagnosis to death, mortality rates (all cause), and median time to death for both patient groups. We also calculated median time to death for several subpopulations on the basis of the stage at diagnosis.

**STATISTICAL ANALYSIS**

We initially compared differences in stage at diagnosis for melanoma between HMO and FFS patients (controlling through matching for sex, race, age at diagnosis, and melanoma as the primary cancer) using the $\chi^2$ test. We then performed conditional logistic regression analysis to determine whether significant differences existed in the specific stages at diagnosis of melanoma between HMO and FFS patients. Results are presented as odds ratios (ORs) with 95% confidence intervals (CIs). We used the nonparametric Gehan-Wilcoxon test to compare survival between patients in Medicare HMOs and FFS plans. We performed separate conditional logistic regression analysis for the subset of patients in whom melanoma was not the primary cancer to evaluate the possible effects of active utilization of health care delivery systems before the melanoma diagnosis. The significance level (2 sided) was set at .05 for all tests.

**RESULTS**

**PATIENT POPULATION**

We evaluated a population of 4608 patients, 61.7% of whom were men. The demographic characteristics of the study patient population are shown in Table 1. Most of the patients (91.8%) were white. Matching was successful in that there were no significant differences between patients in the 2 health care delivery systems in terms of sex, age, race, or year of diagnosis. Overall, 88.0% of the study patients had melanoma as their primary can-
cer. Given the low prevalence of melanoma in nonwhite groups, further analyses were limited to this subgroup.

**STAGE OF CANCER AT DIAGNOSIS**

Table 2 presents melanoma stage at diagnosis for HMO and FFS patients for all melanoma, melanoma as the primary cancer diagnosis, and melanoma as the secondary diagnosis. Overall, 32.1% of all melanoma cases were diagnosed at the in situ stage in HMO patients compared with 23.5% in FFS patients (\(P<.01\)). The differences in other stages between HMO and FFS patients were less obvious (local stage, 43.2% vs 43.9%; regional stage, 5.1% vs 7.8%; and distant stage, 1.7% vs 3.5%). However, the proportion of the unstaged melanoma was slightly lower in HMO patients than in FFS patients (17.9% vs 21.3%). The distributions of stage at the diagnosis for primary melanoma in HMO and FFS patients were almost the same as those in the overall melanoma distribution. For melanoma as the secondary cancer, HMO patients had an appreciably higher (although not statistically significant) proportion of the in situ diagnosis than FFS patients (30.5% vs 24.4%; \(P = .12\)). The differences in other stages, including unstaged melanoma, were minimal (Table 2).

We then performed conditional logistic regression analyses to estimate the odds of having a diagnosis at an earlier stage compared with later stages based on a patient’s Medicare enrollment status (with FFS as the reference population). Overall, HMO patients were less likely than FFS patients to receive a diagnosis at a later stage. For all patients, HMO enrollees were less than half as likely as FFS enrollees to receive a diagnosis at a distant stage (OR, 0.46; 95% CI, 0.24-0.80) (Table 3). Compared with FFS patients, HMO patients were also significantly less likely to receive a diagnosis at a regional vs earlier stages or at local vs earlier stages than FFS enrollees (OR, 0.58; 95% CI, 0.39-0.82). Separate analysis for patients with melanoma as their primary cancer diagnosis yielded similar results for distant vs earlier stages (OR, 0.48; 95% CI, 0.25-0.84) and regional vs earlier stages (OR, 0.58; 95% CI, 0.36-0.84).

Of the total population, 555 patients (12.0%; 190 of them HMO patients) with a diagnosis of melanoma had a preexisting cancer diagnosis. We did not find any statistically significant differences in this subset of patients between HMO enrollees compared with FFS enrollees for distant vs earlier stage (OR, 0.23; 95% CI, 0.00-2.26) and regional vs earlier stage at diagnosis (OR, 0.56; 95% CI, 0.17-1.37).

**PATIENT SURVIVAL**

We evaluated median survival time for patients with a diagnosis of melanoma enrolled in an FFS or an HMO health care plan (Table 4). We found significant differences in median survival time, which was significantly longer for HMO than for FFS patients, ie, 96.7 and 70.3 months, respectively (\(P<.01\)). This appeared to be due to differences in stage at diagnosis. Although the median survival in HMO patients with a diagnosis at a local stage was greater than that for their FFS counterparts, the difference was not statistically significant. We did not find any statistically significant differences in median survival between HMO and FFS patients for other stages at diagnosis (regional stage, 29.0 vs 31.4 months \(P = .49\); distant stage, 6.4 vs 5.3 months \(P = .19\)).

**COMMENT**

We found that Medicare patients enrolled in HMO health care delivery systems received a diagnosis with an earlier stage of melanoma compared with matched patients enrolled in FFS systems. In addition, patients enrolled in HMOs had improved survival after melanoma diagnosis. Indeed, overall median survival for HMO patients was on average 96.7 months (\(>26\) months) longer than that of the FFS patients. However, this survival advantage did not persist when we controlled for stage at diagnosis; this seems to indicate that the survival advantage seen in HMO patients was due to earlier-stage diagnoses of melanoma among these patients, compared with FFS patients. No difference in stage of diagnosis was found for those few patients for whom melanoma was not their first cancer experience, regardless of health plan type.

There are several possible explanations for these findings. The earlier diagnosis and survival advantage among HMO patients could be due to the HMO effect. This term has been used to describe HMO patients who are more...
likely than patients in an FFS system to see their general physician and, as a result, to use preventive services including disease screening. This effect could be related to plan differences in promotion and access to preventive services or to qualitative differences among HMO patients in terms of education, income, or health consciousness, which we did not assess. Particularly relevant to melanoma, increased access to dermatologists in HMO plans or coverage of preventive services may lead to one receiving a diagnosis at an earlier stage of cancer and superior outcomes. For instance, the Kaiser Permanente Health System, which serves several western SEER populations, has long allowed direct access to dermatologists. This is particularly important given results from previous studies that have consistently indicated that dermatologists are superior to nondermatologists in the diagnosis and management of skin disease, including skin cancer. This suggests that the provision for payment of preventive services by Medicare or direct access to dermatologists within managed care systems may improve outcomes.

The finding that there was no difference between the 2 health care delivery systems for the subpopulation with a history of cancer before melanoma diagnosis could reflect increased vigilance and screening behaviors by patients and providers in both health care delivery plans because of cancer history. It may also be that we lacked appropriate power to detect differences within this subset owing to the small sample size.

The present study has several limitations. By definition, the study population was 65 years or older, and it is not clear that the results are generalizable to a younger patient population. Furthermore, the SEER data do not constitute a probability sample of the nation, despite being the primary source of national information on cancer incidence and survival. SEER areas are mostly urban and concentrated in western US states, with undersampling of African American patients. Health care plans and patients from these SEER areas may not be representative of the nation as a whole. The existence of a reporting bias for melanoma in HMO plans, although not expected, is also possible. In addition, changes may have occurred in the health care delivery system in which a patient was enrolled after diagnosis or switched health care systems, which may have had an impact on their survival.

### Table 2. Melanoma Stage at Diagnosis for 4608 Medicare-Aged HMO and FFS Patients, 1985-1994*

<table>
<thead>
<tr>
<th>Stage</th>
<th>Overall HMO</th>
<th>FFS</th>
<th>P Value</th>
<th>Melanoma as First Cancer HMO</th>
<th>FFS</th>
<th>P Value</th>
<th>Melanoma as Second or Later Cancer HMO</th>
<th>FFS</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>In situ</td>
<td>496 (32.1)</td>
<td>720 (23.5)</td>
<td>&lt;.01</td>
<td>437 (32.3)</td>
<td>632 (23.4)</td>
<td>&lt;.01</td>
<td>58 (30.5)</td>
<td>89 (24.4)</td>
<td>.12</td>
</tr>
<tr>
<td>Local</td>
<td>667 (43.2)</td>
<td>1345 (43.9)</td>
<td>.65</td>
<td>581 (42.9)</td>
<td>1174 (43.5)</td>
<td>.72</td>
<td>87 (45.8)</td>
<td>169 (46.3)</td>
<td>.99</td>
</tr>
<tr>
<td>Regional</td>
<td>79 (5.1%)</td>
<td>239 (7.8)</td>
<td>&lt;.01</td>
<td>66 (4.9)</td>
<td>205 (7.6)</td>
<td>&lt;.01</td>
<td>11 (5.8)</td>
<td>35 (9.6)</td>
<td>.12</td>
</tr>
<tr>
<td>Distant</td>
<td>26 (1.7%)</td>
<td>107 (3.5)</td>
<td>&lt;.01</td>
<td>26 (1.9)</td>
<td>100 (3.7)</td>
<td>.01</td>
<td>1 (0.5)</td>
<td>3 (2.2)</td>
<td>.18†</td>
</tr>
<tr>
<td>Unstaged</td>
<td>276 (17.9)</td>
<td>653 (21.3)</td>
<td>.01</td>
<td>244 (18.0)</td>
<td>588 (21.8)</td>
<td>.01</td>
<td>33 (17.4)</td>
<td>64 (17.5)</td>
<td>.96</td>
</tr>
<tr>
<td>Total No.</td>
<td>1544</td>
<td>3064</td>
<td></td>
<td>1354</td>
<td>2699</td>
<td></td>
<td>190</td>
<td>365</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: FFS, fee-for-service; HMO, health maintenance organization.
*Unless otherwise indicated, data are expressed as number (percentage) of patients.
†Fisher exact test was used.

### Table 3. Conditional Logistic Regression Results of Melanoma Stages at Diagnosis for Medicare-Aged HMO vs FFS Patients, 1985-1994*

<table>
<thead>
<tr>
<th>Melanoma Stage</th>
<th>Distant vs Earlier Stages</th>
<th>Regional vs Earlier Stages</th>
<th>Local vs In Situ Stages</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>0.46 (0.24-0.80)</td>
<td>0.58 (0.39-0.82)</td>
<td>0.72 (0.59-0.89)</td>
</tr>
<tr>
<td>Melanoma as primary cancer diagnosis</td>
<td>0.48 (0.25-0.84)</td>
<td>0.58 (0.36-0.85)</td>
<td>0.71 (0.57-0.89)</td>
</tr>
<tr>
<td>Melanoma as secondary or later cancer diagnosis</td>
<td>0.23 (0.00-2.26)</td>
<td>0.56 (0.17-1.37)</td>
<td>0.79 (0.44-1.43)</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; FFS, fee-for-service; HMO, health maintenance organization; OR, odds ratio.
*The FFS patients were the reference group.

### Table 4. Median Survival Times for Medicare-Aged Melanoma Patients by Insurance Enrollment Status and Stage of Melanoma at Diagnosis

<table>
<thead>
<tr>
<th>Melanoma Stage</th>
<th>Median Survival Time, mo</th>
<th>HMO</th>
<th>FFS</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>All stages</td>
<td>96.7</td>
<td>70.3</td>
<td>&lt;.01</td>
<td></td>
</tr>
<tr>
<td>Stage at diagnosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Localized</td>
<td>92.7</td>
<td>83.2</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td>29.0</td>
<td>31.4</td>
<td>.49</td>
<td></td>
</tr>
<tr>
<td>Distant</td>
<td>6.4</td>
<td>5.3</td>
<td>.19</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: FFS, fee-for-service; HMO, health maintenance organization.
*Calculated by the Gehan-Wilcoxon test.
These results are consistent with the findings of Riley et al., who demonstrated diagnosis of melanoma at an earlier stage during a 5-year period in patients enrolled in an HMO compared with those in an FFS plan. In this study, we have extended this observation to a longer period and demonstrated that the observed differences in survival are likely due to differences in stage at diagnosis between enrollees of the 2 health care delivery systems rather than differences in the actual health care delivery.

The results of this study are especially important in light of the prevalence of skin cancer in general and melanoma in particular. The incidence of skin cancer increases with advancing age, and with the progressive aging of the US population, it appears inevitable that the incidence of skin cancer will continue to rise in this country. Efforts at primary prevention for skin cancer in terms of limiting exposure to the presumed etiologic agent, in most cases UV light, are under way, but a significant lag time exists between primary exposure to UV light and the subsequent development of skin cancer. Therefore, current efforts at secondary prevention through screening and early detection are critical for the prevention of morbidity and mortality associated with melanoma.

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REFERENCES


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