

Chemotherapy Use among Medicare Beneficiaries at the End of Life

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Background: Although many observers believe that cancer chemotherapy is overused at the end of life, there are no published data on this.

Objective: To determine the frequency and duration of chemotherapy use in the last 6 months of life stratified by type of cancer, age, and sex.

Design: Retrospective cohort analysis.

Setting: Administrative databases from Massachusetts and California.

Patients: All Medicare patients who died of cancer in Massachusetts and 5% of Medicare cancer decedents in California in 1996.

Measurements: Use of intravenous chemotherapy agents, chemotherapy administration, or medical evaluation for chemotherapy from Medicare billing data for each patient in 30-day periods from the date of death backward.

Results: In Massachusetts, 33% of cancer decedents older than 65 years of age received chemotherapy in the last 6 months of life, 23% in the last 3 months, and 9% in the last month. In California, the percentages were 26%, 20%, and 9%, respectively. Chemotherapy use greatly declined with age. Chemotherapy use was similar for patients with breast, colon, and ovarian cancer and those with cancer generally considered unresponsive to chemotherapy, such as pancreatic, hepatocellular, or renal-cell cancer or melanoma. Patients with types of cancer that are unresponsive to chemotherapy had shorter duration of chemotherapy use.

Conclusion: Among patients who died of cancer, chemotherapy was used frequently in the last 3 months of life. The cancer's responsiveness to chemotherapy does not seem to influence whether dying patients receive chemotherapy at the end of life.

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Many people are concerned that patients dying of cancer are frequently overtreated with chemotherapy (1–3). Indeed, some critics contend that oncologists prey on their patients' vulnerability, imply that chemotherapy is the vehicle of hope, and press patients to try it before reconciling themselves to death (4). As one managed care executive claimed: "My case managers are coming to me and saying that about half my patients are dying within 2 weeks of their last chemotherapy course. So where was the oncologist saying, 'it's time for palliative care?' . . . Instead [patients] continue to get treated, and treated, and treated (5)."

Oncologists respond that they use chemotherapy prudently only when it is likely to extend life or relieve symptoms and that it is terminally ill patients and their families who demand treatment.

Although there are some data on treatment of patients with metastatic cancer, data on how frequently patients with cancer receive chemotherapy in the months before death are lacking (6). Furthermore, there are no data on whether chemotherapy is used appropriately for cancer that responds to chemotherapy or for cancer for which chemotherapy is proven to relieve symptoms but not cancer unresponsive to chemotherapy. To provide such data, we examined the use of chemotherapy among Massachusetts and California Medicare beneficiaries who died of cancer.

METHODS

Data Sources

We obtained Medicare denominator (Medicare Provider Analysis and Review), outpatient, and carrier files from the Centers for Medicare & Medicaid Services

(CMS); death certificate information from Massachusetts; and a random 5% sample of Medicare beneficiaries in California.

Identifying the Study Sample

We studied fully entitled, fee-for-service Medicare beneficiaries in Massachusetts and California who died in 1996, were at least 66 years of age at death, and were not enrolled in Medicare's End Stage Renal Disease program. We merged CMS's denominator files with each state's 1996 death certificate files and selected decedents whose underlying cause of death was cancer. Among 42 452 decedents in Massachusetts, 7919 died of cancer and met all other eligibility criteria. In California, Medicare's 5% research sample encompassed 4715 decedents, including 956 study-eligible cancer decedents.

Identifying Chemotherapy Use

Chemotherapy was identified from claims in the inpatient, outpatient, or carrier Medicare files. Identifying codes were intravenous chemotherapy agents (Healthcare Common Procedure Coding System [HCPCS] codes 964xx, 965xx, and J9000 to 9999); chemotherapy administration (International Classification of Diseases, Ninth Revision [ICD-9], code 99.25, HCPCS codes Q0083 to Q0085); and medical evaluation for chemotherapy (ICD-9 codes V58.1, V66.2, and V67.2). Thus, we captured both hospital- and non-hospital-based chemotherapy administration, but could not capture (nonreimbursed) oral chemotherapeutic agents. We identified chemotherapy use for decedents in the six 30-day periods preceding death.

Context

Some worry that physicians prescribe chemotherapy for patients with cancer at the end of life even when treatment is unlikely to prolong life or palliate symptoms.

Contribution

Among the study sample of Medicare beneficiaries who died of cancer in 1996, the proportions that received chemotherapy were about 30%, 20%, and 10% in the last 6, 3, and 1 months of life. Chemotherapy use was similar for types of cancer that usually respond to chemotherapy and those that do not.

Implications

During the last 6 months of life, many Medicare beneficiaries with cancer receive chemotherapy, regardless of the type of cancer they have. Unfortunately, this study does not tell us why.

—The Editors

Statistical Analysis

Results are stated as percentages or means and standard deviations within groups with a reported denominator. Differences discussed are all statistically significant at a *P* value less than 0.05. Similarity statements are subjective assessments regarding clinical importance of magnitudes, not statistical tests. Statistical analyses were conducted by using SAS software, version 6.12 (SAS Institute, Inc., Cary, North Carolina).

Role of the Funding Source

This project was funded by the Department of Clinical Bioethics, Clinical Center, and National Institute of Aging, National Institutes of Health, which have no financial or other interests in the outcome. One author from the Department of Clinical Bioethics contributed to study design, conduct, and reporting.

RESULTS**Frequency of Chemotherapy in the Last Months of Life**

In 1996, 33% of Medicare cancer decedents in Massachusetts received chemotherapy in the last 6 months of life, 23% in the last 3 months of life, and 9% in the last month of life (Table 1). In California, the percentages were 26%, 20%, and 9%, respectively. Although chemotherapy use during the last 6 and 3 months is more common in Massachusetts than in California (33% vs. 26% [*P* < 0.001]; 23% vs. 20% [*P* = 0.036], respectively), chemotherapy use in the last month of life is similar for the two states (9% vs. 9%; *P* > 0.2).

Table 1 shows the proportion of patients with each type of cancer who received chemotherapy in the last months of life. Patients who died of hematologic malignant conditions received chemotherapy most frequently. In

both states, patients with breast, colon, or ovarian cancer, which tend to be more responsive to chemotherapy, received chemotherapy about as often as patients with less responsive tumors, such as pancreatic, hepatocellular, or renal-cell cancer or melanoma. None of the patients dying of melanoma or renal-cell cancer in Massachusetts received interferon- α in the last 3 months of life.

In both states, chemotherapy use decreases significantly with increasing age (Table 1). The use of chemotherapy is two to three times greater for Massachusetts patients 65 to 74 years of age than for patients 85 years of age and older and more than four times higher for the youngest versus oldest age groups in California (Massachusetts: 44% [65 to 74 years of age], 31% [75 to 84 years of age], 16% [\geq 85 years of age] [*P* < 0.001 for trend]; California: 39% [65 to 74 years of age], 25% [75 to 84 years of age], 8% [\geq 85 years of age] [*P* < 0.001 for trend]). This decrease in chemotherapy use by age was seen across cancer types and for both men and women (Appendix Table, available at www.annals.org).

Duration of Chemotherapy in the Last Months of Life

Among Massachusetts patients receiving chemotherapy in the last 6 months of life, 41% received no more than 1 month of chemotherapy, 36% received 1 to 3 months of chemotherapy, and 23% received more than 3 months of chemotherapy (Table 2). Mean duration of chemotherapy use was somewhat shorter for men than women (2.2 months for men vs. 2.5 months for women; *P* = 0.003), and decreased significantly with age (2.5 months for patients 65 to 74 years of age, 2.3 months for patients 75 to 84 years of age, and 1.9 months for patients \geq 85 years of age; *P* < 0.001 for trend). Only about one third of patients with breast, colon, or ovarian cancer received chemotherapy for 1 month or less; in contrast, half or more of patients with pancreatic, hepatocellular, or renal-cell cancer or melanoma received chemotherapy for 1 month or less (Table 2).

DISCUSSION

This study examined chemotherapy use for Medicare cancer decedents in Massachusetts and California in their final months of life. Overall, more than one quarter of patients received chemotherapy in the last 6 months of life and more than 20% received chemotherapy in the last 3 months of life. Furthermore, because of the significantly greater use of chemotherapy in the last months of life at younger ages, chemotherapy use is likely to be even higher among all cancer decedents. Nevertheless, these data suggest that the claim that half of patients dying of cancer received chemotherapy within the last few weeks of life is exaggerated (5). Even among patients with hematologic malignant conditions, fewer than 20% received chemotherapy in their last month of life.

Patients with pancreatic, hepatocellular, or renal-cell cancer or melanoma, which tend to be unresponsive to

Table 1. Characteristics of Cancer Decedents in Massachusetts and California by Receipt of Chemotherapy in the Last 6 Months of Life

Characteristic	Patients in Massachusetts				Patients in California			
	Patients	Receiving Chemotherapy in the Last 6 Months of Life (n = 2625)	Receiving Chemotherapy in the Last 3 Months of Life (n = 1854)	Receiving Chemotherapy in the Last Month of Life (n = 715)	Patients	Receiving Chemotherapy in the Last 6 Months of Life (n = 253)	Receiving Chemotherapy in the Last 3 Months of Life (n = 191)	Receiving Chemotherapy in the Last Month of Life (n = 85)
	n	%			n	%		
Men	3863	35	22	10	437	30	24	11
Women	4056	31	26	8	519	23	1	7
Age								
65–74 y	2926	44*	32	12	323	39*	31	12
75–84 y	3392	31*	22	8	444	25*	18	9
≥85 y	1601	16*	11	5	189	8*	6	3
All types of cancer	7919	33†	23‡	9§	956	26†	20‡	9§
Breast	612	32	22	8	73	27	19	7
Colon	846	32	23	7	79	18	9	1
Ovarian	169	47	30	7	23	43	39	22
Pancreas	408	33	25	8	52	27	23	8
Hepatocellular and gall bladder	231	29	20	8	26	19	19	12
Renal cell	147	29	22	7	15	13	13	7
Melanoma	84	30	21	10	15	33	20	7
Lung	2003	28	19	7	280	23	17	8
Prostate	602	39	28	10	83	37	27	13
Hematologic	760	51	42	19	112	36	29	14
Other	2057	30	20	9	198	2	19	9

* Test for trend, $P < 0.001$.

† Massachusetts and California comparison rate, $P < 0.001$.

‡ Massachusetts and California comparison rate, $P = 0.036$.

§ Massachusetts and California comparison rate, $P > 0.2$.

|| Includes all acute and chronic leukemias, non-Hodgkin lymphomas, and Hodgkin disease but excludes multiple myeloma.

chemotherapy, were just as likely to receive chemotherapy in the last 6 months of life as patients with breast, colon, or ovarian cancer, which tend to be responsive to chemotherapy (7, 8). However, decedents with cancer unresponsive to chemotherapy were somewhat more likely to have only a short course of therapy. These findings suggest some selectivity in chemotherapy use at the end of life on the basis of the cancer's responsiveness to chemotherapy. It is possible that after one therapy cycle, many patients and oncologists are convinced by ineffectiveness or the side effects to stop treatment for cancer unresponsive to chemotherapy. Nevertheless, many patients receiving chemotherapy for unresponsive cancer, such as pancreatic and hepatocellular cancer, received chemotherapy during 4 or more of the final 6 months of life. Although phase II data showing greater than 20% tumor responsiveness to chemotherapy can be cited for almost any cancer, "most studies to date with single-agent or combination chemotherapy have shown little impact on quality of life or survival" of the tumors typically classified as unresponsive (7, 8).

Many reasons may explain chemotherapy use at the end of life. Desperate patients and families may demand a "trial" to see whether chemotherapy might shrink the tumor; indeed, patients with cancer are often willing to endure substantial side effects for small prolongations in life (9, 10). Lacking an established relationship and confronting an emotionally distraught patient and family, oncologists

may provide one cycle of chemotherapy while the patient and family adjust to the diagnosis and prognosis. More than half of the patients receiving chemotherapy for unresponsive cancer received 1 month of chemotherapy or less, which supports this explanation.

Another potential explanation is that chemotherapy may improve quality of life and palliate symptoms (11, 12). Some data demonstrate the palliative effect of chemotherapy for advanced lung, colon, and other types of cancer (13–17). That palliative effects can occur without objective tumor responses suggests that they may be related to patient expectations (18). The intention to palliate symptoms is a valid use of chemotherapy at the end of life.

Other reasons for the use of chemotherapy at the end of life might include uncertain prognosis, uncertain responsiveness of the cancer to chemotherapy, and use of experimental chemotherapies. While the exact date of death cannot be predicted, advanced cancer (unlike the terminal phases of chronic obstructive pulmonary disease or heart failure) tends to have monotonic, unremitting decline to death despite interventions (19). Typically, within the last three months of life oncologists can predict with reasonable certainty that the patient will die shortly, regardless of treatment. Finally, although some patients may be receiving experimental chemotherapy, this is rare among Medicare beneficiaries, who are frequently ineligible because of age and comorbid conditions.

The relatively high use of chemotherapy shown by our data contrasts with documented underuse of chemotherapy proven to prolong survival. For instance, only 55% of Medicare beneficiaries received adjuvant chemotherapy for stage III colon cancer (20). Indeed, among 85-year-old patients, the use of chemotherapy for stage III colon cancer is 11%, comparable to chemotherapy use in the final 3 months of life for 85-year-old patients with colon, pancreatic, or hepatocellular cancer (11%, 12%, and 15% respectively [Appendix Table]).

Although the absolute use of chemotherapy at the end of life differs somewhat between California and Massachusetts, the patterns of use are similar. These findings should be confirmed in national data.

This study has substantial limitations. First, the California data, while a random sample, contain few cases with specific tumor types. Second, the data may not be generalizable. Chemotherapy use among dying patients younger than 65 years of age might be different. However, the strong trend toward greater use of chemotherapy with decreasing age in patients older than 65 years of age suggests these data might actually underestimate chemotherapy use. Third, our study excluded patients enrolled in managed care plans, where chemotherapy use might differ. Fourth, we have no data on oral chemotherapy use, which could only increase the proportion of patients receiving chemotherapy at the end of life. Fifth, death certificates may be insensitive, albeit specific, for identifying cancer as the underlying cause of death. Finally, we have not examined other important factors, such as stage of disease, conditions, or functional status, that might explain differences

between patients receiving and not receiving chemotherapy. Even the CMS–Surveillance, Epidemiology, and End Results linked data would not provide the relevant clinical data since its data on chemotherapy use are not reliable and do not provide clinical descriptions of patients in the last months of life.

There are no data about whether chemotherapy is used appropriately in patients near the end of life. This study found that one third of Medicare beneficiaries who died of cancer received chemotherapy in their last 6 months of life with essentially no difference in the prevalence of use between persons with cancer responsive to chemotherapy and cancer unresponsive to chemotherapy. Chemotherapy use in the final months of life deserves further study.

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Table 2. Massachusetts Cancer Decedents Receiving Chemotherapy in the Last 6 Months of Life and Duration of Chemotherapy

Characteristic	Patients <i>n</i>	Duration of Chemotherapy			Mean Duration of Chemotherapy ± SD <i>mo</i>
		≤1 Month ←	>1 to 3 Months %	>3 Months →	
Men	1361	38	36	26	2.2 ± 1.4*
Women	1264	45	36	19	2.5 ± 1.6*
Age					
65–74 y	1305	35	39	26	2.5 ± 1.5†
75–84 y	1060	44	35	21	2.3 ± 1.5†
≥85 y	260	59	28	13	1.9 ± 1.3†
All types of cancer	2625	41	36	23	2.4 ± 1.5
Breast	198	32	39	29	2.6 ± 1.5‡
Colon	274	35	41	24	2.5 ± 1.5§
Ovarian	80	29	39	32	2.8 ± 1.6
Pancreas	136	49	34	17	2.1 ± 1.4‡
Hepatocellular and gall bladder	66	59	21	20	2.1 ± 1.5§
Renal cell	43	51	37	12	2.0 ± 1.3
Melanoma	25	56	36	8	1.8 ± 1.2
Lung	567	45	39	16	2.2 ± 1.4
Prostate	236	30	31	39	3.0 ± 1.7
Hematologic	390	32	39	29	2.7 ± 1.6
Other	610	50	33	13	2.1 ± 1.4

* $P = 0.003$.

† $P < 0.001$; trend for men, $P = 0.003$; trend for women, $P < 0.001$.

‡ Breast vs. pancreatic cancer comparison, $P < 0.001$.

§ Colon vs. hepatocellular and gall bladder cancer comparison, $P = 0.013$.

|| Includes all acute and chronic leukemias, non-Hodgkin lymphomas, and Hodgkin disease but excludes multiple myeloma.

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Appendix Table. Massachusetts Cancer Decedents Receiving Chemotherapy in the Last 3 Months of Life, by Cancer Type and Age

Type	Patients <i>n</i>	Patients, Age 65–74 y (<i>n</i> = 2926)	Patients, Age 75–84 y (<i>n</i> = 3392)	Patients, Age ≥85 y (<i>n</i> = 1601)
		← % →		
All types of cancer	1854	32	22	11
Breast	135	38	19	7
Colon	191	33	23	11
Ovarian	51	43	22	17
Pancreas	101	33	24	12
Hepatocellular and gall bladder	47	23	21	15
Renal cell	33	36	15	10
Melanoma	18	27	19	13
Lung	371	28	12	6
Prostate	170	32	34	11
Hematologic*	321	54	44	17
Other	416	26	20	11

* Includes all acute and chronic leukemias, non-Hodgkin lymphomas, and Hodgkin disease but excludes multiple myeloma.