Use of Complementary Therapies for Cancer Symptom Management: Results of the 2007 National Health Interview Survey

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Abstract

Objectives: Complementary therapies are often used as adjuncts to conventional treatment by individuals with cancer. Patterns of use of these practices and products represent important data for health care providers in delivering adequate patient care.

Design: This study compared use of complementary therapies between the cancer and noncancer populations in the United States through secondary analyses of the 2007 National Health Interview Survey data. The analysis compared use by cancer survivors (those individuals self-reporting a diagnosis of cancer; $n=1785$) and individuals without cancer ($n=21,585$), as well as self-report of symptoms affecting health-related quality of life (HQoL).

Results: Data suggest similar patterns of use between cancer survivors and the general population; however, a greater percentage of cancer survivors use complementary modalities. Individuals with cancer reported a greater percentage of use of complementary therapies overall, with cancer status significantly associated with ever having used complementary and alternative medicine ($p<0.001$). The five most common complementary practices and products used by individuals with cancer and controls were vitamin/mineral supplements, prayer for self, intercessory prayer, chiropractic/osteopathic manipulation, and herbal therapies. Additionally, as might be expected, individuals with cancer experience greater frequency of deleterious symptoms associated with decreased HQoL. Individuals with cancer were more likely to sleep fewer than 7 hours ($p=0.0108$) or greater than 9 hours ($p=0.0108$), and have increased insomnia ($p<0.001$), excessive sleepiness ($p<0.001$), depression ($p<0.001$), and anxiety ($p<0.001$) versus those without cancer.

Conclusions: The current findings may inform health care providers about the use of complementary and integrative practices and products by patients with cancer in an effort to manage symptoms of the disease. Additionally, these results may also be used to promote research to define the merits of the use of such complementary and integrative practices and products.

Introduction

PATIENTS ARE INCREASINGLY involved in many aspects of their own health care.¹ With a growing interest in complementary and alternative medicine (CAM),^{1,2} cancer survivors are altering their dietary and physical activity regimens, as well as consuming supplements, with the goal of improving health-related quality of life (HQoL). CAM is defined by the National Center for Complementary and Alternative Medicine as “a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine,”³ a definition that remains fluid as

more complementary therapies become incorporated into conventional care (e.g., massage and acupuncture).⁴ Moreover, the expectations of society with regard to the conventional health care system are changing, with people more inclined to seek out and use CAM^{5,6} and 75% of U.S. adults having used at least one CAM modality for improved health at some point in their lifetime.⁷ According to the population-based 2007 National Health Interview Survey (NHIS), 38.3% of the U.S. population reported use of at least one CAM therapy in the last 12 months.⁸ U.S. adults made an estimated 354.2 million visits to CAM providers.⁹ In that same year, adults’ out-of-pocket expenditures on use of CAM providers, CAM products, and

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CAM practices totaled \$33.9 billion; the majority (\$22 billion) was spent on CAM products and classes compared to \$11.9 billion spent on CAM providers.⁹

Within the cancer patient population, CAM use is widespread and estimated to be as high as 64%.^{3,7,10,11} Predictors of higher CAM use by patients with cancer include female gender,^{3,7,11,12} stage of disease at diagnosis,^{7,11} age,^{4,12} higher education,^{4,12} higher income,^{4,12} race,^{7,12} and geographical location.^{7,11} Additionally, individuals living at a greater distance from health care providers may be more inclined to self-treat using CAM.⁷

Complementary modalities are utilized by patients with cancer in an effort to enhance the benefits of conventional treatments, including radiation and chemotherapy, as well as to improve overall well-being and HQoL.^{3,7,11,13,14} Use of CAM by patients with cancer is significantly associated with receiving multiple treatments, management of illness and treatment-related symptoms, improving survival, and decreasing recurrence,^{2,3,7,12} with patients using CAM during adjuvant chemotherapy, radiation therapy, palliative therapy, and phase I clinical trials.¹ Additionally, data from the 2002 NHIS reveal that patients with cancer are more apt to utilize complementary modalities provided by a practitioner.¹² The goals of the present study were to examine and describe the national patterns of CAM use with regard to services, practices, and products among individuals with cancer compared to those who did not report cancer, as well as the impact that HQoL symptoms (i.e., pain, insomnia, fatigue, and depression) experienced by patients with cancer have on CAM use.

Methods

Design and sample

Data from 23,370 adult respondents (aged 18 years and older) included in the 2007 NHIS were analyzed. Of the total sample, a subset of 1785 survey respondents was created based on their report of a previous cancer diagnosis.

The NHIS is an annual nationally representative survey designed by the National Center for Health Statistics of the Centers for Disease Control and Prevention to provide data on health and health care use in the United States. Two (2) CAM supplements, collected in 2002 and 2007, provide extensive data on the use of and expenditures for CAM providers, practices, and products. These supplements provide information related to factors in the CAM Health Care Model. Compared to the NHIS 2002 CAM supplement, the NHIS 2007 supplement expanded the number of CAM therapies (from 27 to 35), the number of diseases treated with CAM (from 73 to 81), and the list of CAM products (from 35 to 45), while the reference period for use of CAM products was reduced from 12 months to 30 days.⁸ The NHIS methodology employs a multistage sampling design that is representative of the U.S. "civilian noninstitutionalized population," and has been described elsewhere.^{3,8,9} Protection of human subject confidentiality was assured through federal rules governing public use files and the oversight of the University of Virginia Health Sciences Research Institutional Review Board.

Data analyses

Data files from the 2007 NHIS were merged and statistical analyses completed using SAS v.9.1 (SAS Institute, Cary,

NC). These files included the household, sample adult, and adult alternative medicine files. Data were merged and sorted by the household, sample, and person-level variables. Data for individuals responding "yes" or "no" to the question of ever being diagnosed with cancer were included in the analysis. Frequency distributions of demographic variables were calculated using the final sample weighting variable. Chi-square tests were performed to analyze differences between those individuals with and without cancer. Regression analyses were performed to examine the influence of cancer status and report of symptoms on ever having used CAM.

Results

Sociodemographic characteristics of respondents

Sociodemographic characteristics of the respondents are reported in Table 1. Those individuals who reported having been diagnosed with cancer were more likely to be older ($p < 0.001$), female ($p < 0.001$), non-Hispanic whites ($p < 0.001$), unemployed ($p < 0.001$), and single ($p = 0.0487$) than those individuals without cancer.

TABLE 1. SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Characteristic	Prevalence n (weighted %)	
	Respondents with cancer ^a (n = 1785)	Respondents without cancer (n = 21,585)
Age (yrs) ($p < 0.001$)		
<30	52 (3.16)	4491 (23.62)
30–39	81 (4.29)	4235 (18.98)
40–49	197 (13.50)	4224 (20.38)
50–64	515 (30.29)	4998 (23.44)
≥65	940 (48.76)	3637 (13.58)
Gender ($p < 0.001$)		
Men	706 (43.69)	9654 (48.62)
Women	1079 (56.31)	11,931 (51.38)
Race ($p = 0.0001$)		
White	1559 (91.06)	16,199 (80.21)
African American	166 (6.29)	3581 (12.26)
Native American	7 (0.28)	223 (1.05)
Asian	36 (1.72)	1217 (4.91)
Other	17 (0.53)	365 (1.41)
Ethnicity ($p < 0.0001$)		
Hispanic	129 (4.74)	4066 (14.08)
Non-Hispanic	1656 (95.26)	17,519 (85.92)
Employment status ($p < 0.0001$)		
Employed	647 (38.88)	13,797 (66.55)
Unemployed	1137 (61.10)	7755 (33.25)
Partner status ($p = 0.0487$)		
Married/partnered	879 (65.08)	11,105 (64.17)
Single	903 (34.92)	10,352 (35.83)
Region ($p = 0.0591$)		
Northeast	303 (17.30)	3615 (17.12)
Midwest	430 (24.97)	4784 (24.01)
South	672 (37.20)	8038 (36.63)
West	380 (20.54)	5148 (22.24)

^aCancer defined as self-report of ever being diagnosed with any type of cancer.

Complementary therapy usage

The prevalence of ever having used a complementary therapy is reported in Table 2. Individuals with cancer reported a greater percentage of use of complementary therapies overall, with cancer status significantly associated with ever having used CAM ($p < 0.001$). The five most common complementary practices and products used by individuals with cancer and controls were vitamin/mineral supplements (76.64% and 64.02%, respectively), prayer for self (68.85% and 53.19%, respectively), intercessory prayer (49.22% and 33.44%, respectively), chiropractic/osteopathic manipulation (34.60% and 22.07%, respectively), and herbal therapies (32.14% and 24.11%, respectively).

Supplement use

The most prevalent vitamins and minerals used in the past 12 months are reported in Table 3. A greater percentage of individuals with cancer (76.64%; $p < 0.001$) reported use of vitamins and minerals than those without cancer (64.02%; $p < 0.001$). Around 25% of individuals in both groups reported consumption of a calcium supplement. A greater percentage of individuals without cancer report use of a multivitamin (84.09%). The most prevalent herbal therapies used in the past 12 months are reported in Table 4 for individuals with and without cancer. The most common herbal supplement used by both individuals with and without cancer, respectively, were fish oil (44.38% and 38.33%), glucosamine (25.91% and 21.40%), garlic pills or gelcaps (15.72%

TABLE 3. VITAMINS AND MINERALS MOST COMMONLY USED WITHIN THE PAST 12 MONTHS

Vitamin/mineral	Prevalence (weighted %)	
	Respondents with cancer ^a (n = 1785)	Respondents without cancer (n = 21,585)
Calcium	33.70%	22.65%
Folate	5.17%	3.78%
Vitamin B complex	9.35%	8.02%
Vitamin C	19.12%	17.87%
Vitamin E	14.57%	8.53%
Multivitamin	82.75%	84.09%

^aCancer defined as self-report of ever being diagnosed with any type of cancer.

and 11.23%), flaxseed oil (15.79% and 15.74%), and chondroitin (13.81% and 11.89%).

Health-related quality of life

Hours of sleep and measures of HQoL over the past year are reported in Table 5. Individuals with cancer were more likely to sleep fewer than 7 hours (27.60%; $p = 0.0108$) or greater than 9 hours (6.98%; $p = 0.0108$), and have increased insomnia (31.04%; $p < 0.001$), excessive sleepiness (15.60%; $p < 0.001$), depression (15.77%; $p < 0.001$), and anxiety (14.96%; $p < 0.001$) versus those without cancer. When controlling for cancer status and hours of sleep, insomnia ($p < 0.001$), fatigue ($p = 0.006$), and anxiety ($p < 0.001$) were predictive of CAM use. Data reflecting psychologic symptoms within the past 30 days are reported in Table 6. Individuals with cancer were more likely to feel sad, nervous, restless or fidgety, hopeless, that everything was an effort, and worthless than those without cancer ($p < 0.001$). Increased symptoms were significantly associated with use of

TABLE 2. PREVALENCE OF COMPLEMENTARY THERAPY USE

Modality	Prevalence n (weighted %)	
	Respondents with cancer ^a (n = 1785)	Respondents without cancer (n = 21,585)
Alternative medical systems ^b	298 (16.50)*	2567 (11.66)
Biologically based therapy		
Herbal therapies	574 (32.14)*	5021 (24.11)
Vitamins/minerals	1359 (76.64)*	13,644 (64.02)
Manipulation-based therapy		
Chiropractic/osteopathic	596 (34.60)*	4526 (22.07)
Massage	329 (19.56)*	3415 (16.14)
Mind-body therapy		
Meditation	250 (12.94)	2521 (11.78)
Relaxation techniques ^c	345 (19.15)*	2709 (12.72)
Deep-breathing exercises	336 (17.70)*	3151 (14.69)
Yoga/t'ai chi/qigong	237 (12.98)	2810 (13.06)
Biofeedback/hypnosis	125 (7.87)*	707 (3.44)
Energy healing therapy	45 (2.53)*	356 (1.52)
Prayer		
Prayer for self	1259 (68.85)*	11,190 (53.19)
Prayer by others	922 (49.22)*	7476 (33.44)

^aCancer defined as self-report of ever being diagnosed with any type of cancer.

^bAlternative medical systems include seeing a practitioner for acupuncture, Ayurveda, naturopathy, or homeopathy.

^cRelaxation techniques include guided imagery, progressive muscle relaxation, support group meetings, or stress management classes.

* $p < 0.05$.

TABLE 4. HERBS AND SUPPLEMENTS MOST COMMONLY USED WITHIN THE LAST 12 MONTHS

Herb/supplement	Prevalence (weighted %)	
	Respondents with cancer ^a (n = 1785)	Respondents without cancer (n = 21,585)
Chondroitin	13.81%	11.89%
Coenzyme Q10	11.76%	9.35%
Echinacea	11.31%	17.95%
Fish oil	44.38%	38.33%
Flaxseed oil	15.79%	15.74%
Garlic (pills or gelcaps)	15.72%	11.23%
Ginkgo biloba	10.28%	10.64%
Ginseng	7.33%	12.45%
Glucosamine	25.91%	21.40%
Grape seed extract	4.37%	4.32%
Green tea (pills)	3.70%	5.64%
Soy supplements/isoflavones	2.87%	5.08%
St. John's wort	2.64%	3.40%
Valerian	1.95%	3.26%

^aCancer defined as self-report of ever being diagnosed with any type of cancer.

TABLE 5. HEALTH-RELATED QUALITY OF LIFE IN THE PAST 12 MONTHS

Variable	Prevalence n (weighted %)	
	Respondents with cancer ^a (n=1785)	Respondents without cancer (n=21,585)
Hours of sleep		
<7 hours	490 (27.60)*	5793 (26.25)
7–9 hours	1127 (63.27)*	14,442 (68.01)
>9 hours	126 (6.98)*	2027 (3.10)
Health-related Quality of Life		
Insomnia	564 (31.04)*	3845 (17.09)
Excessive sleepiness	292 (15.60)*	2121 (9.79)
Frequently depressed	321 (15.77)*	2390 (10.37)
Frequently anxious	294 (14.96)*	2303 (10.49)

^aCancer defined as self-report of ever being diagnosed with any type of cancer.

* $p < 0.05$.

CAM therapies, after controlling for cancer status ($p < 0.001$), with those individuals reporting higher rates of symptoms affecting HQoL more likely to use CAM than those with lower report of symptoms.

Discussion

Use of complementary modalities by patients with cancer is common and similar in pattern to that of individuals without cancer in the general population, suggesting that the diagnosis of cancer alone may not be the motivation for the use of CAM (Table 2). However, a greater percentage of cancer survivors (i.e., those individuals self-reporting ever being diagnosed with cancer) utilize CAM therapies versus the general population. Both cancer survivors and individuals in the general population make considerable use of so-called “low/no cost” practices, such as meditation and deep breathing exercises, as well as other mind–body modalities. Additionally, use of natural products is very high among respondents, as is prayer, both by self and by others. Practices such as some mind–body modalities, natural products, and prayer may be easier to adopt for self-care and disease management, requiring less expense and time commitment than utilizing the services of a practitioner. The results of the current study are similar to findings reported by others using similar survey data.^{3,12,15} However, direct comparison of numbers with previous surveys should be done cautiously, given the differences in the sample population, the phrasing of questions, and the definition and types of CAM therapies included. What is unique about the current study is the analysis of symptoms affecting HQoL and the relationship to use of complementary practices and products.

In the current study, respondents with cancer were more likely to receive inadequate or excessive sleep, as well as to experience greater insomnia, fatigue, depressed mood, and anxiety over the course of the previous year (Table 5). Moreover, insomnia, fatigue, and anxiety were predictive of CAM use after controlling for hours of sleep and cancer status. Cancer survivors were more likely to be affected by increased psychologic symptoms associated with reduced HQoL in the past 30 days versus the general population

TABLE 6. SELF-REPORT OF PSYCHOLOGIC SYMPTOMS, PAST 30 DAYS

Variable	Prevalence n (weighted %)	
	Respondents with cancer ^a (n=1785)	Respondents without cancer (n=21,585)
So sad nothing cheers you up*		
None of the time	1233 (72.02)	16,237 (77.02)
A little of the time	256 (13.72)	2718 (12.10)
Some of the time	185 (9.08)	1586 (6.79)
Most of the time	54 (2.59)	487 (2.00)
All of the time	27 (1.21)	186 (0.75)
How often felt nervous*		
None of the time	1119 (63.68)	14,738 (67.58)
A little of the time	307 (17.63)	3759 (18.20)
Some of the time	221 (11.74)	2023 (9.33)
Most of the time	60 (3.36)	481 (2.10)
All of the time	47 (2.16)	297 (1.41)
How often restless/fidgety*		
None of the time	1128 (63.81)	15,150 (69.46)
A little of the time	269 (15.48)	3049 (14.63)
Some of the time	234 (12.40)	2115 (9.91)
Most of the time	75 (4.36)	595 (2.72)
All of the time	47 (2.39)	385 (1.89)
How often felt hopeless*		
None of the time	1497 (85.45)	18,845 (87.98)
A little of the time	97 (5.23)	1161 (5.12)
Some of the time	107 (5.54)	849 (3.57)
Most of the time	31 (1.35)	264 (1.12)
All of the time	22 (0.97)	169 (0.81)
How often felt everything was an effort*		
None of the time	1256 (71.91)	16,448 (76.57)
A little of the time	182 (10.43)	2108 (9.91)
Some of the time	194 (10.14)	1640 (7.37)
Most of the time	62 (3.08)	604 (2.60)
All of the time	61 (3.04)	466 (2.03)
How often felt worthless*		
None of the time	1535 (87.25)	19,384 (90.30)
A little of the time	79 (3.96)	884 (3.81)
Some of the time	82 (4.18)	640 (2.82)
Most of the time	30 (1.41)	211 (0.84)
All of the time	26 (1.54)	159 (0.80)

^aCancer defined as self-report of ever being diagnosed with any type of cancer.

* $p < 0.001$.

(Table 6). These data are not surprising, given the unquestionably stressful nature of the diagnosis of cancer and its treatment, which results in symptoms including depression, anxiety, fatigue, sleep disturbances, and pain. These disease- and treatment-related symptoms are the impetus for many patients with cancer to combine conventional care with complementary modalities to improve HQoL.^{3,7,11,13,14}

The most common categories of complementary modalities used by individuals with a self-reported diagnosis of cancer were natural products, including vitamins, minerals, and herbal therapies, and mind–body practices, including meditation, relaxation techniques, deep breathing exercises, yoga, *t'ai chi*, *qigong*, biofeedback, hypnosis, and energy healing therapies (Table 2). Research suggests that guided imagery may aid the reduction of cancer pain.^{16,17} Various types of meditation have been shown to improve quality of

life in patients with cancer including improvements in mood, sleep quality, and perceived stress.¹⁸ Additionally, several studies report enhanced quality of life in patients with cancer, such as lower sleep disturbance, decreased stress symptoms, and changes in cancer-related immune cells after patients received relaxation, meditation, and gentle yoga therapy.¹⁹ Preliminary data suggest that biofield therapies such as Healing Touch and Reiki may increase quality of life in cancer and reduce pain and fatigue in patients with cancer.²⁰

More than 50% percent of U.S. adults report taking dietary supplements regularly.²¹ Dietary intake of fruits and vegetables high in vitamin C, folate, and other antioxidants has been associated with reduced risk of various types of cancer in epidemiologic studies, particularly cancers of the mouth, esophagus, stomach, colon, lung, and breast.^{22,23} Vitamin C supplements have not been found to produce similar protective effects.²⁴ Preliminary evidence surrounding the use of folate seems promising for decreasing the risk of breast, cervical, pancreatic, and gastrointestinal cancer.²⁵ Currently there is insufficient evidence available to recommend folate supplementation for any type of cancer prevention or treatment. Data concerning supplementation with vitamin E are equivocal. There is preliminary evidence of the possible benefits of long-term vitamin E supplementation to reduce the risk of mortality in patients with bladder cancer;²⁴ however, recent data from the Women's Health Study show no reduction in the development of cancer with the use of a natural-source vitamin E supplement taken daily.²³ Additional research is necessary before a clear conclusion can be reached.

Several epidemiologic studies report that dietary omega-3 fatty acids or fish oil may reduce the risk of developing breast, colon, or prostate cancer;²⁶ however, randomized controlled trials are necessary before a clear conclusion can be drawn regarding the benefit of omega-3 fatty acid supplements on cancer prevention and treatment. Initial human studies suggest that regular consumption of garlic, particularly unprocessed garlic, may reduce the risk of developing several types of cancer, including gastric and colorectal malignancies; however, garlic may alter levels of various anticancer drugs.²⁷ Early studies suggest that ginseng may improve body weight, quality of life, and the immune response in patients with cancer, and a few studies report that ginseng taken by mouth may lower risk of developing some cancers, especially if ginseng powder or extract is used.²⁸

Side-effects and interactions with chemotherapy are being increasingly reported with herb use,²⁹ and concerns about potential interactions of complementary modalities with biomedical and pharmacologic treatment, safety, efficacy, cost, and establishment of scientific evidence are rising.⁷ Given that many botanical supplements lack basic and clinical research documentation and are not closely regulated, many supplements may be contaminated.²¹ Toxicity may result from high concentrations of active ingredients in a supplement versus the native form of the natural product. Moreover, there remains a lack of reliable dosage guidelines. Nearly two thirds of individuals reporting use of natural supplements are unaware of drug interactions and information concerning adverse effects, making the assumption that a lack of such information implies safety.³⁰ Concern has been raised that antioxidants may interfere with some che-

motherapy agents, such as alkylating agents, anthracyclines, or platinum, which can depend on oxidative damage to tumor cells for the desired anticancer effects. For example, folic acid could interfere with the anticancer effects of methotrexate.²⁵ Studies on the effects of antioxidants on cancer therapies have yielded mixed results, with some reporting interference, others noting benefits, and most suggesting no significant interaction.³¹ Still, caution is recommended for people undergoing treatment with chemotherapy or radiation because it has been proposed that the use of high-dose antioxidants may interfere with the effectiveness of treatment.

The questions of the adult alternative health survey do have several limitations. Firstly, data are dependent upon a respondent's knowledge of complementary and alternative practices and products as well as a willingness to report use. Secondly, the cross-sectional nature of the data collection does not allow for the calculation of annual estimates of CAM use, limiting the ability to track changes in use over time, or to examine causal relationships between CAM use and diagnosis of disease. Moreover, it is not possible to know whether or not a respondent began using CAM before or after his or her diagnosis. Because no additional follow-up questions were asked concerning the impact of CAM approaches on symptoms associated with HQoL, this relationship cannot be evaluated. The authors do not assume that all patients with cancer have similar patterns of CAM use and believe that adopting or maintaining complementary practices and products is individualized and subject to a variety of factors. The results presented in the current article represent the use of CAM overall over the course of the previous year rather than the use of complementary practices and products for a particular disease or condition, in this case cancer. While questions were asked in the NHIS as to whether or not these therapies or products were used specifically for cancer, many of these data are missing and do not reflect the overall use of CAM by patients with cancer. For example, patients with cancer may not have used a complementary practice or product for cancer *per se* but may have used these modalities for a disease- or treatment-related condition, such as fatigue, sleep disturbance, or pain. These data are not captured by the NHIS. Moreover, assessing use of CAM practices and products by cancer site/type increases the amount of statistical comparisons used and reduces the sample size, especially with regard to less common cancers, such that significant findings may be simply a result of multiple comparisons and artifact. Additionally, the number of therapies included in the survey is limited and does not include all modalities that may be commonly used by patients with cancer, such as aromatherapy or creative therapies such as art therapy, music therapy, and journaling.³²

Conclusions

A major strength of the NHIS data concerning complementary modalities is the collection of data from a nationally representative sample of U.S. adults. These data allow for the estimation of use of complementary modalities across a variety of subgroups within the general population, such as cancer survivors. The large sample size facilitates investigation of the associations between use of complementary therapies and a range of self-reported health characteristics.

The results of the current study could potentially guide researchers in conducting future CAM intervention studies of those therapies most commonly used by patients with cancer, as well as more trials to examine the benefits, risks, chemopreventive properties, and/or antitumor activities of complementary practices and products. Additionally, these findings may inform health care providers about the use of complementary and integrative practices and products by patients with cancer in an effort to manage symptoms of the disease as well as other comorbidities by providing the most current national estimates of CAM use in patients with cancer. Health care providers need to assess patient use of complementary practices and products routinely, especially in the oncology setting, while increasing their knowledge of CAM to maximize positive patient outcomes.

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References

1. von Gruenigen VE, Frasur HE, Jenison EL, et al. Longitudinal assessment of quality of life and lifestyle in newly diagnosed ovarian cancer patients: The roles of surgery and chemotherapy. *Gynecol Oncol* 2006;103:120-126.
2. Fouladbakhsh JM, Stommel M. Using the behavioral model for complementary and alternative medicine: The CAM Healthcare Model. *J Complement Integrat Med* 2007;4.
3. Fouladbakhsh JM, Stommel M. Gender, symptom experience, and use of complementary and alternative medicine practices among cancer survivors in the U.S. cancer population. *Oncol Nurs Forum* 2010;37:E7-E15.
4. Buettner C, Kroenke CH, Phillips RS, et al. Correlates of use of different types of complementary and alternative medicine by breast cancer survivors in the nurses' health study. *Breast Cancer Res Treat* 2006;100:219-227.
5. Forgues E. Methodological issues pertaining to the evaluation of the effectiveness of energy-based therapies, avenues for a methodological guide. *J Complement Integrat Med* 2009;6:1-17.
6. vanderVaart S, Gijzen VM, de Wildt SN, Koren G. A systematic review of the therapeutic effects of Reiki. *J Altern Complement Med* 2009;15:1157-1169.
7. Fouladbakhsh JM, Stommel M, Given BA, Given CW. Predictors of use of complementary and alternative therapies among patients with cancer. *Oncol Nurs Forum* 2005;32:1115-1122.
8. Barnes PM, Bloom B, Nahin RL. Complementary and Alternative Medicine Use Among Adults and Children: United States, 2007. *Natl Health Stat Report* 2008;12:1-23.
9. Nahin RL, Barnes PM, Stussman BJ, Bloom B. Costs of complementary and alternative medicine (CAM) and frequency of visits to CAM practitioners: United States, 2007. *Natl Health Stat Report* 2009;18:1-14.
10. Bardia A, Barton DL, Prokop LJ, et al. Efficacy of complementary and alternative medicine therapies in relieving cancer pain: A systematic review. *J Clin Oncol* 2006;24:5457-5464.
11. Mansky PJ, Wallerstedt DB. Complementary medicine in palliative care and cancer symptom management. *Cancer J* 2006;12:425-431.
12. Fouladbakhsh JM, Stommel M. Comparative analysis of CAM use in the US cancer and noncancer populations. *J Complement Integrat Med* 2008;5.
13. Lev-ari S, Maimon Y, Yaal-Hahoshen N. Long-term survival of a patient with widespread metastases from epithelial ovarian carcinoma receiving mind-body therapies: Case report and review of the literature. *Integr Cancer Ther* 2006;5:395-399.
14. Kemper KJ, Fletcher NB, Hamilton CA, McLean TW. Impact of healing touch on pediatric oncology outpatients: Pilot study. *J Soc Integr Oncol* 2009;7:12-18.
15. Eisenberg DM, Davis RB, Ettner SL, et al. Trends in alternative medicine use in the United States, 1990-1997: Results of a follow-up national survey [see comment]. *JAMA* 1998;280:1569-1575.
16. Kwekkeboom K, Cherwin C, Lee J, Wanta B. Mind-body treatments for the pain-fatigue-sleep disturbance symptom cluster in persons with cancer. *J Pain Symptom Manage* 2010;39:126-138.
17. Kwekkeboom KL, Abbott-Anderson K, Wanta B. Feasibility of a patient-controlled cognitive-behavioral intervention for pain, fatigue, and sleep disturbance in cancer. *Oncol Nurs Forum* 2010;37:E151-E159.
18. Foley E, Baillie A, Huxter M, et al. Mindfulness-based cognitive therapy for individuals whose lives have been affected by cancer: A randomized controlled trial. *J Consult Clin Psychol* 2010;78:72-79.
19. Ulger O, Yagh NV. Effects of yoga on the quality of life in cancer patients. *Complement Ther Clin Pract* 2010;16:60-63.
20. Anderson JG, Taylor AG. Effects of healing touch in clinical practice: A systematic review of randomized clinical trials. *J Holistic Nurs* 2011;29:221-228.
21. Carlson S, Peng N, Prasain JK, Wyss JM. Effects of botanical dietary supplements on cardiovascular, cognitive, and metabolic function in males and females. *Gender Med* 2008;5(suppl A):S76-S90.
22. Martinez-Gonzalez MA, Estruch R. Mediterranean diet, antioxidants and cancer: The need for randomized trials. *Eur J Cancer Prev* 2004;13:327-335.
23. Prentice RL, Caan B, Chlebowski RT, et al. Low-fat dietary pattern and risk of invasive breast cancer: The Women's Health Initiative Randomized Controlled Dietary Modification Trial. *JAMA* 2006;295:629-642.
24. Willett WC, Sacks F, Trichopoulos A, et al. Mediterranean diet pyramid: A cultural model for healthy eating. *Am J Clin Nutr* 1995;61(6 suppl):1402S-1406S.
25. Xia W, Low PS. Folate-targeted therapies for cancer. *J Med Chem* 2010;53:6811-6824.
26. Serra-Majem L, Roman B, Estruch R. Scientific evidence of interventions using the Mediterranean diet: A systematic review. *Nutr Rev* 2006;64:S27-S47.
27. Shord SS, Shah K, Lukose A. Drug-botanical interactions: A review of the laboratory, animal, and human data for 8 common botanicals. *Integr Cancer Ther* 2009;8:208-227.

28. Qi LW, Wang CZ, Yuan CS. American ginseng: Potential structure-function relationship in cancer chemoprevention. *Biochem Pharmacol* 2010;80:947–954.
29. Powell CB, Dibble SL, Dall'Era JE, Cohen I. Use of herbs in women diagnosed with ovarian cancer. *Int J Gynecol Cancer* 2002;12:214–217.
30. Wood MJ, Stewart RL, Merry H, et al. Use of complementary and alternative medicine therapies in patients with cardiovascular disease. *Am Heart J* 2003;145:806–812.
31. Bjelakovic G, Nikolova D, Simonetti RG, Gluud C. Antioxidant supplements for preventing gastrointestinal cancers. *Cochrane Database Syst Rev* 2008;3:CD004183.
32. Carlson L, Bultz B. Mind-body interventions in oncology. *Curr Treat Opt Oncol* 2008;9:127–134.

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