Predicting Survival in the Advanced Cancer Patient

Robert J. Miller

Recommended Citation
Available at: https://scholarlycommons.henryford.com/hfhmedjournal/vol39/iss2/4
Predicting Survival in the Advanced Cancer Patient

Robert J. Miller, MD*

One of the unfortunate aspects of the Medicare hospice benefit has been the tendency to let the statutory requirements define hospice. The hospice benefit requires that physicians certify a patient as terminal, defined as a person with a medical prognosis of six months or less (1). Physicians have objected to this requirement, pointing out the difficulty of making such predictions accurately (2). A recent United States General Accounting Office study (3) on the Medicare hospice benefit noted the problems with this definition and recommended changes. The Health Care Financing Administration, however, has resisted changing the requirement, stating that patients need this information to have "a sound basis for choosing palliative rather than curative care" (1). Is it possible to comply with this requirement?

Predicting Survival

Studies show that even experts in terminal care have little ability to predict accurately time of survival for patients with advanced cancer (4-7). Most predictions are too optimistic (4.5). For patients with advanced disease, age, sex, and tumor histology become irrelevant; the best prognostic tool is the performance status, such as the Karnofsky score (KS) (4,8,9).

From the data of the National Hospice Study, Mor et al (8) found there was an increase in survival of 15 days for each increase in one KS level, with more variation or predictive error occurring at higher levels. It is clearly more difficult to predict survival with accuracy when patients are in a higher performance status, such as below 50 to 60 (Figure). By combining data that include KS and survival from several studies of patients with terminal cancer (4,8-11), an almost linear inverse relationship exists between survival and KS below 50 to 60, but a more unpredictable relationship persists above this level (Figure). Accordingly, this is not a problem until the KS falls below 50 or 60 (defined as a patient requiring considerable assistance or more specialized care) when a patient is likely to require hospice care. The Karnofsky Performance Status Scale and other commonly used host performance scales, including the American Joint Committee on Cancer host scale and the Eastern Cooperative Oncology Group scale, are shown in Table I.

Reuben et al (10) provide some practical data that clinicians may use to predict survival in patients with advanced cancer, based on performance status and key clinical symptoms (Tables 2A and 2B). In patients with advanced disease there is a common terminal syndrome; the specific tumor type or metastatic pattern is not important (12). For patients with advanced cancer referred for possible hospice care, use of these tables is appropriate. The survival of patients with incurable cancer and higher performance scores is less predictable and varies widely, based on tumor type and many other variables.

Common Cancers and Metastatic Patterns

Physicians concerned with palliative care are often expected to make accurate survival estimates for cancer patients. General guidelines to distinguish between incurable and terminal patients are needed.

In estimating mortality, understanding the tremendous impact of stage and severity of disease is critical, perhaps more so for cancer than any other condition (13). Much survival data available for patients with advanced cancer come from studies that have excluded the type of patients we see in hospice care (i.e., those with Karnofsky performance scores below 50 to 60), and much of this data may be misleading if applied to patients with very low performance status or advanced disease.
Bone metastases
As bone metastases are generally not life-threatening, their impact on survival is generally small. In patients with otherwise indolent disease (e.g., breast or prostate cancer), survival may be prolonged and prognosis is better judged from other criteria. Representative survival statistics from studies by the Radiation Therapy Oncology Group (14,15) demonstrated large variation in survival, with prolonged survival in breast cancer (73 weeks for single metastasis, 34 to 48 weeks for multiple metastases), intermediate survival in prostate cancer and most other histologies (39 and 33 weeks for single metastasis, 30 and 16 weeks for multiple metastases), and generally the shortest survival for lung cancer (14 weeks for single metastasis, 12 to 22 weeks for multiple metastases).

Brain metastases
The survival of untreated brain metastases is usually stated as 1 month with no treatment, 2 months with steroids only, and 3 to 4 months with palliative radiotherapy (16,17). Survival in patients selected for surgery is much longer.

Within the large series of patients treated with palliative radiotherapy, survival is related strongly to the underlying neurologic functional category (18,19) (working: 27 weeks; homebound: 17 weeks; hospitalized: 14 weeks; comatose: 5 weeks). Use of favorable criteria such as controlled primary tumor, no other distant metastases, age < 60 years, and performance score ≥ 70 can generate survival rates as short as 1.8 months (with none of these factors) to 7.4 months (with all of them) (20). Patients who respond to therapy can be expected to survive much longer (complete response: 33 to 49 weeks; partial response: 20 weeks; no response: 9 to 14 weeks) (18-21). Histology is not as important as functional state, for once these patients develop brain metastases the survival is similar (18,22,23).

Hepatic metastases
The survival of patients with untreated hepatic metastases is reported to be from 2.5 to 8 months (24,25). Much recent literature, which includes patients suitable for aggressive therapy with infusion pumps, reports survival of 13 to 25 months (26,27), with responders living much longer than nonresponders (31 months versus 16 months) (28). Patients treated by surgical resection may have prolonged survival, with as many as one-third surviving 5 years (25).

Survival based on the primary histology shows some variation (colon: 5 to 9 months; gastric: 6 months; breast: 6 months; pancreas: 2.4 months) (29). Data based on performance status or liver function provide for more accurate survival estimates (29,30) (16 months for KS ≥ 80 versus 7.2 months for KS < 80; 18.9 months if lactate dehydrogenase is ≤ 500 versus 8.6 months if lactate dehydrogenase is > 500). Degree of liver involvement also has prognostic significance (< 20%: 24.5 months; 21% to 40%: 13.6 months; 41% to 60%: 8.8 months; ≥ 60%: 6.1 months).

Breast cancer
In typical series of chemotherapy for metastatic breast cancer, survival ranges from 12 to 57 months (31-37), reflecting the marked variability as well as the frequently indolent nature of this disease.

Patients whose tumors are estrogen receptor-positive will survive longer than those whose tumors are estrogen receptor-negative (30 months versus 12 to 18 months) (38). Those who have a complete response to therapy have prolonged survival (36 to 47 months) (39).

The extent of disease and performance status affect survival as might be expected (KS 100: 34 weeks; KS 80-90: 24 to 27 weeks; KS 60-70: 14 to 21 weeks; KS 40-50: 7 to 9 weeks; KS 20-30: 3 to 5 weeks) (40).

Colon cancer
Some typical reports of survival of patients with colon cancer treated with current chemotherapy show wide variation (4 to 16 months) (41-47). Most of these patients succumb to hepatic metastases.

Lung cancer
The survival of patients with untreated inoperable lung cancer is from 8 to 36 weeks (48). With palliative doses of radiation survival is 20 to 26 weeks (49); with various chemotherapy regimens survival is 13 to 86 weeks (50,51). A patient with an excellent response to chemotherapy may live substantially longer than a patient with no response (e.g., 83 weeks versus 15 weeks) (52).

Table 1
Performance Status Scales

<table>
<thead>
<tr>
<th>Activity</th>
<th>AJCC</th>
<th>ECOG</th>
<th>KS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal activity</td>
<td>H0</td>
<td>0</td>
<td>90-100</td>
</tr>
<tr>
<td>Symptomatic but ambulatory</td>
<td>H1</td>
<td>1</td>
<td>70-80</td>
</tr>
<tr>
<td>Ambulatory &gt; 50%, some assistance needed</td>
<td>H2</td>
<td>2</td>
<td>50-60</td>
</tr>
<tr>
<td>Ambulatory &lt; 50%, nursing care needed</td>
<td>H3</td>
<td>3</td>
<td>30-40</td>
</tr>
<tr>
<td>Bedridden, may need hospitalization</td>
<td>H4</td>
<td>4</td>
<td>10-20</td>
</tr>
</tbody>
</table>

AJCC = American Joint Committee on Cancer, ECOG = Eastern Cooperative Oncology Group, KS = Karnofsky score.

Table 2A
Survival in Terminal Cancer Patients from the National Hospice Study*

<table>
<thead>
<tr>
<th>Karnofsky Score</th>
<th>Karnofsky Performance Groups</th>
<th>Survival by Performance Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-20</td>
<td>Moribund, requiring active support</td>
<td>16.8 days</td>
</tr>
<tr>
<td>30-40</td>
<td>Disabled, requiring special medical care</td>
<td>49.8 days</td>
</tr>
<tr>
<td>50+</td>
<td>Care for their own personal needs</td>
<td>86.1 days</td>
</tr>
</tbody>
</table>

Table 2B  
Survival with Terminal Cancer Based on Karnofsky Score and Key Symptoms

<table>
<thead>
<tr>
<th>Number of Symptoms</th>
<th>KS 10-20</th>
<th>Survival Period</th>
<th>KS 30-40</th>
<th>KS 50+</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>53 days</td>
<td>115 days</td>
<td>172 days</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>38-46 days</td>
<td>83-98 days</td>
<td>125-191 days</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>29-38 days</td>
<td>69-82 days</td>
<td>95-123 days</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>23-30 days</td>
<td>50-65 days</td>
<td>75-97 days</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>19-23 days</td>
<td>41-49 days</td>
<td>62-74 days</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>16 days</td>
<td>36 days</td>
<td>54 days</td>
<td></td>
</tr>
</tbody>
</table>


Table 3  
Classification of Treatments in Patients with Cancer

<table>
<thead>
<tr>
<th>Goal:</th>
<th>Curative</th>
<th>Palliative-Active</th>
<th>Palliative-Symptomatic</th>
<th>Supportive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor:</td>
<td>Cure</td>
<td>Prolong survival</td>
<td>Symptoms</td>
<td>Symptoms</td>
</tr>
<tr>
<td>Morbidity:</td>
<td>Eradicate</td>
<td>Arrest growth</td>
<td>Response</td>
<td>None</td>
</tr>
<tr>
<td>Psychological:</td>
<td>Major</td>
<td>Moderate</td>
<td>Minor</td>
<td>None</td>
</tr>
<tr>
<td>Hospice:</td>
<td>Win</td>
<td>Fight</td>
<td>Live with it</td>
<td>Surrender</td>
</tr>
<tr>
<td>KS 10-20</td>
<td>No</td>
<td>No</td>
<td>Maybe</td>
<td>Yes</td>
</tr>
<tr>
<td>KS 30-40</td>
<td>38-46 days</td>
<td>53 days</td>
<td>69-98 days</td>
<td>125-191 days</td>
</tr>
<tr>
<td>KS 50+</td>
<td>23-30 days</td>
<td>50-65 days</td>
<td>75-97 days</td>
<td>62-74 days</td>
</tr>
<tr>
<td>KS 70+</td>
<td>19-23 days</td>
<td>41-49 days</td>
<td>62-74 days</td>
<td>54 days</td>
</tr>
</tbody>
</table>

Performance status is critical in this group, and by utilizing such data Lanzotti et al (53) and Minna et al (54) were able to develop groups with survival from < 1 week to 30 weeks.

Prostate cancer

The survival of patients with metastatic prostate cancer is generally long, with 23% to 30% surviving 5 years (55,56). Median survival with hormonal therapy is 2 to 3 years, but once the cancer becomes resistant to hormones the patients live only 4 to 8 months (57,58). Performance status has less prognostic significance in patients receiving hormonal treatment (59).

Recommendations

With use of these data, physicians can be more accurate with survival estimates. However, there is need for better data, data that are more representative of the patients seen in the private setting. As community-based tumor registry data become available, we should have more accurate figures. These numbers may be useful to the physician but need not necessarily be shared with the patient.

One of the first rules of communicating with incurable patients is never give them a specific estimate of survival. When patients ask how much time they have left to live, it is generally wise to find out why they want to know. Often specific concerns, such as whether they should be placed on permanent disability or whether they can plan for their summer vacation, can be answered with some certainty. By clarifying the question we often can provide an answer that is honest and helpful to the patient but avoids the use of numbers which become fixed in the patient's mind, cause psychological distress, and are almost never correct anyway.

Nevertheless, we are required under Medicare to certify a patient as terminal with 6 months to live. Fortunately, this regulation has been modified with the addition of the phrase "...if the terminal illness runs its normal course" (60). This subtle but important change allows a doctor to say to a patient who has not given up the hope of living longer that "based on the stage of your disease you qualify for the hospice program, but knowing you, I'm betting you'll beat those numbers." This meets the legal requirements of the statutes but allows the physician to remain "on the patient's side" psychologically, to allow the patient to maintain hope, and to avoid "condemning" the patient.

The only "appropriate" terminal care is that which is consistent with the goals of the patient. Use of terms such as "palliative therapy" or "aggressive therapy" do not convey enough information to be useful. Understanding the patient's goals, mindset, and tolerance of morbidity is necessary in order to determine the appropriateness of therapy (Table 3).

References


