

REVIEW



Evaluating the Economics of Complementary and Integrative Medicine

评估补充和整合医学的经济性

Evaluación de los aspectos económicos de la medicina complementaria e integradora

Patricia M. Herman, ND, PhD

ABSTRACT

Healthcare in the United States is expensive and becoming more so every year. Policy and decision makers increasingly need information on costs, as well as effectiveness and safety, in order to formulate healthcare strategies that are both clinically effective and financially responsible.

Many people believe the benefits of complementary and integrative medicine (CIM) exceed its costs. Surveys have shown that a substantial portion of the US population uses CIM and pays directly for that use.¹⁻⁴ The most recent estimates show that total US out-of-pocket expenditures for CIM were \$34 billion—11% of all US out-of-pocket healthcare expenditures.¹ However, if CIM is to be considered in broader healthcare strategies, its economic impact must be determined.

Theoretically, CIM seems a good candidate for cost-effectiveness, and even cost savings, because it avoids high technology, offers inexpensive and noninvasive remedies, encourages healthy lifestyle change, and focuses on the whole person, all of which may improve health beyond the targeted disease or condition. However, to many in the conventional healthcare system, CIM is seen only as an “add on” expense. What must be demonstrated via economic evaluation are the healthcare costs that can be avoided through the use of CIM.

CIM offers the potential for several avenues of cost reduction. The first is as a direct replacement for the usual conventional therapy for a condition. The second is in terms of lower future healthcare utilization both in general (through treating the whole person) and for the targeted disease or condition. A third avenue to cost

reduction is through reducing productivity loss for employers. A reduction in costs to employers does not directly reduce healthcare costs (unless the employer is itself a healthcare facility); however, both are costs to society. Productivity losses can be reduced through improved employee health, and potentially through the improved employee well-being and empowerment offered by CIM.

摘要

在美国进行医疗保健很昂贵，且年年递增。政策和决策制定者越来越需要获取关于费用，有效性和安全性的信息，以制定临床有效且经济的医疗保健政策。

许多人相信补充和整合医学 (CIM) 的益处超过其成本。调查已显示美国人口中有相当一部分使用 CIM 并直接为之付款。1-4最近的估算显示美国 CIM 现款支付总额为 340 亿美元，占美国全部现款支付医疗保健开支的 11%。但是，如果要在更宽泛的医疗保健策略中考虑 CIM，则必须确定其经济影响。

理论上讲，CIM 似乎是有效控制成本的良好候选，其甚至可节省成本，因为其不用高科技，提供价廉和非侵入式的救治方法，还鼓励改用健康的生活方式及以整体来关注个人，所有这些都可能改善整体健康，超出仅对靶向疾病或病况的治疗。但是，对于常规医疗保健系统中的许多人而言，CIM 只被看作“附加”开销 必须通过经济性评估而证明的，是因使用 CIM 而可以避免的医疗保健成本。

CIM 为消减成本提供了多条可能的渠道。首先是作为一病情的常规治疗的直接替代品。其二是降低对未来医疗保健的利用，包括总体（以整体来治疗个人），及靶向疾病或病况。消减成本的第三种渠道是让雇主的生产力损失得以减少。减少

雇主成本不会直接消减医疗保健成本（除非雇主本身即是医疗保健机构）；但是，这两种成本均属社会成本。生产力损失可以通过员工健康的改善，也可以潜在地通过提高员工福利和CIM 的赋能得到改善。

SINOPSIS

La atención sanitaria en Estados Unidos es costosa y su coste aumenta cada año. Los encargados de la elaboración de las políticas y de la toma de decisiones necesitan cada vez más información sobre los costes, así como de la seguridad y eficacia, para formular estrategias de atención sanitaria que ofrezcan eficacia clínica y responsabilidad financiera.

Muchos creen que los beneficios de la medicina complementaria e integradora (MCI) superan sus costes. Diversos estudios han demostrado que una parte importante de la población estadounidense usa la MCI y paga directamente tal uso.¹⁻⁴ Los cálculos aproximados más recientes muestran que el total de gastos directos en Estados Unidos para la MCI ascendió a 34 mil millones de dólares, el 11 % de todos los gastos sanitarios directos estadounidenses.¹ Sin embargo, si se pretende incluir la MCI en las estrategias sanitarias más amplias, debe determinarse su impacto económico.

En teoría, la MCI parece un buen candidato para obtener rentabilidad e incluso ahorro de los costes, ya que evita la alta tecnología, ofrece remedios económicos y no invasivos, promueve un cambio a un estilo de vida saludable y se centra en la persona en su totalidad, todo lo cual puede mejorar la salud más allá de la enfermedad o el trastorno que se pretende

Adapted with permission from *Evaluating the Economics of Complementary and Integrative Medicine*, CreateSpace Independent Publishing Platform, Seattle, Washington; 2012. This work is supported by the US Army Medical Research and Materiel Command under Award no. W81XWH-06-1-0279. The views, opinions, and/or findings contained in this report are those of the author and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation. The book from which this article was adapted is available at www.SamueliInstitute.org.

Author Affiliation

RAND Corporation, Santa Monica, California; Samueli Institute, Alexandria, Virginia.

Correspondence

Patricia M. Herman, ND, PhD
pherman@rand.org

Citation

Global Adv Health Med. 2013;2(2):56-63. Published online 12 Mar 2013. DOI: 10.7453/gahmj.2013.002

Key Words

Healthcare, complementary and integrative medicine, costs, economic evaluation

tratar. Sin embargo, muchas personas del sistema sanitario tradicional consideran que la MCI es únicamente un “gasto adicional”. Lo que debe demostrarse mediante una evaluación económica son los costes económicos que pueden evitarse por medio del uso de la MCI.

La MCI ofrece diversas avenidas posibles para la reducción de los costes. La primera es la sustitución

directa del tratamiento tradicional habitual para un trastorno. La segunda se obtiene gracias a una menor utilización de la atención sanitaria en el futuro tanto en general (el tratamiento de la persona en su totalidad) como para la enfermedad o el trastorno que se trata. Una tercera vía hacia la reducción de los costes es mediante la reducción de las pérdidas de productividad de emplead-

ores. La reducción en estos costes no disminuye directamente los costes sanitarios (a menos que el empleador sea un centro sanitario). No obstante, ambos son costes para la sociedad. Las pérdidas de productividad pueden reducirse por medio de la mejora de la salud de los empleados y, posiblemente, por la mejora de su bienestar y la autonomía que ofrece la MCI.

ECONOMIC EVALUATION OF COMPLEMENTARY AND INTEGRATIVE MEDICINE (CIM)

The concepts and techniques described here for the economic evaluation of CIM are the same as those used for conventional medicine.⁵ This is necessary in order for results to be accepted and understood by the policy and decision makers who make decisions about, and allocate resources to, the various components of the healthcare system. However, there are some differences in how the techniques may be applied for CIM. Many of these differences were delineated by the Economic Toolkit Expert Panel Conference sponsored by the Samueli Institute and held January 2011 at the RAND Corporation offices in Santa Monica, California. Below is a summary of the key aspects of economic evaluation particularly salient to CIM.

Patient Perspective

Because much of CIM is accessed directly through patient self-referral and paid out-of-pocket, the patient's perception of whether the benefits of care exceed its cost is important. Thus, the practices and outcomes valued by the patient become critical in CIM. The patient perspective is, for the most part, ignored in economic evaluations of conventional medicine. It should be noted that the benefits of care to the patient may extend beyond health improvement for the condition of interest and beyond health improvement in general. Patients may also derive value from the process of care (eg, their relationship with their practitioner) or through the self-empowerment achieved through actively improving their health. These additional patient benefits can be missed if the context and goals of CIM and the patient perspective are not considered.

Availability of Data on the Effectiveness of Therapies

Economic evaluation requires information on both the health benefits (ie, effectiveness) and costs of the therapies under consideration. There are many challenges involved in determining the effectiveness of CIM. By extension, these same challenges also affect economic evaluations of CIM.

Appropriate and Well-defined Comparators

To be useful to healthcare policy and decision makers, the CIM therapy under consideration should be compared to some version of the care presently provided to that patient population (ie, usual care). For generalizabil-

ity and treatment fidelity, both need to be well-defined. One challenge in evaluating CIM is that it can be anything from a simple therapy (eg, taking capsules containing the herb Willow bark) to multi-component collaborative care at an integrative medicine clinic. In an economic evaluation both comparators need to be defined to the level where their differences end. For example, comparing the use of Willow bark to a nonsteroidal antiinflammatory drug may only require a description of the contents of each capsule if both are administered by the same practitioner in the same clinic. Comparing care at an integrative clinic to care at a conventional clinic requires defining at least the different therapies offered, the types of practitioners involved and their training, the clinic setting, and any differences in how patients access each clinic.

Health Outcomes and Quality-adjusted Life-years

Because CIM tends to address the whole person rather than target a specific symptom or disease, it can have a broader range of health impacts. Therefore, it is important to measure both a wide range of outcomes and to consider using a summary measure of overall health that could capture the full range such as quality-adjusted life-years (QALYs). Care must be taken to use measures that are sensitive within the range of wellness seen in the target population.

Measuring the Costs of CIM

There are several systemic issues specific to CIM when measuring costs. These include the fact that since much of CIM is not covered by insurance, claims data are not readily available for analysis; that there is little published information on the cost or amount charged for individual CIM services; and since CIM can have broad health impacts, one must consider whether to capture all healthcare costs or only those related to the condition of interest.

WHAT ECONOMIC EVALUATION DOES AND DOES NOT DO

Economic evaluation adds information on costs to the information already available on a therapy's safety and effectiveness. Cost data are essential to allow for efficient resource allocation—ie, to allow decision makers to identify the distribution of resources (funds, staff, equipment and facilities across various populations) that generates the greatest overall good. Because the results of

economic evaluation bring this additional crucial information to a decision, there is sometimes the illusion that the results are “the answer.” However, there are many considerations that go into a decision that are beyond the scope of an economic evaluation. For example, economic evaluations focus on efficiency—achieving the greatest total health gain possible from the resources available. They do not directly address equity—whether the costs and health gains are distributed fairly. They also do not address whether the therapies are legal, ethical, or politically acceptable. Therefore, although the results of economic evaluations can bring more information to a decision, they alone are not sufficient to make the decision.

A second main point is that although health outcomes are, to some extent, considered generalizable across settings, economic outcomes usually are not.⁶ This is likely because human physiology and psychology tend to be more consistent and replicable across locations and settings than are resource availability, practice patterns, and relative prices. Therefore, whereas meta-analysis can be used across the results of a number of trials to generate broad (ie, generalizable) statements regarding the efficacy (or effectiveness) of a particular therapy for a particular health condition, similar broad statements regarding cost-effectiveness are usually not possible. In the face of this specificity regarding setting, one goal in economic evaluation is to ensure the transferability of study results—ie, to provide enough study detail so that results can be adapted (usually via modeling) to other settings.⁷

BASIC PRINCIPLES OF ECONOMIC EVALUATION

First Principle: Economic Evaluation as a Decision-making Tool

Economic evaluation is performed to provide information which is useful to decision makers who are facing options—eg, whether a new therapy should be offered or new approach to care adopted. The use of economic evaluation as a decision-making tool has at least three implications.

An Added Dimension of Information. Because most decision makers desire safe and effective health-care, they gain useful information from the results of clinical trials which indicate whether one therapy or approach is safe and more effective (eg, better at reducing blood pressure) than another. Economic evaluation expands upon this by providing concurrent information on both effectiveness and cost. The added dimension of cost is important because few decision makers can ignore the cost implications of their choices. Adding costs to the analysis allows for the consideration of both effectiveness (ie, whether something provides more health benefits) and efficiency (ie, whether the additional effectiveness is worth the cost) in decisions.

Consider Figure 1. This is the type of information available to decision makers from effectiveness studies. This graph shows the results of four hypothetical effectiveness trials. Each of four new therapies (therapies A, B, C, and D) was compared to the therapy in current use (ie,

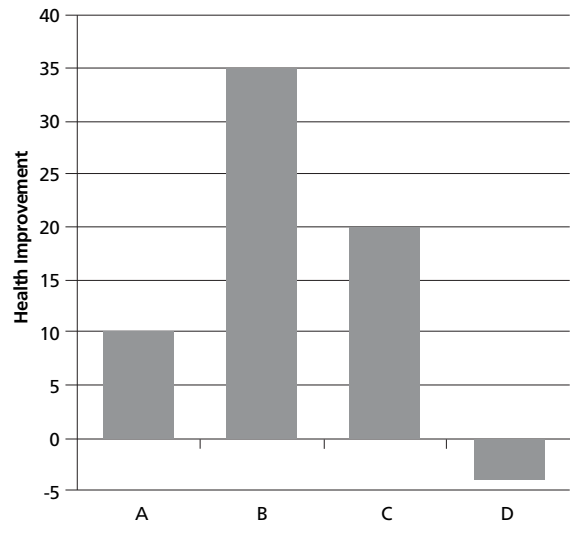


Figure 1 Effectiveness results for four therapies.

usual care). The height of the bar in each case indicates the amount that each therapy improves health over what it would have been under usual care. If you were a decision maker, which would you choose?

Most people would choose therapy B because it is the most effective—offers the largest health improvement. However, what if you also had the information available in Figure 2? What would your decision be now? In addition to considering effectiveness (ie, options that will improve health), you would now have the ability to consider your budget and whether the additional health improvement was worth its cost. If your budget is tight, and you could take the savings and use them to do greater good in some other disease area, you may now choose therapy A, which offers both a health improvement and a cost savings of \$100 per patient. On the other hand, if you had some money available in your budget and the additional health benefits were worth at least \$4 per unit (\$80/20 additional units of health improvement), you

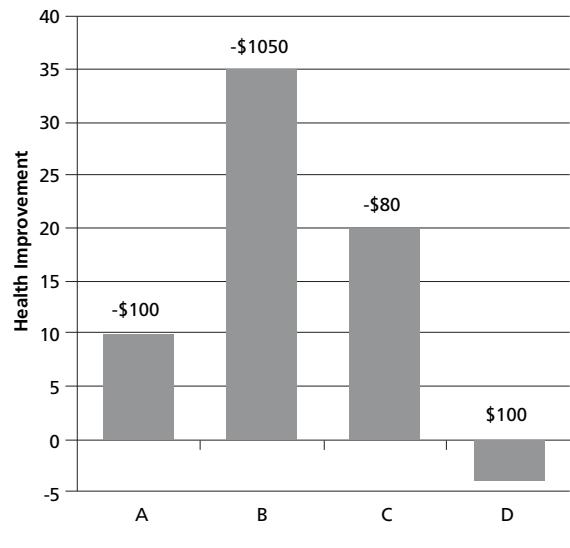


Figure 2 Effectiveness and cost results for four therapies.

may now choose therapy C. Note that only in the case where you had the funds available and where these health improvements were worth at least \$30 per unit (\$1050/35) would you choose therapy B, even though it is the most effective.

Realistic Comparisons. To be useful for decision makers, an economic evaluation has to compare costs and effectiveness between two or more alternatives, and each of these alternatives has to be a realistic possibility. It is unusual for a healthcare decision maker to consider offering placebo as a therapy option. Therefore, placebo is rarely an appropriate comparator in an economic evaluation. That is, it is generally of little use to decision makers to know whether a particular therapy is more or less cost-effective than placebo. Along these same lines, it is often helpful to include a comparison to present care (or usual, standard, or routine care) to allow a clear assessment of whether moving from where an organization is at present (ie, offering the present form of care) to some alternative makes sense.

Timeliness and Relevance. For economic evaluation to have a primary purpose as a decision making tool, it must be timely and relevant. The information must be available to decision makers in time for it to be of use to the decision—eg, before the budget is due. Therefore, an economic evaluation must be practical and have the overall goal of providing the best information available within the timeframe available. The information must also be relevant to that decision maker and decision. The economic evaluation must use unit costs that are comparable to those faced by the decision maker and compare alternatives that are feasible and of interest—eg, usual care should represent what is usual for that decision maker's situation.⁸

Second Principle: Incremental Analysis

In the simplest sense, an economic evaluation involves the comparison of benefits to costs and allows consideration of whether the benefits achieved are worth the costs incurred. However, in making this comparison it is important to realize that the real question being asked is: Are the additional benefits of one option over another worth the additional costs of that option over the other? In other words, are the incremental (or net) bene-

fits of one option over another worth the *incremental* (or net) costs? An economic evaluation always assumes that the decision maker is in one situation (eg, a health plan covers a particular set of procedures for back pain or a hospital offers a particular set of therapies) and is considering whether to change this situation (eg, by adding coverage for a new procedure or replacing one therapy with another). Therefore, it is the cost (and effect) of that *change* that is important.

As an example, the Table presents the results of a 2004 economic evaluation comparing usual general practitioner (GP) care alone to the addition of osteopathic spinal manipulation for subacute back pain.⁹ Although one could compare the simple ratios of costs to outcomes for each arm of the study, the correct comparison is that of incremental costs to incremental outcomes. This tells how much we are paying, for each additional QALY gained, to add osteopathy. In brief, a QALY adjusts each year of life by the health-related quality of life experienced during that period. A year of life under perfect health has a value of 1.0, and death has a value of 0.0. Therefore, the relevant cost per QALY for the addition of osteopathy in the United Kingdom is £3650, not £5411 per QALY. The decision makers in this example (the United Kingdom's National Health Service - NHS) were already getting a gain (over baseline) of 0.031 QALYs per patient at a cost per QALY of £6935. Their question is: how much do the 0.025 additional QALYs gained from adding osteopathy cost? They cost £88 per patient, or £3560 per QALY. It is now up to the NHS to decide whether this amount is cost-effective (ie, whether the health gains are worth the cost).

Third Principle: Perspective of the Analysis

This principle calls attention to one of the first challenges in determining the costs to include in an economic evaluation: Whose view (perspective) of costs should be used? For example, the cost of acupuncture is different if you are a hospital, a health plan, or a patient. The cost of acupuncture from the perspective of the hospital would include the cost of the needles and the space needed to offer the service plus the cost to pay the acupuncturist and any staff needed for scheduling. The cost of acupuncture from the point of view of the health plan would include the amount reimbursed for each acupuncture session. The cost of acupuncture from the patient's

Table Economic Evaluation of Adding Osteopathy to Usual General Practitioner Care for Subacute Back Pain

	Cost	Health outcome (QALY gain)	Ratio of cost to outcome (£/QALY) ^a
Usual care	£215	0.031	£6935
Usual care plus osteopathy	£303	0.056	£5411
Increment of the addition of osteopathy over usual care alone	£88	0.025	£3650

Costs are reported for fiscal year 1999/2000.

^a The first two numbers in this column were calculated from numbers available in Williams et al (2004).⁹ The last number in this column was taken directly from the article and was apparently calculated using a cost and/or QALY estimate with more decimal places than reported in the article. Nevertheless, the relative sizes of these cost estimates are still valid for explanatory purposes.

Abbreviation: QALY, quality-adjusted life-year.

perspective would be the amount he or she would have to pay out-of-pocket for each session plus the time and expense incurred in getting to the appointment.

In general, the perspective of the analysis is determined by the identity of the decision maker the economic evaluation is intended to inform. If the purpose of the economic evaluation is to provide information to health plans on whether it makes sense to provide coverage for a particular therapy, then that economic evaluation should be performed from the perspective of a health plan (ie, the third-party payer perspective). It should be noted that many economic evaluations contain results from more than one perspective, and, thus, are useful to more than one type of decision maker. In practice, much of the data collection and analysis required for one perspective can also serve to produce results relevant to another perspective. This is especially true of the societal perspective that captures all costs no matter who pays.

There are as many possible perspectives as there are decision makers. However, the most common perspectives used in published studies are those of the third-party payer (eg, health insurance companies), hospital, employer, or society as a whole. The societal perspective accumulates all outcomes, while the others are more selective.

The Panel on Cost Effectiveness in Health and Medicine, appointed by the US Public Health Service, recommends that all economic evaluations include a “reference case” analysis from the societal perspective.¹⁰ The panel argues that the societal perspective is in line with the view that decisions are most likely fair when they are made in the public interest and not in the interest of those who would directly gain or lose. The Panel goes on to say that the societal perspective “is the only perspective that never counts as a gain what is really someone else’s loss.”^{10(p7)} Ideally, decision makers who are establishing state or national healthcare policy would take the societal perspective because they are concerned with the impact of a healthcare decision on all their constituents.

One perspective that is rarely used in published economic evaluations of healthcare is that of the patient. The costs to the patient are included in the societal perspective, but since much of CIM depends on patient self-referral and given increasing interest in patient-centered healthcare, separate reporting of results from the patient perspective makes sense. These results can give an indication of an option’s relative attractiveness to patients. Also, explicit consideration of the patient perspective will help ensure that the societal perspective truly contains all costs.

A final point is that although the perspective mainly determines the costs to use in an economic evaluation, it is also important that the health benefits (or effects) measured are of interest to the decision maker. For example, a government official may be interested in the cost of broad health improvements such as are measured by QALYs; however, a hospital administrator may not be.

Instead, a hospital administrator may be most interested in having beds available. Therefore, an economic evaluation aimed at informing this administrator might report results in terms of the cost per day of hospital stay reduced rather than per QALY gained.

Fourth Principle: The Type of Economic Evaluation

There are a number of different types of economic evaluation. The main types of full economic evaluations are cost-effectiveness analysis (CEA), cost-utility analysis (CUA), and cost-benefit analysis (CBA). These differ mainly in the manner in which health impacts are measured and included. If the health impacts are measured in some standard natural unit such as years of life saved or percentage point reductions in hemoglobin A_{1c} (HbA_{1c}), then the economic evaluation is a cost-effectiveness analysis. If health impacts are measured more broadly in terms such as QALYs, then it is a cost-utility analysis. However, if the health impact has been monetized (eg, given a dollar value) using a human capital or “willingness to pay” type method, then it is a cost-benefit analysis. There is also one other type of economic evaluation (cost consequence analysis or CCA) that may be especially useful to CIM. It presents all costs and outcomes for each alternative and leaves it to the decision maker to choose those that are most relevant.

Cost-effectiveness Analyses (CEA). These are the most common type of economic evaluation found in the literature. One reason is because a CEA can directly use the health outcome units measured in the effectiveness trial(s). If the health outcome is a widely accepted clinical measure for a particular disease or condition, cost-effectiveness analysis results using that outcome can then be directly compared across therapy options for that disease or condition. For example, various options to lower HbA_{1c} could all be directly compared using CEA results in terms of a cost-per–percentage point reduction in HbA_{1c}. The disadvantage of using CEA is that it does not allow direct cost comparisons across healthcare options available for different diseases. Also, of particular concern for CIM, CEA would allocate all costs to just one of what could be many different types of health effects seen. For example, a CIM therapy targeting diabetes may not only lower HbA_{1c} but also improve blood lipids, sleep, and overall energy.

Examples of CIM studies using different health outcomes in CEA include cost per reduction in percent breech presentations at delivery for pregnant women who were given moxibustion of acupuncture point *Zhiyin* (Bladder 67)¹¹; cost per days free of back pain and/or Roland disability score change from the Alexander technique or massage¹²; and cost per hip fracture avoided in a study of tai chi for nursing home residents.¹³

Cost-utility Analyses (CUA). These analyses are intended to improve upon the limitations of CEA by incorporating a broad measure of health. This broad measure of health attempts to incorporate all aspects of health

(or its opposite, disease or morbidity) and mortality and allows direct comparisons across all types of therapies targeting all types of health states. Because CUAs use a broad measure of health, they are an especially good type of economic evaluation for CIM. “Utilities” in health economics “are numbers that represent the strength of an individual’s preference for different health outcomes under conditions of uncertainty.”^{14(p241)} The conventional utility scale allocates a utility of 1.0 for complete or perfect health and 0.0 for being dead. States worse than death can have negative utility values. Utility scores are used as the preference or quality-of-life weights when calculating QALYs. The reference case recommended by the US Panel on Cost Effectiveness in Health and Medicine is a CUA from the societal perspective using QALYs as the measure of health outcomes.¹⁵ Note that there can be problems with interpretation of utilities and that many utility measures are in various stages of development, so it is sometimes recommended that both CEA and CUA results be presented.¹⁶

Examples of CUA in CIM include the series of studies of acupuncture for various conditions (chronic low back pain, headache, dysmenorrhea, and allergic rhinitis), each of which reported a cost per QALY from the societal perspective.¹⁷⁻²¹

Cost-benefit Analyses (CBA). These include all costs and benefits in monetary terms. In the ideal sense, CBAs have three advantages. The first is that costs can be directly subtracted from benefits to give the net monetary benefit of one option over another. The second is that like CUAs, a CBA should be able to incorporate the monetary value of all the health benefits of an option and to allow comparisons across therapies targeting different disease states. The third is that a CBA should also be able to incorporate non-health-related benefits—eg, the value of patient empowerment. These last two advantages should make CBA the economic evaluation of choice for CIM.⁵ However, the big disadvantage of CBAs is that they require that a monetary value be put on health—and on all other outcomes. Monetizing health is morally problematic for many people. Therefore, few CBAs have been done in healthcare.²² In fact, CBA has been called “a formulation in search of data.”^{23(p12)} No CBAs of CIM from a societal perspective were found in a recent search. However, the following could be an example of a CBA from the employer perspective: costs compared to the health benefit to employers of naturopathic care for chronic low back pain.²⁴ The health benefit was measured as reduced absentee days, which were then valued using the cost to the employer (in terms of salary and benefits—ie, using a human capital approach) of each absentee day.

Cost-consequence Analysis (CCA). This is a form of full economic evaluation that makes few assumptions and places the greatest burden on the user of the analysis.¹⁴ This analysis lists the cost components and various outcomes of each therapy separately, leaving it to the

decision maker to prioritize and choose the costs and outcomes of most interest from his or her point of view. In this way a CCA can be considered to be a method for reporting the results of a full economic evaluation. Because of the broad range of health and other outcomes seen in CIM, CCA seems particularly suited to these evaluations. Using CCA, individual health impacts (eg, biomarkers and reports of function improvement for the health condition of interest, as well as other positive side effects such as improvements in cognitive function, energy, pain, sleep, mood, well-being, etc) and summary measures (eg, QALYs) can each be listed for each therapy. This allows the decision maker to both see the range of benefits offered by and the cost impacts of CIM and to note those of most interest and relevance to the decision at hand. It is recommended that all economic evaluations of CIM report their outcomes in terms of a CCA, whether or not the analysis goes on to report specific CEA, CUA, or CBA results under one or more perspectives.

An example of a CCA of CIM is an economic evaluation that compared treatment by a musculoskeletal medicine physician (using acupuncture, manual therapy, injections, and other pain management techniques) to management by an orthopedic surgeon-led team for patients with “nonsurgical” musculoskeletal conditions (eg, low back pain and soft tissue knee injuries).²⁵ The report lists the number and cost of each type of individual treatment given and a number of different health outcomes for each group.

Other Types of Economic Evaluation. There are a number of other types of studies that include costs but are not full economic evaluations. CEA, CUA, and CBA are all considered forms of full economic evaluations because they compare costs and health effects between two or more therapies. Cost minimization analysis (CMA) includes an explicit assumption that the health impacts of the therapies compared are equivalent; therefore, CMA has been called a full economic evaluation.²⁶ However, it is no longer regarded as such.^{23(p12)} Instead, it is now considered to be a partial economic evaluation. Other types of partial economic evaluations include cost outcome descriptions, which consider the costs and health outcomes of only one therapy (ie, no comparison) and cost comparisons, which compare only costs between two or more healthcare options.^{22,23} Many cost comparisons have been mistakenly called CBAs because they include monetized values.²² However, because they lack a measure of health benefit, they are partial economic evaluations and not CBAs.

A study that described the diagnoses, prescriptions, and costs of patients seen by a sample of French homeopathic general practitioners is an example of a CIM cost outcome description.²⁷ An example of a cost comparison evaluation in CIM is a study that used claims data to determine and compare the costs reimbursed per patient for physicians in Switzerland who were certified to practice homeopathy, anthroposophic medicine, neural therapy, and/or traditional Chinese medicine to those who were not.²⁸

Because the type of economic evaluation mainly differs in the form in which the health effects are reported, more than one type can be reported in one study. For example, it is common that both CEA and CUA results are presented. Also, it is common in the literature for CEA, CUA, and CBA to be mislabeled²² and for the terms cost-effectiveness analysis and cost-benefit analysis to be used as general terms each encompassing all types of economic evaluation. Finally, as noted above in the third principle, the perspective of the analysis mainly determines the costs to include in an economic evaluation. However, perspective should also be considered when determining the appropriate form of the health benefits and thus, the type of economic evaluation performed.

INTERPRETING AND REPORTING THE RESULTS OF ECONOMIC EVALUATIONS OF CIM

Proper interpretation and reporting of economic evaluations are important for a number of reasons. These include ensuring that the results are accessible and useful to targeted (and potential) decision makers, making the results as potentially transferable to other settings as possible, and getting the study published. There have been several different sets of guidelines published regarding the quality of economic evaluations.²⁹⁻³³ The *BMJ* has published a guideline for their economic submissions,³⁴ and this or another of the published checklists should be followed for all economic evaluation manuscripts. These guidelines are to economic evaluations what the various CONSORT statements are to manuscripts describing the results of clinical trials. To this end, note that the proper write-up of an economic evaluation requires its own manuscript, separate from the one reporting effectiveness results, if the economic evaluation was performed alongside a clinical trial. It is recommended that one or more of these guidelines be obtained early in the study design process so that study authors are prepared to respond to the information required in their manuscript. Examples of well-reported economic evaluations of CIM, in terms of the *BMJ* checklist, include

- Wonderling et al (2004)³⁵—a study of acupuncture for chronic headache.
- Hollinghurst et al (2008)³⁶—a study of Alexander technique and massage for low back pain.
- Herman et al (2008)²⁴—a study of naturopathic care for chronic low back pain.

Interpretation of the Results of Economic Evaluations

There are four main outcomes from an economic evaluation, and these each relate to a quadrant of what has been called a cost-effectiveness decision matrix (Figure 3).

The horizontal dimension of this matrix is determined by the results of effectiveness trials and captures the answer to the question of whether the therapy under consideration provides better or worse health outcomes than usual care. Clearly, in most cases, a decision maker would

Increased Costs	Definitely Reject Alternative (Base Case Dominates)		Decision: Are Benefits Worth the Cost?
		Indifferent	
No Change			
Cost Savings	Decision: Is Health Loss Worth the Savings?		Definitely Adopt Alternative (Alternative Dominates)
	Worse Health	No Change	Improved Health

Figure 3 Cost-effectiveness decision matrix.

give more positive consideration to a therapy that improves health outcomes—ie, has results which land on the right side of the matrix. The vertical dimension is determined by costs and is the dimension added by economic evaluation. Here, in most cases, a decision maker would give more positive consideration to a therapy that reduces costs (as compared to usual care), so preference would be given to results landing in the lower part of this matrix.

If a therapy both improves health outcomes and lowers costs compared to usual care (ie, lands in the lower-right quadrant), then that therapy is said to dominate, and the message from the economic evaluation would be that this therapy should be strongly considered for adoption. Of course, there are other considerations that must be taken into account (including equity, ethics, and legal issues) in the final decision. If health is improved but at a cost, be cautious about declaring something as cost-effective. Remember that whether something is or is not cost-effective is a judgment call that is ultimately up to the decision maker,³⁷ and the resources to implement a higher-cost effective therapy (ie, therapies in the top-right quadrant of the matrix) have to come from somewhere.

Generalization of the Results of Economic Evaluations

Whereas health outcomes are, to some extent, considered generalizable across settings, economic outcomes usually are not.⁶ This is because human physiology and psychology are generally more consistent and replicable across settings than are resource availability, practice patterns, the expertise of staff, financial incentives to providers, and local prices.³⁸ Basically, “[o]perational efficiency may not be relevant to the clinical outcome, but it is critical to the cost outcome.”^{38(p695)} Therefore, whereas meta-analysis can be used across the results of a number of trials to generate broad (ie, generalizable) statements regarding the efficacy (or effectiveness) of a particular therapy for a particular health condition, similar broad statements regarding cost-effectiveness are usually not possible. The results of any particular study should be reported as specific to that setting—ie, “the addition of individualized acupuncture provided by Traditional Chinese Medicine-trained, licensed acupuncturists practicing in private acupuncture clinics in the United Kingdom for low back pain is cost saving from the societal perspective when compared to usual care alone.”³⁹

One goal in economic evaluation is to ensure the transferability of study results—ie, to provide enough study detail so that results can be adapted (usually via modeling) to apply to other settings.⁷ Studies have shown that the aspect of setting which has the most effect on costs is unit price.⁴⁰ Fortunately, the problem of price variation across settings is the easiest to handle methodologically through the separate reporting of resource use and unit costs.^{8,41} Therefore, economic evaluations of CIM should at least meet this reporting requirement.

CONCLUSION

Complementary and integrative medicine (CIM) is usually defined as those approaches to health that are outside mainstream medicine.⁴² In overcoming this exclusion, CIM faces a number of challenges of credibility as well as the need to show safety, effectiveness, and cost-effectiveness. Therefore, effectiveness trials and economic evaluations of CIM may have to meet a higher quality bar than those of conventional medicine. There is also limited funding for all research but especially for CIM. This is why well-designed and well-done effectiveness trials are essential and economic evaluations should be added wherever possible. It is also imperative that the results of these efforts be well reported. It is only by generating high-quality evidence that CIM can be considered at the healthcare policy table.

REFERENCES

- 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. Hyattsville, MD: National Center for Health Statistics; 2009.
- Barnes PM, Powell-Griner E, McFann K, Nahin RL. Complementary and alternative medicine use among adults: United States, 2002. Hyattsville, MA: National Center for Health Statistics; 2004.
- Eisenberg DM, Davis RB, Ettner SL, et al. Trends in alternative medicine use in the United States, 1990-1997. *JAMA*. 1998;280(18):1569-75.
- Eisenberg DM, Kessler RC, Foster C, Norlock FE, Calkins DR, Delbanco TL. Unconventional medicine in the United States: prevalence, costs, and patterns of use. *New Engl J Med*. 1993;328:246-52.
- Spinks J, Hollingsworth B. Are the economics of complementary and alternative medicine different to conventional medicine? *Expert Rev Pharmacoecon Outcomes Res*. 2009;9(1):1-4.
- Drummond M, Manca A, Sculpher M. Increasing the generalizability of economic evaluations: recommendations for the design, analysis, and reporting of studies. *Int J Technol Assess Health Care*. 2005;21(2):165-71.
- Drummond M, M. B, Cook J, et al. Transferability of economic evaluations across jurisdictions: ISPOR good research practices task force report. *Value Health*. 2009;12(4):409-18.
- Bonsel GJ, Rutten FFFH, Uyl-de Groot CA. Economic evaluation alongside cancer trials: methodological and practical aspects. *Eur J Cancer*. 1993;29A(Suppl 7):S10-S14.
- Williams NH, Edwards RT, Linck P, et al. Cost-utility analysis of osteopathy in primary care: results from a pragmatic randomized controlled trial. *Fam Pract*. 2004;21(6):643-50.
- Gold MR, Patrick DL, Torrance GW, et al. Identifying and valuing outcomes. In: Gold MR, Siegel JE, Russell LB, Weinstein MC, editors. *Cost-effectiveness in health and medicine*. New York: Oxford University Press; 1996:82-134.
- van den Berg I, Kaandorp GC, Bosch JL, Duvekot JJ, Arends LR, Hunink MG. Cost-effectiveness of breech version by acupuncture-type interventions on BL 67, including moxibustion, for women with a breech fetus at 33 weeks gestation: a modelling approach. *Complement Ther Med*. 2010;18(2):67-77.
- Hollinghurst S, Shaw A, Thompson EA. Capturing the value of complementary and alternative medicine: including patient preferences in economic evaluation. *Complement Ther Med*. 2008;16:47-51.
- Wilson CJ, Datta SK. Tai chi for the prevention of fractures in a nursing home population: an economic analysis. *J Clin Outcomes Manage*. 2001;8(3):19-27.
- Berger ML, Binglefors K, Hedblom EC, Pashos CL, Torrance GW, Smith MD, editors. *Health care cost, quality, and outcomes: ISPOR Book of Terms*. Lawrenceville, NJ: International Society for Pharmacoeconomics and Outcomes Research; 2003.
- Gold MR, Siegel JE, Russell LB, Weinstein MC, editors. *Cost-effectiveness in health and medicine*. New York: Oxford University Press; 1996.
- Drummond M, O'Brien B, Economics Workgroup. Economic analysis alongside clinical trials: practical considerations. *J Rheumatol*. 1995;22(7):1418-9.
- Reinhold T, Witt CM, Jena S, Brinkhaus B, Willich SN. Quality of life and cost-effectiveness of acupuncture treatment in patients with osteoarthritis pain. *Eur J Health Econ*. 2008;9(3):209-19.
- Witt CM, Jena S, Selim D, et al. Pragmatic randomized trial evaluating the clinical and economic effectiveness of acupuncture for chronic low back pain. *Am J Epidemiol*. 2006;164(5):487-96.
- Witt CM, Reinhold T, Brinkhaus B, Roll S, Jena S, Willich SN. Acupuncture in patients with dysmenorrhea: a randomized study on clinical effectiveness and cost-effectiveness in usual care. *Am J Obstet Gynecol*. 2008;198(2):166.e1-8.
- Witt CM, Reinhold T, Jena S, Brinkhaus B, Willich SN. Cost-effectiveness of acupuncture treatment in patients with headache. *Cephalalgia*. 2008;28(4):334-45.
- Witt CM, Reinhold T, Jena S, Brinkhaus B, Willich SN. Cost-effectiveness of acupuncture in women and men with allergic rhinitis: a randomized controlled study in usual care. *Am J Epidemiol*. 2009;169(5):562-571.
- Zarnke KB, Levine MAH, O'Brien BJ. Cost-benefit analyses in the health-care literature: don't judge a study by its label. *J Clin Epidemiol*. 1997;50(7):813-822.
- Drummond MF, Sculpher MJ, Torrance GW, O'Brien BJ, Stoddart GL. *Methods for the economic evaluation of health care programmes*. Third ed. Oxford: Oxford University Press; 2005.
- Herman PM, Szczurko O, Cooley K, Mills EJ. Cost-effectiveness of naturopathic care for chronic low back pain. *Altern Ther Health Med*. Mar-Apr 2008;14(2):32-9.
- Brown AP, Kennedy AD, Torgerson DJ, Campbell J, Webb JA, Grant AM. The OMENS trial: opportunistic evaluation of musculo-skeletal physician care among orthopaedic outpatients unlikely to require surgery. *Health Bull*. 2001;59(3):199-210.
- Drummond MF, O'Brien B, Stoddart GL, Torrance GW. *Methods for the economic evaluation of health care programmes*. Second ed. Oxford: Oxford University Press; 1997.
- Trichard M, Lamure E, Chaffuerin G. Study of the practice of homeopathic general practitioners in France. *Homeopathy*. 2003;92:135-9.
- Busato A, Eichenberger R, Kunzi B. Extent and structure of health insurance expenditures for complementary and alternative medicine in Swiss primary care. *BMC Health Serv Res*. Oct 11 2006;6:132.
- Siegel JE, Weinstein MC, Torrance GW. Reporting cost-effectiveness studies and results. In: Gold MR, Siegel JE, Russell LB, Weinstein MC, editors. *Cost-effectiveness in health and medicine*. New York: Oxford University Press; 1996.
- Gerken S, Crott R, Cleemput I, et al. Comparison of three instruments assessing the quality of economic evaluations: a practical exercise on economic evaluations of the surgical treatment of obesity. *Int J Technol Assess Health Care*. 2008;24(3):318-325.
- Siegel JE, Weinstein MC, Russell LB, Gold MR. Recommendations for reporting cost-effectiveness analyses. *JAMA*. 1996;276(16):1339-1341.
- Ofman JJ, Sullivan SD, Neumann PJ, et al. Examining the value and quality of health economic analyses: implications of utilizing the QHES. *J Managed Care Pharm*. 2003;9(1):53-61.
- Ramsey SD, Sullivan SD. Weighing the economic evidence: guidelines for critical assessment of cost-effectiveness analyses. *J Am Board Fam Pract*. 1999;12(6):477-85.
- Drummond MF, Jefferson TO; BMJ Economic Evaluation Working Party. Guidelines for authors and peer reviewers of economic submissions to the BMJ. *BMJ*. August 3 1996;313:275-83.
- Wonderling D, Vickers AJ, Grieve R, McCarney R. Cost effectiveness analysis of a randomised trial of acupuncture for chronic headache in primary care. *BMJ*. 2004;328(7442):747.
- Hollinghurst S, Sharp D, Ballard K, et al. Randomised controlled trial of Alexander technique lessons, exercise, and massage (ATEAM) for chronic and recurrent back pain: economic evaluation. *BMJ*. 2008;337:a2656.
- Donaldson C, Currie G, Mitton C. Cost effectiveness analysis in health care: contraindications. *BMJ*. 2002;325(7369):891-4.
- Ellwein LB, Drummond MF. Economic analysis alongside clinical trials: bias in the assessment of economic outcomes. *Int J Technol Assess Health Care*. 1996;12(4):691-7.
- Ratcliffe J, Thomas KJ, MacPherson H, Brazier J. A randomised controlled trial of acupuncture care for persistent low back pain: cost effectiveness analysis. *BMJ*. 15 Sep 2006;333(7569):626.
- Sculpher MJ, Pang FS, Manca A, et al. Generalisability in economic evaluation studies in healthcare: a review and case studies. *Health Technol Assess*. 2004;8(49).
- Drummond MF, Davies L. Economic analysis alongside clinical trials: revisiting the methodological issues. *Int J Technol Assess Health Care*. 1991;7(4):561-73.
- National Center for Complementary and Alternative Medicine. What is complementary and alternative medicine (CAM)? [Website]. 2011; <http://nccam.nih.gov/health/whatiscam/>. Accessed October 29, 2011.