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Complementary and alternative medicine use in patients before and after a cancer diagnosis

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ABSTRACT

Background Cancer patients are increasingly seeking out complementary and alternative medicine (CAM) and might be reluctant to disclose its use to their oncology treatment team. Often, CAM agents are not well studied, and little is known about their potential interactions with chemotherapy, radiation therapy, or biologic therapies, and their correlations with outcomes. In the present study, we set out to determine the rate of CAM use in patients receiving treatment at a Northern Ontario cancer centre.

Methods Patients reporting for treatment at the Northeast Cancer Centre (NECC) in Sudbury, Ontario, were asked to complete an anonymous questionnaire to assess CAM use. Changes in CAM use before, compared with after, diagnosis were also assessed.

Results Patients in Northern Ontario reported significant CAM use both before and after diagnosis. However, as a function of the CAM type, CAM use was greatly enhanced after cancer diagnosis. For example, the number of patients who reported use of biologic products increased to 51.8% after a cancer diagnosis from 15.6% before a cancer diagnosis. Patients reported much smaller changes in the use of alternative medical systems or spiritual therapy after diagnosis. Vitamin use was reported by 66% of respondents, and the number of different CAMs used correlated significantly with the reported number of vitamins used.

Conclusions Use of CAM, particularly biologic products, increased significantly after a cancer diagnosis. Further studies are required to examine the effect of CAM use on the efficacy and safety of cancer therapies.

Key Words Complementary and alternative medicine, natural products, questionnaires

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INTRODUCTION

The use of complementary and alternative medicine (CAM) has steadily increased, particularly among patients diagnosed with cancer. Complementary and alternative medicine include practices that are not typically part of conventional medical care, such as acupuncture, massage, prayer, diet, and use of biologic products[1,2]. Cancer remains one of the leading causes of death worldwide[3]. Many cancer patients seek out CAMs in an attempt to moderate side effects of chemotherapy or radiation[4,5]. Others believe that CAMs provide other benefits such as promoting health, managing disease symptoms, preventing illness, or improving immune function. Finally, certain religious and cultural factors affect choices, and CAMs are widely perceived to be "natural," leading some patients to feel that CAM use aligns with their beliefs[6,7]. Ideally, the integrative medicine approach would provide patients with the best of both worlds. When scientific evidence supports the efficacy of a CAM, it could be incorporated into the patient's treatment regime; but when a CAM promotes negative effects, it could be discouraged[8].

Recently, CAM treatments have grown in popularity and have been subjected to greater scientific study[9–11]. However, robust scientific data about the efficacy of most CAMs, or about their potential to interfere or interact with conventional medical treatments, are still limited. Although some patients disclose CAM use to their oncology treatment team and other health care professionals, others have multiple reasons for not informing their health care

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teams about their CAM use. One major reason that patients gave, as uncovered by Ezeome and Anarado[7], was simply that no one on the health care team asked. Patients might also conceal CAM use from health care providers for fear of disapproval or because disclosure would render them ineligible for clinical trials[12]. Some studies suggest that about 60% of patients who use CAMs do not disclose that use to their primary care providers[13,14]. As a result, CAM use goes significantly underreported to anyone on the health care team. Moreover, most doctors and nurses are not typically trained or well informed about CAM use, and many avoid discussing the topic with their patients[13,15]. Biologic products can often have biomedical activity that affects health, and it is imperative that doctors be made aware of all products taken by their patients. Opening the lines of communication between doctors and patients with respect to CAM use is extremely important[16]. Further, it would be beneficial to increase training opportunities for health care professionals who want to learn more about CAMs and to educate patients about potential interactions with conventional treatments.

In the present study, we investigated the use of various CAMs by cancer patients at the Northeast Cancer Centre (NECC) in Sudbury, Ontario. In particular, we were interested in determining the proportion of patients with cancer who use CAMs while they are receiving standard therapy and to determine the range of CAMs used. Part of our investigation also looked at changes in CAM use from before to after a cancer diagnosis and at potential relationships between the types of CAMs used.

METHODS

Patients presenting for treatment at the NECC in Sudbury were asked to complete an anonymous questionnaire to assess the use of CAMs. In 2017, 4064 patients were treated at the NECC. The NECC handles approximately 38,000 radiation treatment visits and 15,000 chemotherapy visits per year. Although demographic data were not collected for the present study, NECC statistics show that, in 2017, the most commonly treated cancers were breast cancer (28%), hematologic cancers (16.9%), lung cancer (14.3%), genitourinary cancers (13.6%), and gastrointestinal cancers (12.7%). At diagnosis, 16.6% of the patients were classified as stage I, 18.7% as stage II, 17.7% as stage III, and 17.7% as stage IV. The patient population was 55.3% female and 44.7% male, with 59% of patients being 66 years of age or older.

For this feasibility study, anonymity was used as a means of increasing patient willingness to disclose all CAMs used. The goal was to determine patient interest and willingness to participate, and we therefore did not include questions about demographics (such as age, sex, marital status, socioeconomic status, or education). The questionnaire was available in both the radiation oncology and chemotherapy treatment suites, and was offered to patients scheduled to receive treatment during the period December 2016 to April 2017. Cancer centre staff provided the questionnaire package to 300 patients, and 141 completed questionnaires were returned. Approximately 1000 patients were treated at the NECC during the survey period, and staff offered the questionnaires to all patients arriving for treatment (radiation or chemotherapy) on days when sufficient staff were available in the clinic and when no competing Cancer Care Ontario–mandated questionnaires were being offered. Those restrictions meant that patients were presented with the CAM questionnaire for less than half the available time during that period.

Our CAM use questionnaire was developed after an extensive search of the literature about complementary and alternative medicine use in cancer patients. In addition, some questions were extracted from the I-CAM-Q and from the Ezeome and Anarado study[7,12,17]. The questionnaire was reviewed and approved by the research ethics board at Health Sciences North, Sudbury, Ontario.

Patients were asked which CAMs they had used in the past, which ones they had used since being diagnosed with cancer, and which ones they hoped to use in the future. Patients were provided with a list of CAM practices to choose from. The CAMs were divided into 6 categories, each containing several candidates:

- Special diets such as Gerson, ketogenic, Peskin, Budwig, alkaline, and paleo
- Diet information, including vitamins and minerals
- Biologic products such as teas (green, medicinal, chaga mushroom, Essiac), natural health products [ginger, curcumin (turmeric), flaxseed oil, cat's claw], and miscellaneous products (laetrile B17, pancreatic enzyme therapy, medicinal cannabis, and probiotic foods and supplements)
- Energy therapies (Rife device, Beck device, Lakhovsky device, oxygen or ozone treatment)
- Alternative medical systems and physical therapy (Traditional Chinese Medicine, Indian medicine, Aboriginal medicine, acupuncture, homeopathy, chiropractic, osteopathy, massage, Reiki, and therapeutic touch)
- Spiritual therapy and mind–body systems (faith healing or prayer, divination, meditation, visualization, hypnosis, psychic therapy, mind–body techniques, mental imagery, yoga, *qi gong*, *tai chi*, and relaxation techniques)

Patients were also asked about their reasons for using CAM, the benefits that they were expecting, how they learned about the CAM they are using, and how they obtained their supply of CAM. Users were also asked whether there were any aspects of CAM that they wish were available in conventional medicine.

Data were summarized as frequencies and descriptive analyses. Comparisons of nominal variables before and after diagnosis were conducted using the McNemar test for repeated measures. Continuous data were assessed for normal distribution using the Shapiro–Wilk test and visual methods (histogram and Q–Q plot) before groups were compared using either the independent *t*-test or nonparametric Mann–Whitney *U*-test, depending on distributional properties. A Bonferroni correction was applied within categories to adjust for type I errors, and comparisons that remained significant are shown. Correlation analyses used either the Pearson or the nonparametric Spearman method, depending on data distribution. Confidence intervals for correlation coefficients were computed

using a bootstrap technique. All statistical analyses were conducted in the IBM SPSS Statistics software application (version 21: IBM, Armonk, NY, U.S.A.) and statistical significance was considered at $p < 0.05$.

RESULTS

Between December 2016 and April 2017, 141 anonymous self-report questionnaires about CAM use before and after cancer diagnosis were completed by patients actively receiving treatment with radiation or chemotherapy (or both). Questionnaire packages had been provided to 300 patients attending treatment clinics, for a response rate of 47%. The CAM most commonly reported was vitamin use, with 66% of patients reporting use of at least 1 vitamin. Because of the high frequency of vitamin and mineral use, that CAM category was analyzed separately from the other CAM modalities.

Of the questionnaire respondents, 52.5% reported using at least 1 type of CAM (excluding vitamins and minerals) before diagnosis; 60% reported using at least 1 CAM after their cancer diagnosis. Interestingly, the reported use of CAM was not significantly different in patients receiving chemotherapy treatments compared with patients receiving radiation therapy (Mann–Whitney *U*-test, $p > 0.05$). The incidence of CAM use before and after diagnosis varied as a function of the CAM type. For example, total use of biologic products increased dramatically to 51.8% after diagnosis from 15.6% before diagnosis (Figure 1). After a within-category Bonferroni correction, the biologic products that showed a significant increase in use after diagnosis were green tea, ginger, chaga mushroom, curcumin (turmeric), flaxseed oil, and probiotics (all $p < 0.01$, Figure 2). In contrast, the use of alternative medical systems such as chiropractic, massage, and acupuncture all decreased significantly after a cancer diagnosis (Figure 3). The use of spiritual therapies remained relatively consistent, with the exception of faith healing or prayer, and yoga, which decreased by approximately 50% a after cancer diagnosis—a result that was significant by the McNemar test, but not after the Bonferroni correction (Figure 4).

Patients were asked to list their motives for deciding to use CAM (Table I). The most prevalent reason, cited by 51.6% of respondents, was that they were "just trying to do everything that can help." "Other" reasons were reported by 17.74% of respondents. Patients were also asked to list any benefits obtained from CAM use (Table I). The reported benefits were diverse, with 18.23% of respondents stating they used CAMs to "stimulate the body's ability to fight the cancer"; 16.58%, to help sleep or relax; 15.47%, to do everything possible to fight cancer; 13.81%, to improve psychological or emotional well-being; 12.71%, to improve physical well-being; and 11.05%, to relieve side effects of cancer treatments. Patients learned about CAM (Table I, multiple answers possible) from friends (16.96%), family members (16.96%), the Internet (15.18%), and health care personnel in the hospital (10.71%).

Vitamin and mineral use was reported by 66% of respondents, with vitamin D being the most popular (46.1% of respondents reporting use), although 12.8% stated that they used it "not regularly" (Figure 5). The next most commonly used vitamins and minerals were calcium (33.4%), multiple vitamins (32.7%), vitamin C (29.8%), B complex (18.4%), magnesium (17.7%), iron (13.5%), vitamin E (13.5%), and zinc (6.3%). Interestingly, compared with patients who did not report use of vitamins and minerals, respondents who reported vitamin use also used significantly more biologic products ($z = 3.32$, $p < 0.01$) and spiritual therapies or mind–body systems ($z = 3.09$, $p < 0.01$) by Mann–Whitney *U*-test. Further, Spearman correlations with bootstrap confidence intervals (CIs) showed a relationship between the number of vitamins and the number of CAM options used from each category. Positive correlations were observed for the number of vitamins used with the number of therapies used from the

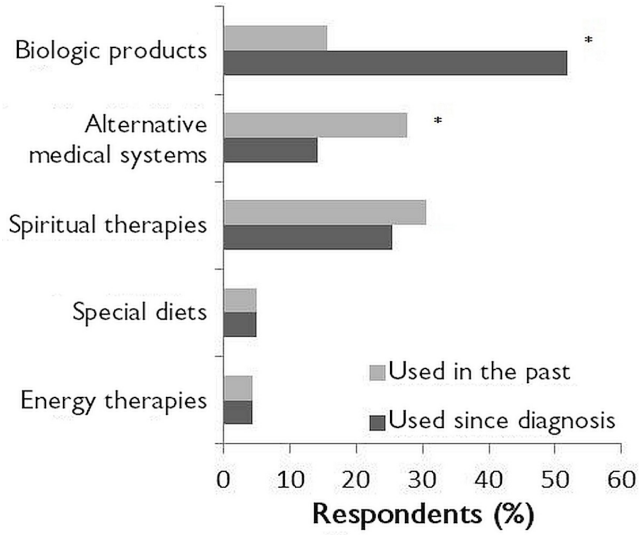

FIGURE 1 Reported frequency of complementary and alternative medicine (CAM) use before and after cancer diagnosis, grouped by category.*$p < 0.01$.

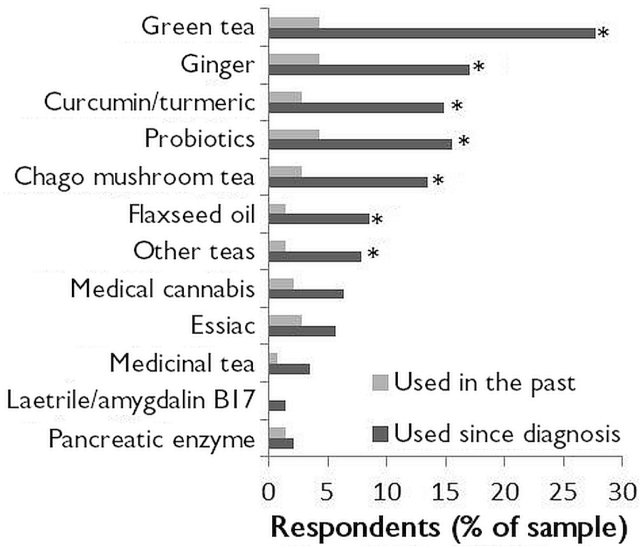

FIGURE 2 Reported frequency of biologic product use before and after cancer diagnosis. *$p < 0.01$.

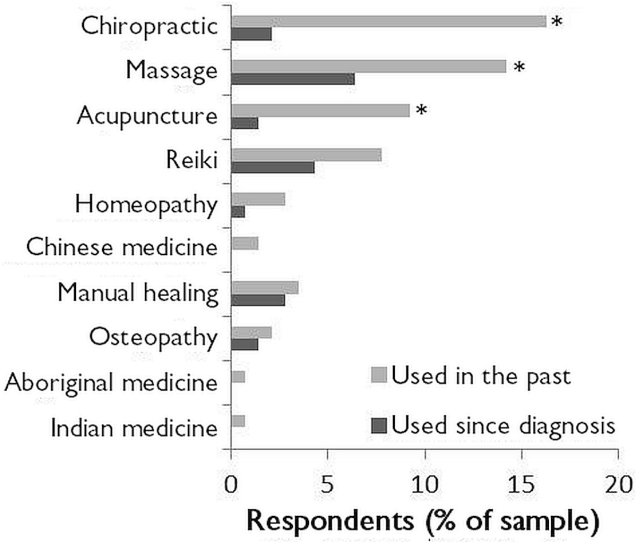

FIGURE 3 Reported frequency of alternative medical system use before and after cancer diagnosis. *$p < 0.01$.

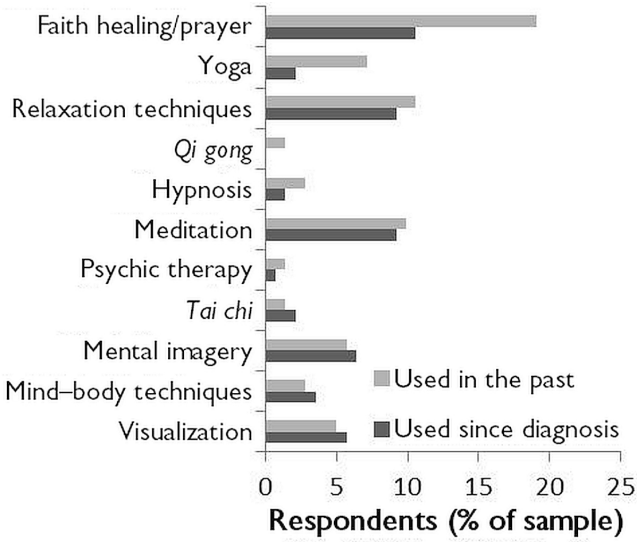

FIGURE 4 Reported frequency of spiritual therapy use before and after cancer diagnosis.

alternative medical systems group ($\rho = 0.29$, $p < 0.01$; 95% CI: 0.12 to 0.44), the biologic products group ($\rho = 0.35$, $p < 0.01$; 95% CI: 0.19 to 0.49), and the spiritual therapies or mind–body systems group ($\rho = 0.35$, $p < 0.01$; 95% CI: 0.20 to 0.48).

DISCUSSION

Findings from the present study show that CAM use is prevalent among patients being treated at a regional cancer centre in Northern Ontario, with 60% of patients trying at least 1 form of CAM after a diagnosis of cancer. That rate is similar to rates of CAM use reported in other studies of patients with cancer. Depending on the type of cancer, patient demographics, the country in which the study was conducted, and the type of CAM being assessed, CAM use has been reported by 40%–85% of patients. In Europe, CAM use was reported by approximately 50% of patients with multiple cancer diagnoses[18,19], by 55%–65% of women diagnosed with breast cancer[20,21], and by 41% of patients diagnosed with melanoma[22]. The most commonly reported CAMs included diet or vitamins, spiritual practices, and natural health products. In the United States, CAM use was reported by approximately 85% of patients with cancer, with diet or vitamins, mind–body practices, and biologic products being the most common[23,24]. In a study from Alberta, 49% of colorectal cancer patients reported CAM use, with spiritual practices, diet or vitamins, and natural products being the most common[25]. Studies from Australia showed that 45%–65% of patients reported CAM use—a proportion that was not significantly different in rural and metropolitan areas[26] and that did not change after a cancer diagnosis[27].

Interestingly, our data showed differences in reported CAM use before and after a diagnosis of cancer. The most significant changes were seen in the use of biologic products such as green tea, ginger, curcumin, chaga mushrooms, and flaxseed oil (which are also called natural health products), with 52% of patients reporting use of a biologic product after a diagnosis of cancer compared with 15% of patients reporting such use before a diagnosis. Such use is cause for concern, because many patients falsely assume that because a product is "natural," it is also safe, and they therefore do not report their use to the health care team as they begin chemotherapy or radiation therapy. Some biologic products can interfere with prescribed treatments[28], and a discussion with the cancer treatment team is therefore important. Implementation of a patient intake questionnaire that includes more questions about CAM use would be helpful.

Some of the CAMs reported by our cancer patients have the potential to interact with standard chemotherapy. The most popular biologic product reported by cancer patients at our institution was green tea, whose use increased to 28% after diagnosis from 4% before diagnosis. Some studies suggest that tea polyphenols confer several benefits, such as the ability to synergistically enhance the anticancer properties of chemotherapeutic drugs or to protect against chemotherapy-induced toxicity. It has also been shown that green tea polyphenols might interfere with drug-metabolizing enzymes and drug transporters[29].

The second and third most commonly used biologic products were ginger and curcumin (turmeric), which are both known to have anti-inflammatory properties[20,30–32]. Some anti-inflammatory agents have been shown to decrease the toxicity of conventional chemotherapeutic agents[33]. In contrast, Lu and colleagues[34] found that treatment with curcumin significantly increased the sensitivity of paclitaxel-resistant non-small-cell lung cancer cells to paclitaxel. Other products are known to adversely affect the efficacy and pharmacokinetics of prescription medications (examples are grapefruit juice and St. John's wort, which can respectively inhibit or induce P450 enzyme activity), and many natural products are being consumed with unknown effects[35,36]. More research is therefore required to identify potential contraindications with those products.

TABLE I Questionnaire responses

Question	Choices	Response (%)
A. What were your reasons for deciding to use CAM?		
	You are just trying to do everything that can help	51.61
	Other	17.74
	Conventional treatment is too toxic	8.07
	CAM is more true to your beliefs and inner self	8.07
	You want to take control of your treatment	8.07
	Conventional treatment is too mechanistic/technological and lacks human touch	4.84
	Disappointed in efficacy of conventional medicine	1.61
B. What benefits were you hoping to get from the CAM you used in this cancer?		
	Stimulate your body's ability to fight the cancer	18.23
	Help relax/sleep	16.58
	Doing everything possible to fight the cancer	15.47
	Improve psychological/emotional well-being	13.81
	Improve physical well-being	12.71
	Relieve side effects of cancer treatments	11.05
	Relieve symptoms of cancer	4.42
	It will treat/cure your cancer	3.32
	Clean up wound	2.76
	Other	1.66
C. How did you come to know of the CAM you were using?		
	From friend	16.96
	From family members	16.96
	Internet	15.18
	From health personnel in the hospital	10.71
	From other patients	8.93
	From health care professional outside of hospital setting	8.04
	From CAM practitioner	5.36
	From mass media (television, newspaper, radio, magazines)	5.36
	From church/religious group	4.46
	Recommendation from staff at health food store	4.46
	Other	3.57

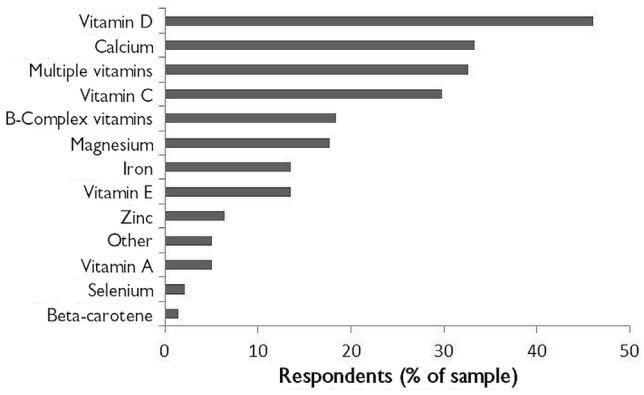

FIGURE 5 Reported use of vitamins and minerals.

Our study showed significant decreases in the use of chiropractic, massage, and acupuncture therapies after diagnosis (Figure 3). The use of chiropractic medicine in cancer patients remains understudied; evidence to determine whether chiropractic treatment should be recommended or avoided is insufficient. The Canadian Cancer Society's Web site states that "chiropractic therapy may not be recommended for patients with bone cancer, leukemia, or metastatic disease"[37] and that "certain hormone therapies may weaken bones or cause severe osteoporosis." Chiropractic therapy might therefore increase risk. Because the respondents in our study completed their questionnaires while they were on active treatment, the reduction in chiropractic use might correlate with the timing of the questionnaire. Our results showed a significant drop in acupuncture use in patients after diagnosis, and questionnaire respondents

did not offer any reason for the change. However, some studies suggest that acupuncture might be useful for reducing chemotherapy-induced nausea and vomiting[38]. Further investigation would be required to determine if those therapies benefit patients.

Approximately 20% of respondents said that they used prayer before diagnosis—a result similar to that reported in other studies from Canada (30%)[25] and the United States (20%)[24]. But use of prayer decreased to just 10% after diagnosis. The decrease in the number of reports of prayer use, while not significant after Bonferroni correction ($p = 0.07$) might deserve further study. Furthermore, that finding could be somewhat unfortunate given that studies have shown prayer to have some positive effects on health. For example, Carvalho *et al.*[39] showed that prayer was effective in reducing anxiety in cancer patients undergoing chemotherapy treatments.

Patients were asked about their reasons for starting CAM use (Table I). The most common answer was that "they were just trying to do everything that can help"—identified by 52% of respondents. Unfortunately, although patients think that combining CAMs with their cancer treatment is "helping," many are unaware that the CAMs could be negatively interfering with their conventional treatments. Many of our patients reported obtaining their information about the CAMs they were using from friends and family members or from the Internet; a much smaller group received their information from health care professionals. Knowing whether the patient has received accurate information about the potential risks of using a particular CAM and how that CAM might interact with cancer therapy is therefore difficult. For that reason, it is extremely important that the cancer treatment team be made aware of all CAMs used by patients during active treatment and that patients be educated about the potential dangers.

One of the most common reasons that physicians will recommend a CAM to a patient (if at all) is to help alleviate the side effects of cancer treatments or the symptoms of the cancer itself[40]. Interestingly, those benefits were not the ones most commonly expected by the questionnaire respondents. Approximately 20% of respondents said that they hoped the use of CAMs would help to stimulate the body's ability to fight the cancer. Patients also said that they preferred the treatment team to take a whole mind–body approach rather than treat just their disease. That approach is consistent with the idea of integrative medicine, which works toward a more patient-centred approach. Use of CAMs makes patients feel that they have more control over their own treatments.

Our study is limited by the fact the respondents represent a small anonymous population of patients undergoing treatment for any cancer at any stage. We chose to conduct an anonymous study to avoid patient concerns that their CAM use might be viewed with disapproval by their treatment team or might affect their treatment program. To avoid the potential for identification, we did not collect demographic or diagnostic information—both of which could affect the way patients use CAM. In addition, because we were most interested in identifying CAM use by patients during their normal therapy, we surveyed patients who were currently undergoing therapy; we did not survey for intensity of CAM use; and we did not define the duration for reporting CAM use. All of those factors could bias the results toward the use of CAM because patients might be most likely to "do everything that can help" as indicated by the patient responses (Table I).

CONCLUSIONS

Given the rising cost of health care, the aging population, and increased interest in nonconventional treatments, more people are turning to CAMs. Our results in a regional cancer treatment centre in Northern Ontario show that CAM use is reported by approximately 50% of patients—a proportion similar to that reported in other studies. However, our study also showed that patients significantly increased their reported use of biologic products after their cancer diagnosis. That observation has not previously been reported and seems at odds with a study conducted in rural Australia[27]. Our patients also reported a decrease in the use of alternative medical systems such as chiropractic and massage treatments, which is consistent with recommendations from the Canadian Cancer Society. Because patients will likely continue to use CAMs with or without the knowledge or approval of their health care team, it might be beneficial to add questions about CAM use to the patient's intake form and to provide more evidence-based information about CAMs to patients and health care professionals alike.

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CONFLICT OF INTEREST DISCLOSURES

We have read and understood *Current Oncology*'s policy on disclosing conflicts of interest, and we declare that we have none.

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