A Review of the Use of CAM Therapy and the Sources of Accurate and Reliable Information

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ABSTRACT

OBJECTIVE: To describe how pharmacists can answer the call by the Institute of Medicine (IOM) of the National Academies to become more involved in evaluating complementary and alternative medicine (CAM) and to suggest resources pharmacists can access to be better prepared to advise their patients about these therapies.

SUMMARY: Information published by the IOM in January 2005 clearly indicates that the American public considers CAM therapies increasingly to be “conventional” lifestyle choices rather than “alternative” practices. Some managed care organizations (MCOs) have offered CAM services for at least 8 years, and one of the nation’s largest MCOs created a network of CAM providers in 2003 with a 30% discount on provider fees. Pharmacists report an increase in questions regarding the use of herbal products and dietary supplements. As experts in drug-drug interactions, there is the expectation that pharmacists are a source of information for drug-herb interactions. Yet some surveys show pharmacists are uncomfortable answering questions about these products because, although there is an increase in the integration of CAM and conventional medicine, there are few scientific studies available to guide the clinical decisions that are necessary. The Office of Dietary Supplements (ODS) and the National Center for Complementary and Alternative Medicine (NCCAM) have increased funding of CAM research. There is a particular need for clinicians to become involved in assessing the safety and efficacy of these products. At least one health plan has created, through its pharmacy and therapeutics committee, a scientifically based, pocket-sized CAM guide that clinicians rated as somewhat to very helpful as a counseling aid.

CONCLUSION: With the increasing volume of information on CAM aimed at consumers by the press, television, Internet, and other media, it is critical for pharmacists to remain current in their knowledge. Pharmacists should know what the IOM is saying about CAM and develop relationships with the CAM practitioners in their communities. Pharmacists should know what reliable information resources are available and be able to evaluate the literature to help patients and providers interpret what they read and hear. It is important for pharmacists to have access to and be involved in ongoing evaluation of CAM therapies being used by so many people.

KEYWORDS: Complementary and alternative medicine, Pharmacy practice, Dietary supplements, Herbs, Botanicals, Pharmaceutical care, Information management, Clinical trials, NCCAM, IOM, NIH, ODS

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A recent article published in the Journal of Managed Care Pharmacy described the development of a scientifically based, pocket-sized CAM guide through its pharmacy and therapeutics (P&T) committee that clinicians rated as somewhat to very helpful as a counseling aid. The National Center for Complementary and Alternative Medicine (NCCAM), one of 27 institutes and centers making up the National Institutes of Health (NIH), defines CAM as “a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine.”

A 1990 national survey (1,539 adults contacted via telephone, with a 67% response rate) documented the prevalence, cost, and patterns of use of alternative medicine in the U.S. health care system. One in 3 respondents (34%) reported using at least 1 unconventional therapy in the past year, and a third of these had met with providers of unconventional therapy. Frequency of use of these therapies varied among sociodemographic groups. The highest use was found among nonblack respondents aged 25 to 49 years with more education or higher incomes. The majority reported using unconventional therapies for chronic medical conditions. Extrapolating the results suggests that, in 1990, Americans made an estimated $425 million (95% confidence interval, 302-548 million) visits to providers of unconventional therapy, a number exceeding the count of all visits to U.S. primary care physicians (388 million). The associated 1990 expenditures for these unconventional therapies were approximately $13.7 billion, three quarters of which ($10.3 billion) was paid out of pocket. This is comparable to out-of-pocket expenditures for all hospital care in the United States in 1990 ($12.8 billion) and nearly half the out-of-pocket payments for physicians’ services ($23.5 billion).

Other survey data confirm the extensive and growing use of CAM. Ten percent of survey respondents in 1994 and 42% in a public opinion poll in 1997 reported use of alternative medicine in the United States. The aforementioned national telephone survey conducted in 1990 was repeated by Eisenberg et al. in 1997 (2,055 adults contacted, with a 60% weighted response rate) and revealed an increase in CAM use from 33.8% in 1990 to 42.1% in 1997 (P ≤ 0.001). Therapies showing the most increase in use between 1990 and 1997 included herbal medicine, massage, megavitamins, self-help groups, folk remedies, energy healing, and homeopathy. Kessler and colleagues’ analyzed Eisenberg’s 1997 dataset, this time focusing on questions about first-time use of CAM by all individuals aged 18 years and older. These data are shown in Figure 1,
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![FIGURE 1](image-url)

Percent of Cohort Having Used One or More CAM Therapies by Age 33 at the Time of Survey

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Baby Boom (Aged 18-33 Years)</td>
<td>70%</td>
</tr>
<tr>
<td>Baby Boom (Aged 34-53 Years)</td>
<td>50%</td>
</tr>
<tr>
<td>Pre-Baby Boom (Aged &gt;54 Years)</td>
<td>30%</td>
</tr>
</tbody>
</table>

Note: Pre–baby-boom respondents were aged ≥54 years at interview and born before 1945, baby-boom respondents were aged 34 to 53 years at interview and born between 1945 and 1964, and post–baby-boom respondents were aged 18 to 33 years at interview and born between 1965 and 1979.


CAM = complementary and alternative medicine.

revealing lifetime use of CAM to be higher in younger age groups.

Eisenberg et al. attributed about one third of CAM use to disease prevention and health promotion. These appear to be the primary reasons that 50% of the baby-boom cohort, aged 34-53 years at the time of the survey (born 1945-1964), currently use CAM. In the coming quarter century, as this large cohort ages, its members will be acquiring chronic or disabling conditions that will likely result in further increases in CAM use. The post–baby-boom (younger age) cohort already uses CAM and that total yearly visits to CAM providers are exceeding visits to primary care physicians. An estimated 15 million adults take herbal remedies or high-dose vitamins along with prescription drugs. The annual out-of-pocket costs for CAM are estimated to exceed $27 billion.

The Centers for Disease Control and Prevention’s National Center for Health Statistics released a report based on its 2002 National Health Interview Survey in May 2004. The data were collected from a nationally representative sample of U.S. adults aged 18 years and older and a total of 31,044 interviews. Statistics were age-adjusted to the year 2000 U.S. standard population. When excluding prayer specifically for health reasons, the data show that 36% of adults had used some form of CAM therapy during the previous 12 months, most often to treat back pain or back problems, head or chest colds, neck pain or neck problems, joint pain or stiffness, and anxiety or depression. Using conservative assumptions about fees charged by alternative therapy practitioners, Eisenberg et al. estimated that Americans spent $21.2 billion on visits to these practitioners in 1997, of which at least $12.2 billion was paid out of pocket. This exceeds actual 1997 out-of-pocket expenditures of $11.1 billion for all hospitalizations and is more than half the amount of actual out-of-pocket payments for all physician services that year, $21.6 billion.

Including herbal remedies, megavitamins, diet products, and alternative therapy books, classes and equipment, total out-of-pocket expenditures related to alternative therapies in 1997 were estimated at $27 billion, a figure comparable to projected out-of-pocket expenditures for all U.S. physician services that year. Clearly, the American public considers CAM therapies less as “alternative” practices and increasingly as “conventional” lifestyle choices. This widespread increase in use parallels increasing safety concerns. These concerns are expressed in terms of product quality and safety as well as benefit/risk. With respect to the latter, historically safe use of herbal remedies and botanical supplements does not include current society’s use of prescription and over-the-counter agents. People not only take these agents concomitantly with botanicals, but they also tend not to tell their health care providers about such use. In both the 1990 and 1997 surveys by Eisenberg et al., fewer than 40% of CAM therapy users reported disclosing their use of these therapies to their physicians.

A recent review by Izzo and Ernst reveals the potential for fatal consequences when herbal products interact or interfere with the normal pharmacology of some pharmaceutical drugs. The most readily recognized drug-drug or drug-botanical interactions are those involving cytochrome P450 (CYP 450) enzymes. Consideration of these interactions in early drug development has been difficult because of uncertainty about whether the atypical kinetic behavior exhibited in vitro is clinically relevant. Yet understanding drug metabolism is critical to measuring the effect a drug will have in vivo. A confounding problem with herbal or specialty combination products is that each can...
Maizes et al. define integrative medicine as “medicine that re-phasizes the relationship between patient and physician, and integrates the best of complementary and alternative medicine with the best of conventional medicine.” Berndtson defines the term in a similar way, emphasizing the use of evidence. Whatever the definition, integrative medicine reflects the growing recognition by health care practitioners that many factors contribute to the health and well-being of individuals and the public. For example, in order to ascertain whether quantitative electroencephalography could detect differences between medication and placebo responders, 2 independent, double-blind, placebo-controlled studies examined brain function in depressed subjects receiving either an antidepressant or a placebo. Both placebo and antidepressant responders exhibited alterations in prefrontal brain function; however, these changes were distinctly different. Placebo responders showed a significant increase in prefrontal cerebral perfusion starting early in treatment. This was not seen in medication responders, who showed a decrease in prefrontal cerebral perfusion, or in nonresponders, medication or placebo, who showed no significant change. The authors suggest that future studies use brain function measures to explore the distinguishing features of placebo effects and investigate mechanisms by which placebo treatments might reduce depressive symptoms. It is important to remember that whether people are healthy or not has to do “not only with disease and illness, but also with who we are, where we live and work, and the social and economic policies of our government.”

In 1998, the American Hospital Association (AHA) began surveying hospitals on CAM services and found that only 6% of hospitals offered such services. By 2001, 15% of hospitals offered CAM services. When the AHA asked hospitals why CAM services were being offered, 49% indicated that it was in response to patient demand; integrative medicine is being driven by the consumer.

Cancer treatment centers frequently offer CAM therapies. The University of Texas M.D. Anderson Cancer Center supports an integrative medicine approach incorporating research, education, and a clinical program. “Place … of wellness offers more than 75 complementary therapy program opportunities, free of charge, to help with the nonmedical issues of living with cancer. It is a bridge between standard medical care and spiritual healing that we call complementary and integrative medicine.”

The Memorial Sloan-Kettering Cancer Center and the Dana Farber Cancer Institute also have integrative medicine centers. In 2003, a nonprofit organization of health professionals, the Society for Integrative Oncology, was created to provide a “convenient forum for presentation, discussion and peer review of evidence-based research and treatment modalities in the discipline known as integrative medicine” in cancer care.

Several attempts have been made to quantify use of CAM by conventional health care practitioners. Overall, interest is high, and many primary care physicians believe some of these therapies are useful adjuncts to conventional treatments.

As of December 2004, 22 medical centers in the United States belonged to the Consortium of Academic Health Centers for Integrative Medicine. These centers offer fellowships for physicians who want to incorporate CAM therapies into their practices. The University of Arizona’s Program in Integrative Medicine was founded in 1994 by Andrew Weil, MD. In 1997, this program’s faculty included a clinical pharmacist, the late Kathryn Grant, PharmD. Grant attended patient care conferences and worked with the first 4 physicians on fellowship in the program to incorporate allopathic and alternative remedies, while researching alternative treatments. In August 2004, Tieraona Low Dog, MD, joined the faculty of this program as director of botanical medicine. This is the first position of its kind at a conventional medical school in the United States.

In 2002, the Federation of State Medical Boards of the United States responded to the increased interest in CAM by approving model guidelines for the use of complementary and alternative therapies in medical practice, which had been developed at its request. (These model guidelines are available at the Federation of State Medical Boards Web site, www.fsmb.org, under Policy Documents.) Recognizing that standards in evaluating health care practices must be consistent, whether considered conventional or CAM, the model guidelines provide a methodology for evaluating physician adherence to the state’s medical practice act and the following “do no harm” criteria. They question whether the physician is using a treatment that is:

- effective and safe? Having adequate scientific evidence of efficacy and/or safety or greater safety than other established treatment models for the same condition.
- effective, but with some real or potential danger? Having evidence of efficacy, but also of adverse side effects.
- inadequately studied, but safe? Having insufficient evidence of clinical efficacy, but reasonable evidence to suggest relative safety.
- ineffective and dangerous? Proven to be ineffective or unsafe through controlled trials or documented evidence or as measured by a risk/benefit assessment.

The guidelines cover 7 aspects of patient care:

1. evaluation of patient
2. preparation of treatment plan
3. responsibilities during consultation and/or referral to other licensed health care provider
4. documentation of medical records

contain a multitude of naturally occurring chemicals that may either inhibit or induce the CYP 450 system. Evaluating various herbal products with such assays is an example of current research funded by NCCAM.
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5. documentation of medical knowledge with respect to methods offered
6. requirements for the sale of goods from physician offices
7. requirements for performing clinical investigations

Roles for Pharmacists

Pharmacists have the motive, opportunity, and means to play key roles in caring for patients taking, or considering taking, herbal products and other types of alternative medicines. By actively assuming responsibility for counseling on appropriate use of botanicals and dietary supplements, pharmacists gain recognition as a source of expert information in this rapidly growing area and will contribute to improving the quality of care (motive). Compared with other members of the health care team, pharmacists have more frequent interactions with patients (opportunity) and a deeper understanding of how medicines work, alone and in combination with other agents (means).

A recent cross-sectional mail survey of 107 community pharmacists in Texas revealed that most (70%) knew of patients who had used CAM. These pharmacists reported that patients asked them about CAM, particularly in pharmacies that stock herbal and homeopathic preparations. Despite a belief that they need to know when patients are using CAM therapies—to respond to potential drug-botanical interactions, for example—these pharmacists rarely asked patients about CAM use and appeared to be reluctant to respond to inquiries about CAM.

These pharmacists had the opportunity and motive to be information resources about CAM. The patients asked questions, and the pharmacists knew it was important to have the CAM information to provide optimal care, but many of these pharmacists did not have the means to provide reliable information. The authors of the survey reported that pharmacists with access to evidence-based information on CAM were more likely to ask patients about CAM use and answer their questions.

In 2000, the American College of Clinical Pharmacy (ACCP) published a white paper on herbal products, proposing that the basis for pharmacist involvement with herbal products is an extension of their roles in pharmaceutical care and clinical pharmacy practice and their participation on collaborative health care teams. Unfortunately, formal education of pharmacy students about herbal and natural products—pharmacognosy, in general—has declined steadily since the 1970s. As recently as 1997, 20 of 77 pharmacy schools in the United States reported no instruction in herbal/botanical products in their curriculum. Despite the increased use of these products, subsequent surveys have reported similar results, as shown in Table 1. Shields et al. also found that most formal instruction was offered in elective course work rather than in required pharmacy course work. Table 2 shows the courses offered in 64 schools of pharmacy.

In 2003, the National Association of Boards of Pharmacy began including questions regarding herbal products and nutraceuticals on the North American Pharmacist Licensure Examination. Perhaps this will provide further impetus for incorporating these topics into the pharmacy curriculum. Recent studies indicate medical and nursing schools are also adding CAM education to their curricula.

Shields et al. did note an increase in the number of pharmacy schools offering courses devoted to CAM/natural products topics in the past 5 years, from 7 to 40. Rowell et al. report that increased offerings may be reflecting increased student interest in these topics. For example, a 3-credit phytomedicine course, offered as an elective to third-year PharmD students by the College of Pharmacy at the University of Arizona, experienced an increase in enrollment following integration of phytomedicine principles into core medicinal chemistry and pharmacotherapy courses.

ACCP suggested integrating core information on herbal and natural products across the curriculum into medicinal chemistry, pharmaceutics, and therapeutics. Furthermore, they stated that discussion of botanicals in therapeutics courses should (a) emphasize the findings and limitations of current research and the levels of evidence supporting or refuting their use and (b) suggest that botanicals and alternative therapies be held to the same efficacy, safety, and effectiveness standards as conventional treatments. Following this exposure, specific pharmacy course work could be designed to address other skills needed to

### Table 1: Coursework in Colleges of Pharmacy

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<tbody>
<tr>
<td>Some coursework in</td>
<td>Pharmacognosy</td>
<td>CAM</td>
<td>CAM</td>
<td>Natural products</td>
</tr>
<tr>
<td>Affirmative response</td>
<td>74% (57/77)</td>
<td>72% (36/50)</td>
<td>73% (46/63)</td>
<td>80% (51/64)*</td>
</tr>
<tr>
<td>Average credit hours</td>
<td>3</td>
<td>N/A</td>
<td>2</td>
<td>2.45</td>
</tr>
</tbody>
</table>

Percentages refer to the number of colleges offering this instruction out of the total number of survey respondents.

* Includes 40 colleges of pharmacy teaching focused courses and 11 colleges of pharmacy offering miscellaneous lectures on natural products.

### Table 2: Breakdown of Course Offerings by 64 Schools of Pharmacy in the United States

<table>
<thead>
<tr>
<th>Course Offerings</th>
<th>Required</th>
<th>Elective</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural product-focused</td>
<td>2</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>CAM/natural product-focused</td>
<td>3</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>Miscellaneous lectures</td>
<td>11</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Schools without CAM/natural product offerings</td>
<td>–</td>
<td>–</td>
<td>13</td>
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</table>

CAM = complementary and alternative medicine.
prepare pharmacists for this additional responsibility: for example, the factors that motivate patients to use botanicals. ACCP outlined the following 4 core areas of focus for those involved in developing pharmacy curricula as well as for practicing pharmacists looking for continuing education in this subject area:

1. Pharmacists should have a thorough knowledge of the derivation, safety and efficacy, and drug interactions of common herbal and natural products.

2. All pharmacists should have the ability to triage individuals in an ambulatory environment to answer questions about herbal and dietary supplement products. 35-37

3. Pharmacists must have effective oral communication skills that incorporate an appreciation of the health beliefs of culturally and ethnically diverse populations.

4. Pharmacists must possess the technologic and critical appraisal skills for retrieving and evaluating relevant lay information and scientific literature on herbal topics.

Three studies have evaluated the tertiary literature (textbooks and drug compendia) used by pharmacists in drug information centers to answer questions about herbal and dietary supplement products. 33-35 Pooling the results of the 3 studies, the Natural Medicines Comprehensive Database Web site was able to answer more questions than any one of the other available references. However, the focus of these studies was whether a particular reference was able to answer a set of questions, not whether the information provided was accurate. That is, quantity was evaluated, not quality. There are very good reasons for this approach. Evaluating the accuracy of information in tertiary literature can be challenging, even more so when the subject is CAM. Chambliss et al. reviewed 52 books on botanical dietary supplements targeted to pharmacists and physicians, assessing their overall quality as primary and secondary references.

Books judged to have high value provided primary references to support statements and included information necessary to assess the potential for drug interactions and safe use during pregnancy and lactation.

■ CAM Examples in Community Pharmacy Practice

Suppose, for example, a patient wants to know if chamomile tea in the evening will be helpful in initiating sleep. This patient has a history of blood clots and is taking an anticoagulant. A monograph on German chamomile in the Expanded Commission E Monographs reveals no documented interactions with other drugs; the tea is used as a mild sedative and sleep aid in Germany but Commission E did not grant approval for such use because of lack of published data. Nevertheless, one study that is referenced indicates that a water soluble component of chamomile, apigenin, binds at benzodiazepine receptor sites. So, there is a molecular basis for a weak central nervous system depressing effect, which could be researched further by requesting the cited reference.

Tyler’s Honest Herbal provides information regarding isolated reports of allergic reactions to chamomile, but no other words of caution. This resource states that much of the value of chamomile lies in its volatile oil and that steeping the plant material for an extended time in a covered vessel extracts only about 10% to 15% of that volatile oil; however, when used over a long period, beneficial effects can accumulate. Mention is made of the presence of coumarins, in particular, herniarin and umbelliferone, which is of interest particularly if the patient is taking an anticoagulant. The only information given is that these substances contribute additional antispasmodic activity, along with other agents in the tea.

A 5-year-old copy of the Natural Medicines Comprehensive Database suggests that there is a theoretical possibility that large quantities of German chamomile interfere with anticoagulant therapy. Will the patient be drinking large quantities of chamomile? Recalling that “beneficial effects accumulate” leads to the hypothesis that this theoretical interference with anticoagulant therapy could increase over time. What is known about herniarin and umbelliferone? No mention is made of this theoretical interaction between anticoagulants and German chamomile in the more up-to-date online Natural Medicines Comprehensive Database. The reference for the interaction, found in the 5-year-old print material, is not included here, and, unlike the older print edition, the online database states that German chamomile may inhibit cytochrome P450 3A4 (CYP3A4) isoenzymes. Knowing that the anticoagulant the patient is taking is primarily a substrate of CYP2C8/9, what is the appropriate advice to give this patient? Is the chamomile available for purchase German chamomile? How much chamomile is in the tea bag or capsule? Does the manufacturer of the tea bag/capsule provide a principal component analysis of the chamomile to account for variability in chamomile species/subspecies? Perhaps it is safe for your patient to drink the chamomile infusion, but what about efficacy?

■ Efficacy Versus Effectiveness Considerations

Efficacy studies are performed under strictly controlled conditions that are carefully designed to reveal a difference in efficacy if a difference truly exists. The study patient population is typically defined narrowly, measurements are generally made under optimum conditions, and interpretation is highly controlled and well defined. The gold standard for efficacy studies is the randomized, placebo-controlled, double-blind clinical trial (RCT). The results of efficacy studies are offered as “proof of principle” in support of continuing studies such as effectiveness studies, which may explore the size of the effect in different study populations, at different clinical sites, and under different conditions of practice that are not as controlled as RCTs.

In essence, “efficacy” refers to whether well-controlled clinical trials show a treatment effect whereas “effectiveness” refers to whether the treatment effect transfers to real-world populations.
Viewed in terms of internal and external validity, “efficacy” has more to do with internal validity and “effectiveness” has more to do with external validity, i.e., generalizability. Botanical products present formidable challenges in designing efficacy and effectiveness studies because of a host of factors that include uncertainty of the true active ingredient and inconsistency in the formulation and quantity of ingredients in various sources of a given botanical product. Most of these products are not sufficiently characterized to test efficacy or predict that similarly prepared products would be effective in wider public use. Isolating the active agent(s) in botanicals and determining the mechanism of action(s) are essential first steps in their investigation.

### TABLE 3 CAM Reference Resources

<table>
<thead>
<tr>
<th>References</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Churchill Livingston; 1996.</td>
<td></td>
</tr>
<tr>
<td>**The Complete German Commission E Monographs: Therapeutic Guide to Herbal</td>
<td>380 monographs, 190 herbs and fixed combinations approved for therapeutic use, 150 indicators. Sometimes lacking references to primary literature.</td>
</tr>
<tr>
<td>Blumenthal M, Goldberg A, Brinckmann J, eds. **Herbal Medicine: Expanded</td>
<td>New in-depth overviews on 107 monographs with clinical research, expanded sections on chemistry and pharmacology, extensive references.</td>
</tr>
<tr>
<td>Wilkins; 2000.</td>
<td></td>
</tr>
<tr>
<td>**Tyler’s Honest Herbal: A Sensible Guide to the Use of Herbs and Related</td>
<td>Good review of herbal products focusing on pharmacognosy, with some clinical applications.</td>
</tr>
<tr>
<td>Robbers JE, Tyler VE. **Tyler’s Herbs of Choice: The Therapeutic Use of</td>
<td>Authoritative reference on basic herbal principles, herbal regulatory history, and a listing of herbal therapies by disease states.</td>
</tr>
<tr>
<td>Schulz V, Hänsl R, Blumenthal M, Tyler VE. Rational Phytotherapy: A</td>
<td>Practice-oriented introduction to phytotherapy, based on 100 of the most widely prescribed herbal medications in Germany, organized by organ systems and indications. Includes drug-botanical interactions.</td>
</tr>
<tr>
<td>Reference Guide for Physicians and Pharmacists. 5th ed. Berlin, Germany:</td>
<td></td>
</tr>
<tr>
<td><strong>Physicians Desk Reference (PDR) for Herbal Medicines.</strong> 3rd ed. Stamford,</td>
<td>Some monographs are based on German Commission E; however, a recent review of the 2nd edition found inconsistencies.</td>
</tr>
<tr>
<td>CT: Thomson Healthcare; December 2004.</td>
<td></td>
</tr>
<tr>
<td><strong>Natural Standard: The Authority on Integrative Medicine.</strong> Ulbricht C,</td>
<td>Publishes the Journal of Herbal Pharmacotherapy and produces evidence-based CAM information in monthly newsletters. Monographs available online include references to the primary literature with links to abstracts on PubMed.</td>
</tr>
<tr>
<td>Basch E, chief eds. Available at: <a href="http://www.naturalstandard.com">www.naturalstandard.com</a>.</td>
<td></td>
</tr>
<tr>
<td>**American Botanical Council (ABC). Available at: <a href="http://www.herbalgram.org">www.herbalgram.org</a>.</td>
<td>ABC publishes HerbalGram; it is a nonprofit education and resource organization, offering PharmD internships.</td>
</tr>
<tr>
<td><strong>Owen DJ. The Herbal Internet Companion: Herbs and Medicine Online.</strong></td>
<td>Categorized and evaluated Web sites essential to providing up-to-date, reliable information to both consumers and health care professionals.</td>
</tr>
<tr>
<td><strong>National Institutes of Health:</strong> NCCAM:</td>
<td>“Health information” links go to resource lists for finding evidence-based information on CAM therapies, access to PubMed searches, and information on current clinical trials. Free online video overview of CAM use. CME credit available. International Bibliographic Information on Dietary Supplements (IBIDS) database.</td>
</tr>
<tr>
<td><a href="http://nccam.nih.gov">http://nccam.nih.gov</a></td>
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<td><a href="http://ncicam.nih.gov/videolectures/">http://ncicam.nih.gov/videolectures/</a></td>
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<tr>
<td><a href="http://www.ods.od.nih.gov/Health_Information/IBIDS.aspx">http://www.ods.od.nih.gov/Health_Information/IBIDS.aspx</a></td>
<td></td>
</tr>
<tr>
<td><strong>Kinghorn AD, ed. The Journal of Natural Products.</strong> (Published by the</td>
<td>Among the top journals in medicinal chemistry, this publication disseminates research results relating to the chemistry and/or biochemistry of naturally occurring compounds. Targeted audiences include natural product chemists, biochemists, pharmacologists, taxonomists, and ecologists.</td>
</tr>
<tr>
<td>American Chemical Society and the American Society of Pharmacognosy.)</td>
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<tr>
<td>Available at: <a href="http://pubs.acs.org/journals/jnprdl/">http://pubs.acs.org/journals/jnprdl/</a></td>
<td></td>
</tr>
<tr>
<td>**United States Pharmacopeia (USP). Available at: <a href="http://www.usp.org/USP">http://www.usp.org/USP</a></td>
<td>USP establishes public standards for all prescription and over-the-counter medicines, dietary supplements, and other health care products manufactured and sold in the United States. In addition to the standards, medication safety reporting and free health care information are available from this Web site.</td>
</tr>
<tr>
<td>Dietary Supplement Verification Program Available at: <a href="http://www.usp.org/">http://www.usp.org/</a></td>
<td></td>
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<tr>
<td>USPVerified/</td>
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<tr>
<td>**World Health Organization (WHO). Available at: <a href="http://www.who.int/">http://www.who.int/</a></td>
<td>WHO monographs on selected medicinal plants (Volumes 1 and 2) with information on pharmacology, dosing, contraindications, and precautions against potential adverse reactions. WHO Strategy on Traditional Medicine: 2002-2005.</td>
</tr>
<tr>
<td>medicines/areas/traditional/en/index.html. (Click on “Publications,” located</td>
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<tr>
<td>in the center of the page under “More Information.”)</td>
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**CAM = complementary and alternative medicine.**
via efficacy studies.
In its 2001 report, the IOM described an “effectiveness RCT,” taking the position that when evaluating treatments, “the results of a single well-designed outcomes study should be considered as compelling as the results of a single well-controlled randomized trial.”44 While the NCCAM committee chose not to recommend one particular hierarchy of evidence and concurs that, in general, an RCT is the preferred study design if the issue is establishing treatment efficacy, other study designs, including observational studies or effectiveness RCTs, may provide equally compelling evidence as that provided by an efficacy RCT.10(pp.97,98) CAM research is sometimes viewed as analogous to researching new surgical procedures. In both cases, there may be a long time lag between development, first use of a treatment, and the subsequent assembly of a body of scientific evidence of effectiveness.

Resources to Answer CAM Questions
An understanding of pharmacology was necessary to answer the chamomile question, particularly when considering that the patient was taking another medicine. Comorbidities are common in patients, and this is one of the reasons it is critical for pharmacists to actively monitor the use of prescription medicines, botanicals, and dietary supplements. Decisions about the use of a specific treatment are highly dependent on understanding the pharmacology of other treatments already in place.

The process for finding, evaluating, and providing information, in general, is well documented in Drug Information, A Guide for Pharmacists.45 This text provides an extensive listing of resources beneficial for providing drug information related to both drug therapy and disease state management, including some specific to natural products that are included in Table 3.

Natural Standard,46 an international research collaboration founded by clinicians and researchers, aggregates and synthesizes data on CAM therapies. Information is incorporated into monographs based on a combination of evidence and consensus followed by blinded editorial and peer-review process. The monographs, designed to facilitate clinical decision making, are fully referenced to the primary literature with links to the abstracts available online. In addition to the databases, Natural Standard publishes monthly newsletters, reference books, research reports, and the Journal of Herbal Pharmacotherapy.

The American Botanical Council (ABC) is a nonprofit education and research organization dedicated to promoting the safe and effective use of medicinal plants and phytomedicines.45 As part of its ongoing mission to educate health care professionals about herbal medicine, ABC offers a 6 week internship program for PharmD students through the University of Texas at Austin, College of Pharmacy. ABC publishes its journal HerbalGram and provides a literature review service and continuing education materials to health care professionals. Information about these and other services provided by ABC is available at: www.herbalgram.org.

Varro Tyler has said, “More misinformation regarding the efficacy of herbs is currently being placed before the consumer than at any previous time, including the turn-of-the-century heyday of patent medicines.”46 As documented in the NCCAM report, consumer interest and demand for herbal preparations and dietary supplements has increased dramatically. With the advent of increased accessibility to the Internet, consumers have more access to products and information. A 1997 study of Internet herbal information by students at the Albany College of Pharmacy compared claims made about 11 popular herbs with data from peer-reviewed journals and found that 45% of associated claims were true, 6% were false, and 2% were meaningless.47 The remaining 47% of claims were labeled as undetermined because no scientific evidence could be found to either support or refute the claim. Claims were also evaluated for substantiation either in the form of direct evidence on the Web site or references to supporting data, and only 36% of the Internet claims were substantiated; of these, only 40% could be verified as true.

An excellent guide to reliable herbal information on the Internet is The Herbal Internet Companion, by David Owen, education coordinator/librarian at the University of California, San Francisco and assistant clinical professor at the UCSF School of Pharmacy.48 Noting a lack of agreement among practitioners and researchers regarding authoritative resources on the use of herbs, educating health professionals and consumers to assess the quality of health-related information found on Web sites has become critically important. This small paperback book is essential in providing this education as well as categorizing and evaluating Web sites essential to providing up-to-date, reliable information to both consumers and health care professionals.

The NIH NCCAM home page has a “health information” link that will take the reader to a list of resources for finding evidence-based information on CAM therapies, including a link to free-of-charge searching for CAM articles on PubMed. A search for chamomile at the NCCAM Web site yielded a link to a clinical trial evaluating relaxation/guided imagery and chamomile tea in the treatment of functional abdominal pain in children. NCCAM has issued an evaluation of its accomplishments for the first 5 years along with a strategic plan for years 2005-2009. Complimentary copies can be ordered or downloaded from the NCCAM Web site.49

The NIH Office of Dietary Supplements maintains another excellent (and free) online resource.50 Clicking on the “health information” link will take the reader to a number of resources that can be used to formulate answers to patient questions about herbal and dietary supplements. The Journal of Natural Products, published jointly by the American Chemical Society and the American Society of Pharmacognosy, focuses on the chemistry and/or biochemistry of naturally occurring compounds or the biology of living systems these compounds
are derived from.\textsuperscript{31} The United States Pharmacopoeia (USP) develops and distributes quality standards and information for medicine and health care delivery.\textsuperscript{32} The United States Pharmacopoeia-National Formulary (USP-NF), available online, contains standards for medicines, dosage forms, drug substances, excipients, medical devices, and dietary supplements. Voluntary testing of the quality of ingredients used in dietary supplements is offered by USP, and a listing of supplements tested and where they are available is available online. USP offers educational courses, including a free dietary supplement education program available at the Web site, and operates 2 medication safety programs.

\section*{CAM Has Become Mainstream With Opportunities for Pharmacists}

There is no doubt that use of CAM in the United States is widespread, with more than one third of adults in the United States reporting use of some form of CAM, total annual visits to CAM providers now exceeding visits to primary care providers, and annual out-of-pocket costs for CAM in excess of $27 billion. Friends share information about CAM remedies with each other, and television, the press, the Internet, and other media push CAM information to consumers. Hospitals already are offering, and managed care organizations are covering, some CAM therapies. Oxford Health Plans, now part of UnitedHealth Group, began offering a comprehensive CMA program 8 years ago, with a chronic pain management component for managed Medicare members that included massage therapy.\textsuperscript{15} Humana, in 2003, initiated a network of CAM providers—the American WholeHealth Network—providing a 30% discount to Humana members who use the network. Schools of medicine, nursing, and pharmacy are beginning to teach CAM subjects, particularly botanicals and dietary supplements.

NIH is actively promoting involvement of practitioners in investigating which CAM therapies show promise for incorporation into conventional or integrative medical practice. Pharmacists have an important role in the effective use of CAM therapies. Pharmacists are close to patients, with more contact hours than most other health care professionals. Pharmacists are motivated to be the experts on all drug interactions, including drug-herbals. Pharmacists are experts at finding information. Of course, finding information is only the first step to answering a patient's question. Slawson and colleagues write, "Information is not knowledge. Knowledge comes from the interpretation of information. While we are constantly bombarded with data and information, what we want is knowledge and wisdom, i.e., the ability to understand and apply the facts."\textsuperscript{34}

All pharmacists have a role in the effective use of CAM therapies. Individual pharmacists can have an effect on the quality of patient care in CAM therapy by assessing the information that is available on relevant Web sites or becoming involved in the government-sponsored organizations mentioned in this article. Community pharmacists and managed care pharmacists can investigate the services available at the integrative medicine centers in local service areas. Managed care pharmacists can also organize or participate in CAM subcommittees of P&T committees.

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\section*{REFERENCES}

A Review of the Use of CAM Therapy and the Sources of Accurate and Reliable Information


