

Complementary and Alternative Medicine Provider Use and Expenditures by Cancer Treatment Phase

William E. Lafferty, MD; Patrick T. Tyree, AA; Sean M. Devlin, MA;
M. Robyn Andersen, PhD, MPH; and Paula K. Diehr, PhD

Objective: To assess the use of complementary and alternative medicine (CAM) providers and the associated expenditures by specific treatment phases among patients with cancer.

Study Design: Cross-sectional analysis of medical services utilization and expenditures during the 3 therapeutic phases of initial, continuing, and end-of-life treatment.

Methods: Analysis of an insurance claims database that had been matched to the Washington State Surveillance, Epidemiology, and End Results cancer registry.

Results: Of 2900 registry-matched patients, 63.2% were female, the median age was 54 years, and 92.7% were of white race/ethnicity. Breast cancer was the most frequent diagnosis (52.7%), followed by prostate cancer (24.7%), lung cancer (10.1%), colon cancer (7.0%), and hematologic malignancies (5.6%). Patients using CAM providers represented 26.5%. The proportion of patients using CAM was similar during each treatment phase. All patients used some conventional care. Age, female sex, breast cancer diagnosis, and white race/ethnicity were significant predictors of CAM use. Diagnosis of a musculoskeletal problem occurred at some time during the study for 72.1% of patients. CAM provider visits represented 7.2% of total outpatient medical visits, and 85.1% of CAM visits resulted in a musculoskeletal diagnosis. Expenditures for CAM providers were 0.3%, 1.0%, and 0.1% of all expenditures during the initial, continuing, and end-of-life phases, respectively.

Conclusions: For patients with cancer, musculoskeletal issues were the most commonly listed diagnosis made by a CAM provider. Although expenditures associated with CAM are a small proportion of the total, additional studies are necessary to determine the importance that patients place on access to these services.

(*Am J Manag Care.* 2008;14(5):326-334)

For author information and disclosures, see end of text.

Cancer is the second leading cause of death in the United States.¹ The American Cancer Society² estimated that in 2007 more than 1.4 million new cancer cases would be diagnosed and that more than 500,000 persons would die of this disease. Cancer treatment costs are substantial because of the direct cost of new increasingly expensive treatments³ and the enormous indirect costs associated with time spent during treatment for patients and their family members.⁴ Patient surveys have shown that some of these expenditures are for complementary and alternative medicine (CAM) providers, as more than 70% of patients with cancer will use some form of CAM after the diagnosis of cancer and at least 16% of patients with cancer visit a CAM provider.⁵ The use of CAM by patients with cancer is associated with treatment of specific symptoms,⁶⁻¹¹ female sex, diagnosis of breast cancer, and white race/ethnicity.¹²

Previous health services research studies have grouped conventional provider utilization and expenditures for cancer care based on intervals after diagnosis. To accomplish this, Medicare datasets have been matched to cancer registry data.^{13,14} This adds diagnostic detail and mortality end points that are present in registry data to claim-based administrative data. These registry-matched cancer studies have documented healthcare utilization by treatment phase (during the initial 12 months following diagnosis, during the last year of life, and during the continuing period between these 2 phases).⁴ Utilization analysis during each phase captures a different picture of cancer care than a single cross-sectional evaluation. To our knowledge, this type of evaluation has not been performed to assess the use of CAM providers for cancer treatment.

Historically, third-party payment records have been a poor choice for studying CAM provider services because CAM care has traditionally been paid for out-of-pocket¹⁵ and because large public payers (such as Medicare) do not cover most CAM provider services. Some states have taken legislative steps to change this and to integrate CAM providers into mainstream healthcare finance.^{16,17} In 1996, Washington State passed legislation requiring every category of licensed healthcare provider to be covered by private insurance. This mandated the inclusion of acupuncturists, naturopathic physicians, and massage therapists into commercial

In this issue
Take-away Points / p333
www.ajmc.com
Full text and PDF
Web exclusive
eAppendix

Medicine Provider Use and Expenditures by Cancer Treatment Phase

insurance products; legislative mandates in 1983 had already covered chiropractors.¹⁸ Therefore, Washington State's mandate for CAM coverage created a large bank of insurance claims data in which CAM providers have been consistently covered since 2000. Matching enrollment and claims data from a subset of individuals who were privately insured from 2000 to 2004 to the Fred Hutchinson Cancer Research Center's western Washington State Surveillance, Epidemiology, and End Results (SEER) cancer registry identified a cohort of patients with insurance claims and registry information. These data were used to assess the factors that predict CAM use by distinct therapeutic phases, the medical reasons for CAM use during these phases, and the proportion of expenditures resulting from CAM provider care.

METHODS

Population

This study was approved by the institutional review boards of the University of Washington and the Fred Hutchinson Cancer Research Center. Eligible participants consisted of registry-matched patients with cancer aged 18 to 64 years who were diagnosed as having breast, colorectal, hematologic, lung, or prostate cancer from January 2000 through December 2003 and had no prior cancer diagnosis. In addition, eligibility criteria included having insurance coverage at the time of diagnosis and maintaining coverage at least 12 months after diagnosis or (in the situation of survival of <1 year) maintaining contiguous coverage from diagnosis to death. A large private provider of multiple insurance product types supplied the insurance data.

Data

The researchers received separate insurance files with enrollment and medical claims (utilization and expenditures) data for 2000 through 2004. The techniques used to process these data and to define study variables have been previously described.¹⁹ CAM providers included chiropractors, naturopathic physicians, massage therapists, and acupuncturists. CAM and conventional provider visits were defined as outpatient if they occurred at a hospital-based outpatient clinic or at a provider's office.²⁰ The participants' ZIP codes of residence were classified as urban vs nonurban using the rural-urban commuting area method.²¹ *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* codes were categorized into major diagnosis categories using *The Johns Hopkins Adjusted Clinical Groupings Case-Mix System* software.²² All expenditures represent adjusted 2004 dollars based on the consumer price index for medical care.²³

Chemotherapy, radiation therapy, and surgery were defined by *Current Procedural Terminology*²⁴ codes (eAppendix; available at <http://www.ajmc.com>).

Participants were identified through a confidential link of the insurance data and the SEER cancer registry. At the time of the link, SEER maintained diagnosis and death information from 1974 through 2006 and covered 13 western Washington State counties. The features of this registry have been previously described.²⁵ Cancer site and stage at diagnosis, as well as the diagnosis and death dates, were taken from the SEER records. Cancer stage was grouped as local (in situ and localized) and as all other.

Participants' healthcare utilization data were categorized into the following 3 clinically relevant therapeutic phases: initial, continuing, and end-of-life treatment. The treatment phase definitions were based on the study by Yabroff et al⁴; exceptions to their model are described herein. The initial phase represented the first 12 months after diagnosis, the end-of-life phase represented the 12 months preceding death, and the continuing phase represented the time between initial and end-of-life treatment. For patients surviving less than 24 months, the last 12 months were assigned to end-of-life treatment, and the remaining months were assigned to the initial phase; the continuing phase was not represented in this scenario. Unlike Yabroff et al,⁴ the end-of-life phase was defined as diagnosis through death when survival was 12 months or less. When participants survived longer than 12 months after the available insurance data, the end point for the continuing phase was December 2004; otherwise, the end point was 12 months before the date of death. The number of continuing months ranged from 1 to 48 months (median, 16 months; mean, 19.0 months). To approximate the length of the initial and end-of-life phases for analysis of expenditures, the data in the continuing phase were adjusted to an annual figure by taking each individual's monthly mean in that phase and multiplying by 12. Data were not adjusted in the initial or end-of-life phases. Unlike Yabroff et al,⁴ no modifications were made to the length of initial stage based on cancer diagnosis.

Statistical Analysis

Logistic regression analysis assessed the potential predictors of CAM use during each study phase. Separate regression analyses were performed for each predictor of interest because no adjustments were made for other covariates. Odds ratios were considered statistically significant at $P < .05$, corresponding to a 95% confidence interval (CI) not containing 1.0. No adjustments were made for multiple comparisons. All analyses were performed using commercially available statistical soft-

■ **Table 1.** Population and Sample

Variable	No. (%)			
	Initial Phase (n = 2697)	Continuing Phase (n = 2458)	End-of-life Phase (n = 310)	Aggregated Phases (n = 2900)
Age at diagnosis, median, y	54	54	55	54
Demographics				
Female sex	1744 (64.7)	1612 (65.6)	148 (47.7)	1834 (63.2)
Urban residence	2492 (92.4)	2276 (92.6)	284 (91.6)	2680 (92.4)
White race/ethnicity	2496 (92.5)	2274 (92.5)	286 (92.3)	2687 (92.7)
Cancer type				
Breast	1516 (56.2)	1422 (57.9)	34 (11.0)	1527 (52.7)
Prostate	707 (26.2)	645 (26.2)	14 (4.5)	715 (24.7)
Lung	152 (5.6)	115 (4.7)	182 (58.7)	292 (10.1)
Colorectal	184 (6.8)	162 (6.6)	37 (11.9)	204 (7.0)
Hematologic	138 (5.1)	114 (4.6)	43 (13.9)	162 (5.6)
Local stage at diagnosis	1843 (68.3)	1714 (69.7)	25 (8.1)	1855 (64.0)
Insurance features at diagnosis				
Product type				
Preferred provider	1460 (54.1)	1332 (54.2)	175 (56.5)	1575 (54.3)
Point of service	986 (36.6)	895 (36.4)	113 (36.5)	1060 (36.6)
Other ^a	251 (9.3)	231 (9.4)	22 (7.1)	265 (9.1)
Policy type				
Group	2358 (87.4)	2152 (87.6)	256 (82.6)	2526 (87.1)
Individual	339 (12.6)	306 (12.4)	54 (17.4)	374 (12.9)
Use of complementary and alternative medicine providers				
Any ^b	525 (19.5)	536 (21.8)	55 (17.7)	769 (26.5)
Chiropractor	337 (12.5)	389 (15.8)	37 (11.9)	537 (18.5)
Naturopathic physician	176 (6.5)	118 (4.8)	19 (6.1)	224 (7.7)
Massage therapist	92 (3.4)	103 (4.2)	3 (1.0)	155 (5.3)
Acupuncturist	68 (2.5)	79 (3.2)	5 (1.6)	123 (4.2)

^aIncludes health maintenance organization and traditional indemnity.

^bIncludes any use of chiropractor, naturopathic physician, massage therapist, or acupuncturist.

ware (STATA version 9.2; StataCorp LP, College Station, Texas).²⁶

RESULTS

Population and Sample

Of 900,000 persons with private insurance coverage from 2000 to 2004, 2900 were registry-matched patients with cancer who met the study criteria. The study population is summarized in **Table 1**. In the cohort, 93.0%, 84.8%, and 10.7% of participants had data for the initial, continuing, and end-of-life

phases, respectively. Most participants were urban, female, and of white race/ethnicity. Breast cancer accounted for more than 52.7% of all cancer diagnoses, followed by prostate, lung, colorectal, and hematologic malignancies. Patients with lung cancer accounted for 58.7% of patients in the end-of-life treatment phase. The median age of all patients at diagnosis was 54 years, and almost two-thirds of participants were diagnosed as having localized cancer. Point-of-service plans, preferred provider organizations, and group policies were the predominant forms of coverage. Patients with at least 1 claim from a CAM provider accounted for 26.5% of the cumulative

Medicine Provider Use and Expenditures by Cancer Treatment Phase

■ **Table 2.** Predictors of Complementary and Alternative Medicine Provider Use^a

Variable	Odds Ratio (95% Confidence Interval)			
	Initial Phase (n = 2697)	Continuing Phase (n = 2458)	End-of-life Phase (n = 310)	Aggregated Phases (n = 2900)
Cancer type				
Colorectal	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Prostate	1.13 (0.71-1.81)	1.28 (0.79-2.09)	1.16 (0.32-4.21)	1.09 (0.74-1.61)
Lung	1.31 (0.72-2.38)	1.05 (0.53-2.07)	0.30 (0.13-0.68)	0.90 (0.57-1.42)
Hematologic	1.41 (0.77-2.58)	1.61 (0.86-3.03)	0.48 (0.17-1.34)	1.35 (0.82-2.20)
Breast	1.85 (1.19-2.87)	2.04 (1.29-3.22)	0.54 (0.18-1.59)	1.82 (1.27-2.60)
Stage at diagnosis				
Local	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Nonlocal	1.17 (0.96-1.43)	1.00 (0.81-1.23)	0.85 (0.30-2.38)	1.00 (0.84-1.19)
Age at diagnosis				
	0.98 (0.97-0.99)	0.97 (0.95-0.98)	0.98 (0.95-1.02)	0.97 (0.96-0.98)
Sex				
Male	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Female	1.65 (1.33-2.03)	1.68 (1.36-2.08)	2.00 (1.10-3.64)	1.79 (1.49-2.14)
Race/ethnicity				
Nonwhite	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
White	1.85 (1.20-2.87)	1.84 (1.20-2.84)	1.56 (0.45-5.41)	1.78 (1.24-2.56)
Residence				
Urban	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Nonurban	1.20 (0.82-1.76)	1.11 (0.74-1.65)	1.28 (0.41-4.02)	1.21 (0.86-1.69)
Product type				
Point of service	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Preferred provider	1.12 (0.91-1.38)	1.14 (0.92-1.40)	0.61 (0.33-1.11)	1.09 (0.92-1.31)
Other	1.27 (0.90-1.78)	1.47 (1.05-2.05)	0.33 (0.07-1.53)	1.37 (1.02-1.84)
Policy type				
Individual	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Group	1.09 (0.81-1.46)	1.58 (1.14-2.18)	1.10 (0.50-2.40)	1.18 (0.92-1.52)

^aOdds ratios examined the association between the predictor of interest and complementary and alternative medicine use and were not adjusted for other covariates.

cohort of patients with cancer. The use of different CAM provider types was not mutually exclusive. Chiropractors were the most commonly used CAM provider. The prevalence of CAM claims was higher, although not statistically significantly so, in the continuing phase (21.8%) and in the initial phase (19.5%) compared with the end-of-life phase (17.7%). All patients used some form of conventional care.

Predictors of and Reasons for CAM Use

Table 2 gives potential predictors of CAM use during each of the 3 treatment phases. The estimated odds ratio (OR) of

CAM use for patients diagnosed as having breast cancer was significantly higher than that for patients diagnosed as having colorectal cancer during the initial phase (OR, 1.85; 95% CI, 1.19-2.87) and during the continuing phase (OR, 2.04; 95% CI, 1.29-3.22). The estimated OR of CAM use was not significantly different for patients with hematologic malignancies, prostate cancer, lung cancer, and colorectal cancer. No significant differences were found between the estimated OR of CAM use for patients presenting with local cancer compared with that of patients presenting with nonlocal cancer during the initial phase (OR, 1.17; 95% CI, 0.96-1.43). The estimat-

■ CLINICAL ■

ed OR for CAM utilization was marginally lower for older patients during the initial and continuing phases. Patients having group policies had higher odds of CAM use compared with patients having individual policies during the continuing phase only (OR, 1.58; 95% CI, 1.14-2.18). Patients with an insurance product other than a preferred provider organization or a point-of-service plan had slightly higher CAM use in the continuing phase and for the aggregated phases than patients with a point-of-service plan. CAM use did not vary significantly between individuals residing in urban vs nonurban settings.

Female sex was positively associated with CAM use during all 3 treatment phases. The OR of CAM use among women for the aggregated phases was estimated to be 1.79 (95% CI, 1.49-2.14) times the OR of CAM use among men. Adjusting for a musculoskeletal diagnosis, the estimated OR of CAM use between men and women remained statistically significant (OR, 1.54; 95% CI, 1.27-1.86). Stratifying on cancers common among men and women (colorectal, hematologic, and lung cancers), the odds of CAM use for women was estimated to be 80% higher than the odds for men (OR, 1.82; 95% CI, 1.24-2.66).

Visits to CAM providers accounted for 13,858 outpatient medical care visits (7.2%) during the study as follows: chiropractic (4.7%), massage therapy (1.1%), naturopathic physician (0.8%), and acupuncture (0.6%) (data not shown). For patients who used CAM, the median number of CAM visits was 6 during the initial phase, 6 during the continuing phase, and 2 during the end-of-life phase. Because of the high acuity of conventional care during the initial and end-of-life phases, CAM provider visits were a small proportion of all outpatient provider visits (4.9% and 2.1%, respectively). In contrast, CAM provider visits represented 11.9% of all total visits during the continuing phase.

Table 3 gives the diagnoses associated with CAM and conventional medical care visits during all phases of the study. The diagnostic information at each visit indicated that during the study 2092 patients with cancer (72.1%) saw an outpatient provider for a musculoskeletal complaint, accounting for 23,038 visits (12.0%). Musculoskeletal diagnoses were recorded at 11,800 CAM visits (85.1%) and accounted for almost all visits to chiropractors, massage therapists, and acupuncturists. Similar to conventional providers, naturopathic physicians assigned a broader array of diagnoses and recorded a cancer diagnosis at 800 patient visits (49.5%). Naturopathic physicians frequently assigned diagnoses that are used to indicate symptom management. For example, a neurologic diagnosis is often used for headaches, female reproductive diagnoses are given for menopause treatment issues, and the category of

general signs and symptoms frequently indicates debility and undue fatigue.

Among 895 patients receiving chemotherapy, 455 (50.8%) had a diagnosis of nausea or vomiting; 26 of these (5.7%) visited an acupuncturist (data not shown). For patients receiving chemotherapy, the estimated OR of receiving acupuncture was not significantly different for individuals with nausea or vomiting vs individuals without nausea or vomiting (OR, 1.51; 95% CI, 0.81-2.82). Approximately 3.9% of all study participants' visits to an acupuncturist were for nausea or vomiting.

Diagnostic codes for lymphedema were recorded for 240 women (15.7%) with breast cancer. Of these, 29 (12.1%) were treated by a massage therapist and 155 (64.6%) by a physical or occupational therapist. Comparing women with and without lymphedema, the estimated OR of massage therapy was 58% higher for women with lymphedema (OR, 1.58; 95% CI, 1.02-2.45). Among women with breast cancer, the OR of visiting a massage therapist was estimated to be 3.71 (95% CI, 2.78-4.94) times higher for women with lymphedema compared with women without lymphedema.

Expenditures and Use of CAM and Conventional Services by Treatment Phase

The mean per capita expenditures and the relative contribution of selected services for each treatment phase are shown in the **Figure**. The least expensive phase for cancer treatment was the continuing phase, which we estimated to result in \$12,429 of annual expenditures. Expenditures for the initial phase were \$38,587, and the most costly interval (the end-of-life phase) resulted in \$115,994 per capita expenditures. Inpatient hospital and outpatient provider expenditures for conventional treatments accounted for more than 50% of all expenditures during each treatment phase. Expenditures for inpatient and hospice care were proportionately higher during the end-of-life phase than they were in the other treatment phases. Although 179 patients (57.7%) who died used hospice at the end of life, only 1.6% of end-of-life expenditures were for this service.

Expenditures for CAM providers were a small portion of overall expenditures, as shown in the **Figure**. CAM providers accounted for 1% or less of total healthcare expenditures during all 3 treatment phases. As a proportion of outpatient provider charges only, CAM services accounted for 1.2%, 3.1%, and 0.4% of the initial, continuing, and end-of-life phases, respectively (data not shown). CAM outpatient provider expenditures were 1.5% of the total outpatient provider expenditures during the entire study period.

Medicine Provider Use and Expenditures by Cancer Treatment Phase

■ **Table 3.** Diagnoses Assigned by Conventional or Complementary and Alternative Medicine Providers^a

Variable	%				
	Outpatient Conventional Provider (n = 178,603)	Chiropractor (n = 8958)	Naturopathic Physician (n = 1617)	Massage Therapist (n = 2113)	Acupuncturist (n = 1170)
Malignancies	59.6	—	49.5	6.0	4.3
Administrative ^b	21.2	—	9.1	1.0	1.5
General surgery ^c	9.4	—	14.8	3.0	2.4
Musculoskeletal	6.3	100.0	15.8	83.9	69.9
Cardiovascular	5.4	—	6.5	4.5	0.5
General signs and symptoms	5.1	—	23.5	2.4	16.2
Hematologic	5.1	—	5.6	—	0.5
Respiratory	4.1	—	5.0	—	1.2
Allergy	4.1	0.3	6.9	—	1.1
Skin	3.0	0.3	4.8	1.2	0.7
Gastrointestinal/hepatic	2.5	—	16.0	—	4.0
Endocrine	2.5	—	10.3	0.5	—
Neurologic	2.4	8.9	10.3	9.0	15.0
Genitourinary	2.4	—	2.0	—	0.9
Female reproductive	2.0	—	9.5	—	2.1
Psychosocial	1.7	—	3.0	0.5	4.9

^aData are given as percentage of visits to that provider type with that diagnosis (limited to diagnoses that account for at least 2% of visits to any provider type [diagnoses are not mutually exclusive and do not sum to 100%]). Data are limited to hospital-based outpatient clinic or provider office visits at which the provider assigned a diagnosis. The n values represent the number of visits to that provider type.

^bIncludes preventive care, administrative concerns and nonspecific laboratory abnormalities, surgical aftercare, and transplantation status.

^cConditions that often lead to a surgical procedure performed by a conventional provider and not elsewhere classifiable (eg, hemorrhoids, appendicitis, and hernia).

DISCUSSION

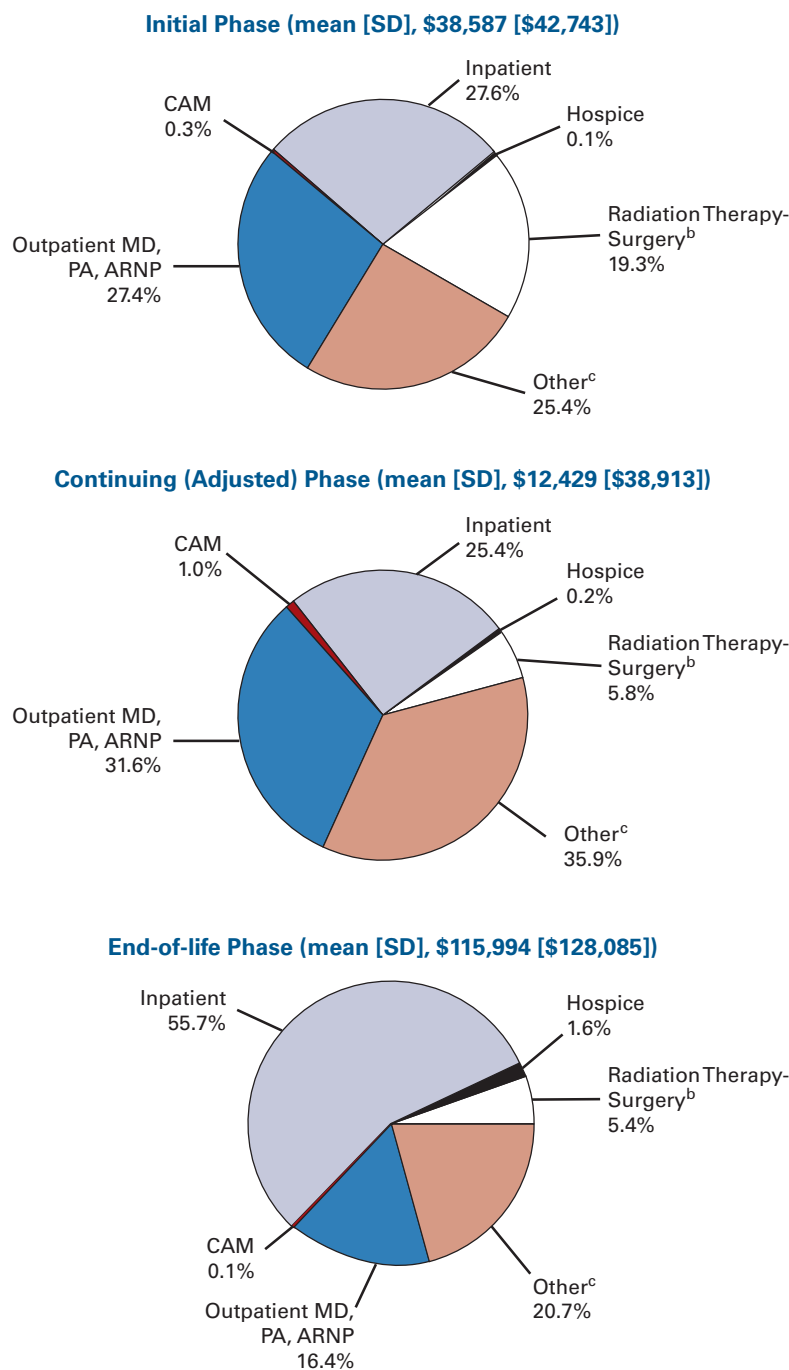
Under the Washington State model (where most patients can self-refer for many CAM services), CAM provider visits accounted for 7.2% of all outpatient provider visits, and the associated expenditures were small for each treatment phase when CAM provider expenditures were compared with standard categories of conventional service. CAM providers represented a slightly higher proportion of expenditures when outpatient provider charges were evaluated separately. The proportion of patients with cancer using CAM providers was similar in each treatment phase, indicating that these providers have a consistent role in the medical care of patients with cancer. Because all of our patients with cancer were also using conventional providers and because CAM provider visits usually resulted in musculoskeletal diagnoses, we see no reason to be concerned that CAM providers are replacing necessary conventional care.

Studies of CAM utilization have struggled with the proper metrics by which to describe CAM use for particular medical conditions and for specific patient populations. Some surveys of CAM use have been broad in their scope and have included personal practices (eg, prayer as a CAM treatment modality).^{27,28} In contrast, we chose a narrow definition of CAM based on licensed healthcare providers whose services are required to be available from private commercial insurance underwritten in Washington State. By doing this, we believe that our findings are relevant to third-party payers elsewhere who may be considering integrating a CAM benefit into their health insurance products.

Women seem to be particularly open to using care from alternative providers. In addition, the predominant diagnoses from CAM providers were for musculoskeletal conditions. Back and neck pain, arthritis, and similar disorders are common in the general middle-aged population,^{29,30} and there is no reason to suspect that patients with cancer would escape

■ CLINICAL ■

■ **Figure.** Per Capita Expenditures by Service Category and by Treatment Phase^a



these conditions that are prevalent and difficult to manage. A previous study,¹⁹ using 2000 data on 600,000 privately insured adult (age range, 18-64 years) enrollees, found musculoskeletal issues to be the most common diagnoses made by conventional and CAM providers. In that study, chiropractic care was used by approximately 11% of the population, acupuncture by 1.3%, naturopathic physicians by 1.6%, and massage therapists by 2.4%. In the present study, the proportion of patients with cancer using nonchiropractic CAM providers during the initial and continuing treatment phases is substantially higher than what was previously noted in the general enrollee population. This probably indicates that patients with cancer use a significant number of all medical services and rely on multiple health-care providers to manage pain and discomfort. Management of pain is not optimal for patients with cancer, and the quality of the science measuring pain relief is often low.³¹ We will be interested to observe how findings from recent studies of acupuncture for the treatment of functional low back pain alter patient and provider choices for the management of this condition in patients who have been diagnosed as having cancer.³²

Our study has several strengths. Our large sample size, consistent definition of CAM, use of claims data, and registry match eliminate much of the uncertainty that has arisen from smaller studies using patient survey methods. Several limitations are also apparent. First, an unknown amount of CAM and conventional care was probably paid for out-of-pocket because not all providers accept insurance. If fewer CAM providers accept insurance than conventional providers, we may have underestimated the role of CAM care. Second, we

CAM indicates complementary and alternative medicine; Outpatient MD, PA, ARNP, outpatient physicians (includes medical doctors and doctors of osteopathy), physician assistants, and advanced registered nurse practitioners.

^aShown as percentage of per capita expenditures.

^bIncludes surgery performed in an ambulatory clinical setting.

^cIncludes laboratory; services by nonphysician, physician assistant, or advanced registered nurse practitioner providers; and services rendered outside an inpatient facility, outpatient clinic, or a provider's office.

did not have data on pharmaceutical expenditures that could be accurately stratified by treatment phase. This information would have likely raised the conventional proportion of the total. Third, we are not commenting on the desirability of integrating CAM into conventional systems of healthcare finance, and treatment efficacy cannot be determined by claims analysis. Although many patients use CAM, we do not know from these data the relative value and importance that patients place on access to CAM services. Fourth, the significance of some of our estimates may be reflective of small sample sizes (eg, for acupuncture). Fifth, ICD-9-CM coding is generally accurate, but some coding errors may have occurred.

The philosophical underpinnings of what insurance should cover and how it should be used by patients with serious medical conditions (such as cancer) will be important to the CAM health policy debate. In a market-based approach, the presence of choices and the willingness to pay for care are potent factors in making coverage decisions. In managed models of integrated care delivery, cost-effectiveness analysis may play a greater role in choosing specific coverage strategies. Most medical treatments, CAM and conventional, have no ideal scientific database to guide these important decisions.^{33,34}

Treatment of all forms of discomfort in patients with cancer is an important issue. Because of the consistent role that CAM providers play in the care for patients with cancer, future studies should assess the relative importance that patients place on access to CAM providers. In addition, studies on the comparative effectiveness of CAM and conventional treatments for the management of musculoskeletal conditions in patients with cancer are warranted.

Acknowledgment

We thank Yuki Durham, MLS, for her assistance with references.

Author Affiliations: Departments of Health Services (WEL, PTT, MRA) and Biostatistics (SMD, PKD), School of Public Health and Community Medicine, University of Washington, and Translational Outcomes Research Group, Fred Hutchinson Cancer Research Center (MRA), Seattle.

Funding Source: This study was supported by grant NIH-5 R01 AT00891 from the National Center for Complementary and Alternative Medicine. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the National Center for Complementary and Alternative Medicine, National Institutes of Health.

Author Disclosures: The authors (WEL, PTT, SMD, MRA, PKD) report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (WEL); acquisition of data (WEL, PTT, MRA); analysis and interpretation of data (WEL, PTT, SMD, MRA, PKD); drafting of the manuscript (WEL, PTT); critical revision of the manuscript for important intellectual content (SMD, MRA, PKD); statistical analysis (SMD); obtaining funding (WEL); administra-

Take-away Points

Under a system in which complementary and alternative medicine (CAM) providers are covered by insurance, 26.5% of patients with cancer will see a licensed alternative provider during the course of their therapy.

- The proportion of patients seeing CAM providers does not significantly vary among the 3 therapeutic phases of initial, continuing, and end-of-life treatment.
- Most patients with cancer will have a musculoskeletal diagnosis during their therapy, and most CAM visits are associated with musculoskeletal diagnoses.
- Expenditures for CAM services are a small proportion of overall expenditures.

tive, technical, or logistic support (MRA, PKD); and supervision (WEL, PKD).

Address correspondence to: William E. Lafferty, MD, Department of Health Services, School of Public Health and Community Medicine, University of Washington, Box 357660, Seattle, WA 98195. E-mail: billlaf@u.washington.edu.

REFERENCES

1. Miniño AM, Heron MP, Smith BL. Deaths: preliminary data for 2004. *Natl Vital Stat Rep*. 2006;54(19):1-49.
2. American Cancer Society. *Cancer Facts & Figures: 2007*. Atlanta, GA: American Cancer Society; 2007.
3. Yabroff KR, Warren JL, Brown ML. Costs of cancer care in the USA: a descriptive review. *Nat Clin Pract Oncol*. 2007;4(11):643-656.
4. Yabroff KR, Davis WW, Lamont EB, et al. Patient time costs associated with cancer care. *J Natl Cancer Inst*. 2007;99(1):14-23.
5. Patterson RE, Neuhaus ML, Hedderson MM, et al. Types of alternative medicine used by patients with breast, colon, or prostate cancer: predictors, motives, and costs. *J Altern Complement Med*. 2002;8(4):477-485.
6. Ezzo JM, Richardson MA, Vickers A, et al. Acupuncture-point stimulation for chemotherapy-induced nausea or vomiting. *Cochrane Database Syst Rev*. 2006;(2):CD002285.
7. Weiger WA, Smith M, Boon H, Richardson MA, Kaptchuk TJ, Eisenberg DM. Advising patients who seek complementary and alternative medical therapies for cancer. *Ann Intern Med*. 2002;137(11):889-903.
8. Berman BM, Lao L, Langenberg P, Lee WL, Gilpin AM, Hochberg MC. Effectiveness of acupuncture as adjunctive therapy in osteoarthritis of the knee: a randomized, controlled trial. *Ann Intern Med*. 2004;141(12):901-910.
9. Lafferty WE, Downey L, McCarty RL, Standish LJ, Patrick DL. Evaluating CAM treatment at the end of life: a review of clinical trials for massage and meditation. *Complement Ther Med*. 2006;14(2):100-112.
10. Cherkin DC, Sherman KJ, Deyo RA, Shekelle PG. A review of the evidence for the effectiveness, safety, and cost of acupuncture, massage therapy, and spinal manipulation for back pain. *Ann Intern Med*. 2003;138(11):898-906.
11. Lind BK, Lafferty WE, Tyree PT, Sherman KJ, Deyo RA, Cherkin DC. The role of alternative medical providers for the outpatient treatment of insured patients with back pain. *Spine*. 2005;30(12):1454-1459.
12. Lafferty WE, Bellas A, Corage Baden A, Tyree PT, Standish LJ, Patterson R. The use of complementary and alternative medical providers by insured cancer patients in Washington State. *Cancer*. 2004;100(7):1522-1530.
13. Kim SP, Feinglass J, Bennett CL, et al. Merging claims databases with a tumor registry to evaluate variations in cancer mortality: results from a pilot study of 698 colorectal cancer patients treated at one hospital in the 1990s. *Cancer Invest*. 2004;22(2):225-233.
14. Keating NL, Landrum MB, Meara E, Ganz PA, Guadagnoli E. Managed care market share and primary treatment for cancer. *Health Serv Res*. 2006;41(1):9-22.

- 15. Eisenberg DM, Kessler RC, Foster C, Norlock FE, Calkins DR, Delbanco TL.** Unconventional medicine in the United States: prevalence, costs, and patterns of use. *N Engl J Med.* 1993;328(4):246-252.
- 16. Cooper RA.** Health care workforce for the twenty-first century: the impact of nonphysician clinicians. *Annu Rev Med.* 2001;52:51-61.
- 17. Sturm R, Unützer J.** State legislation and the use of complementary and alternative medicine. *Inquiry.* 2000-2001;37(4):423-429.
- 18. Watts CA, Lafferty WE, Baden AC.** The effect of mandating complementary and alternative medicine services on insurance benefits in Washington State. *J Altern Complement Med.* 2004;10(6):1001-1008.
- 19. Lafferty WE, Tyree PT, Bellas AS, et al.** Insurance coverage and subsequent utilization of complementary and alternative medicine providers. *Am J Manag Care.* 2006;12(7):397-404.
- 20. Tyree PT, Lind BK, Lafferty WE.** Challenges of using medical insurance claims data for utilization analysis. *Am J Med Qual.* 2006;21(4):269-275.
- 21. Buchanan RJ, Bolin J, Wang S, Zhu L, Kim M.** Urban/rural differences in decision making and the use of advance directives among nursing home residents at admission. *J Rural Health.* 2004;20(2):131-135.
- 22. Johns Hopkins University.** *The Johns Hopkins Adjusted Clinical Groupings Case-Mix System.* 8th ed. Baltimore, MD: Johns Hopkins University; 2006.
- 23. Consumer Price Indexes.** *CPI Detailed Report: Data for October 2007.* Washington, DC: Office of Prices and Living Conditions, Bureau of Labor Statistics; 2007.
- 24. American Medical Association.** *Current Procedural Terminology.* Chicago, IL: American Medical Association; 2002.
- 25. Hankey BF, Ries LA, Edwards BK.** The Surveillance, Epidemiology, and End Results Program: a national resource. *Cancer Epidemiol Biomarkers Prev.* 1999;8(12):1117-1121.
- 26. StataCorp LP.** *STATA Statistical Software: Version 9.2.* College Station, TX: StataCorp LP; 2006.
- 27. Kaptchuk TJ, Eisenberg DM.** Varieties of healing, 2: a taxonomy of unconventional healing practices. *Ann Intern Med.* 2001;135(3):196-204.
- 28. Gray CM, Tan AW, Pronk NP, O'Connor PJ.** Complementary and alternative medicine use among health plan members: a cross-sectional survey. *Eff Clin Pract.* 2002;5(1):17-22.
- 29. Eubanks JD, Lee MJ, Cassinelli E, Ahn NU.** Prevalence of lumbar facet arthrosis and its relationship to age, sex, and race: an anatomic study of cadaveric specimens. *Spine.* 2007;32(19):2058-2062.
- 30. Goumelen J, Chastang JF, Ozguler A, Lanoë JL, Ravaud JF, Leclerc A.** Frequency of low back pain among men and women aged 30 to 64 years in France: results of two national surveys. *Ann Readapt Med Phys.* 2007;50(8):640-644.
- 31. Carr DB, Goudas LC, Balk EM, Bloch R, Ioannidis JP, Lau J.** Evidence report on the treatment of pain in cancer patients. *J Natl Cancer Inst Monogr.* 2004;(32):23-31.
- 32. Haake M, Müller HH, Schade-Brittinger C, et al.** German Acupuncture Trials (GERAC) for chronic low back pain: randomized, multicenter, blinded, parallel-group trial with 3 groups [published correction appears in *Arch Intern Med.* 2007;167(19):2072]. *Arch Intern Med.* 2007;167(17):1892-1898.
- 33. Dubinsky M, Ferguson JH.** Analysis of the National Institutes of Health Medicare coverage assessment. *Int J Technol Assess Health Care.* 1990;6(3):480-488.
- 34. O'Reilly J, Dalal A.** Off-label or out of bounds? Prescriber and marketer liability for unapproved uses of FDA-approved drugs. *Ann Health Law.* 2003;12(2):295-324. ■