Review Article

Review of Economic Methods Used in Complementary Medicine

Christopher M. Doran, Ph.D.,1 Dennis H.-T. Chang, Ph.D.,2 Hosen Kiat, M.B., F.R.A.C.P., F.A.C.C., F.A.C.P.,3 and Alan Bensoussan, Ph.D.2

Abstract

Objective: The purpose of this research is to review the economic methods used in complementary medicine (CM).

Method: A comprehensive literature review was undertaken (1995–2007) to identify peer-reviewed articles related to economic methods used in CM.

Results: The literature found 15 full economic evaluations of CM: 3 in the manipulative and body-based practices, 5 in the whole medical systems, and 7 in the biologically based practices. No evaluations were identified for the areas of mind–body medicine, alternative medical systems, or energy medicine. The review failed to locate any articles that used alternate economic methods such as contingent valuation or discrete choice modelling. The overall consensus from the 15 economic evaluations, despite variations in project design and methodological rigor, was that CM, as evaluated in these studies, was cost-effective compared to usual care.

Conclusions: As health care costs continue to rise, decision makers, both consumers and policymakers, must allocate scarce resources toward those treatments that offer the best value for the money. Considerable scope exists to advance the science behind CM through a more systematic integration of economic methods into CM research.

Introduction

Complementary medicine (CM) has been described as diagnosis, treatment, and/or prevention that complements mainstream medicine by contributing to a common whole, satisfying a demand not met by orthodoxy, or diversifying the conceptual frameworks of medicine.1 Ernst conducted a systematic review of the evidence relating to the global use of CM and reported prevalence rates ranging from 9% to 65%.2 In Australia, evidence suggests that 1 in 2 people regularly use CM, and these consumers spend more on CM than on prescription drugs.3

In spite of the growing body of evidence on the quality and effectiveness of CM,2,4–7 there is a dearth of evidence examining the economics of CM, and in particular, evidence relating to economic evaluation. There are two types of economic evaluation: partial or full.8 Partial evaluations are limited in scope because they focus either on costs or consequences but not both. Full economic evaluations compare both the costs and consequences (or outcomes) of competing health care interventions and can therefore demonstrate whether the new intervention represents value for money. Full economic evaluations present results as an incremental cost-effectiveness ratio that provides policymakers with the information required to justify expenditure decisions.8

There are three types of full economic evaluation: cost-effectiveness analysis (CEA), cost–utility analysis (CUA), and cost–benefit analysis (CBA).8 All types of analyses use a similar method for measuring and valuing resources used in an intervention. The social perspective considers resource use from all potential stakeholders such as the government, health care providers, and patients themselves. A third payer perspective is narrower and considers resources used specifically from the viewpoint of the health care insurer. The distinguishing feature between analyses is how consequences are measured (and valued). In CEA, the consequence is measured in a unit natural to the intervention (for example, number of urinary tract infections prevented or lives years saved). In CUA, the consequence is expressed as a more final outcome measure that considers changes to both quality and quantity of life as a result of the intervention. Common utility measures include the quality-adjusted-life-year (QALY) and

1National Drug and Alcohol Research Centre, University of New South Wales, Sydney, New South Wales, Australia.
2Centre for Complementary Medicine Research, University of Western Sydney, Penrith, New South Wales, Australia.
3School of Advanced Medicine, Macquarie University, New South Wales, Australia.
the disability-adjusted-life-year. In a CBA, the consequences are measured, and then valued, in monetary terms with results expressed as a ratio of costs to benefits. Drummond et al. (2005) provide a good overview of each technique.8

In a review by Herman et al. covering the period 1999–2004, 14 economic evaluations of CM were identified.9 The authors noted several possible explanations for the paucity of such evidence. First, consumers already spend considerable amounts of money on CM despite the limited scientific evidence on the efficacy of CM. Second, economic evaluations have typically been required for the incorporation of new procedures and therapies under traditional financing mechanisms. Given that CM has traditionally fallen outside public funding, there has, perhaps, been little need to justify value for money.9 In addition, some commentators have further suggested that the current application of economic evaluation techniques may be limited in CM given the inability of these techniques to accurately capture both the absolute magnitude of process-related benefits from CM and their magnitude relative to conventional treatment.9,10

While CBA is considered to be the “gold standard” in economic evaluation,8 the application of this technique in evaluating health care interventions is somewhat limited. This is due to the ethical issues surrounding the valuation of health improvement and ultimately human life.10,11 However, a recent advance in the economics literature is the development of tools to translate underlying preferences and outcomes (both process and final) into monetary terms. The most common measure of benefit in monetary terms is willingness to pay (WTP)12 and there are two commonly accepted techniques to estimate WTP: contingent valuation methods (CV) and discrete choice experiments (DCE).

CV is a decision-based approach where individuals are presented with a choice between not having a good or service and having the good or service but foregoing a certain amount of money. The WTP is equivalent to the money that they are willing to forego to have the good or service.12 It is important to note that WTP measures have also been criticized as they are strongly influenced by an individual’s ability to pay. DCE, on the other hand, is an attribute-based measure of benefit based on the assumption that any good or service can be described by its characteristics (or attributes), and the extent to which an individual values a good or service depends upon the levels of these characteristics.13 The technique is also decision-based and involves presenting choices to individuals that vary with respect to the level of attribute. The key feature of WTP assessments derived using DCE is the fact that process attributes can be factored into the decision-making process. WTP implicitly allows consumers to trade all relevant utility components with each other and with health. Another feature of DCE is that results can be used to produce utility estimates for alternatives with different attribute levels. These utilities can then be used in a CUA as the common outcome measure to compare two interventions.11,13

Given that there is a range of economic methods available, the purpose of this research is to review the economic methods that have been used in CM. It is envisaged that such a review may shed light on the current state of play that economics can, and may, play in advancing the scientific rigor of CM.

Methods

A literature review was undertaken using several electronic databases to identify peer-reviewed publications. These databases included: MEDLINE® (Ovid), AMED (Allied and Complementary Medicine), Cochrane Database of Systematic Reviews; NHS Economic Evaluation Library Database (via Cochrane Library); The Cochrane Central Register of Controlled Clinical Trials; Web of Science; Social Science Citations Index; EMBASE; PsychINFO, Complementary and Alternative Medicine via Pub Med, and Natural Medicines Comprehensive database. Search engines such as Google and Yahoo were also utilized. Key economic and health-related journals were also hand searched to increase coverage of recently published research articles.

A sensitive approach was used in order to maximize the number of articles retrieved; searching was restricted to English language journals and databases for the period 1995–2007, inclusive. A combination of subject heading term searches and natural word searches was used. Three (3) categories of search terms were used: (1) complementary and alternative medicine, including complementary medicine, complementary healthcare, alternative medicine, and alternative therapy; (2) economic evaluation such as cost, cost-effectiveness, cost-utility and cost-benefit; and (3) economics including utility, health economics, preferences, and discrete choice experiments. The results of these strategies were then combined. Articles were imported into Endnote 9 and checked for duplicates, which were subsequently removed.

Results

A total of 148 articles were located, which was reduced to 43 articles after closer examination of each abstract to ensure that studies adopted some type of economic method. After closer inspection of these 43 studies, all related to traditional economic evaluations, with no studies identified exploring alternate economic methods. The economic evaluation studies were further scrutinized to remove partial economic evaluations. As mentioned previously, partial evaluations are not relevant to policymakers in the context of priority setting, as such evaluations do not provide a comparison of costs and consequences of competing alternatives. This left 15 full economic evaluations, which were then grouped into CM domains as defined by the United States National Institute of Health: biologically based practices; manipulative and body-based approaches; mind–body medicine; alternative medical systems; and energy medicine.14

A summary of the key features of the 15 economic evaluations are provided in Table 1. Three (3) articles related to the manipulative and body-based practices domain, five in the whole medical systems domain, and seven in the biologically based practices domain. No full economic evaluations were identified for the domains of mind–body medicine, alternative medical systems, or energy medicine.14

In the manipulative and body-based practices domain, three studies conducted CUA: Korthals-deBos et al. (2004) compared physiotherapy, manual therapy, and general practitioner (GP) care for patients with neck pain;19 Williams et al. (2004) compared osteopathy and GP care for patients with spinal pain,16 and Van Tubergan et al. compared combined spa therapy, exercise therapy, and usual care in patients with ankylosing spondylitis.17 All three evaluations were
<table>
<thead>
<tr>
<th>Country</th>
<th>Complementary medicine treatments against comparator of usual care (patient group)</th>
<th>Economic approach, study design (N)</th>
<th>Perspective, year</th>
<th>Economic outcome</th>
<th>Key finding</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manipulative and body-based practices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>Physiotherapy versus manual therapy (patients with neck pain)</td>
<td>CUA, RCT (183)</td>
<td>Social, 1997–98</td>
<td>QALY</td>
<td>Manual therapy is the dominant treatment</td>
<td>15</td>
</tr>
<tr>
<td>Wales</td>
<td>Primary care osteopathy (patients with spinal pain)</td>
<td>CUA, RCT (187)</td>
<td>NHS, 1999–00</td>
<td>QALY</td>
<td>Primary care osteopathy may be a cost effective addition to usual GP care</td>
<td>16</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Combined spa therapy and exercise therapy (patients with ankylosing spondylitis)</td>
<td>CUA, RCT (120)</td>
<td>Social, 1999</td>
<td>QALY</td>
<td>Combined therapy is cost effective</td>
<td>17</td>
</tr>
<tr>
<td><strong>Whole medical systems</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>Acupuncture (patients with chronic low-back pain, headache, pain of the knee, hip, or neck)</td>
<td>CUA, RCT (8496)</td>
<td>Social, 2000–05</td>
<td>QALY</td>
<td>Acupuncture is cost effective</td>
<td>18</td>
</tr>
<tr>
<td>USA</td>
<td>Hyperbaric oxygen (patients with severe foot ulcers from diabetes)</td>
<td>CUA, modeling (1000)</td>
<td>Social, 2001</td>
<td>QALY</td>
<td>Hyperbaric oxygen is cost effective</td>
<td>19</td>
</tr>
<tr>
<td>UK</td>
<td>Acupuncture (patients with chronic low-back pain)</td>
<td>CUA, RCT (239)</td>
<td>NHS, 2001–02</td>
<td>QALY</td>
<td>Acupuncture is cost effective</td>
<td>20</td>
</tr>
<tr>
<td>Germany</td>
<td>Acupuncture (patients with chronic neck pain)</td>
<td>CUA, RCT (201)</td>
<td>NHS, 2002–03</td>
<td>QALY</td>
<td>Acupuncture is cost effective</td>
<td>21</td>
</tr>
<tr>
<td>UK</td>
<td>Acupuncture (patients with chronic headache)</td>
<td>CUA, RCT (401)</td>
<td>NHS, 2002–03</td>
<td>QALY</td>
<td>Acupuncture is cost effective</td>
<td>22</td>
</tr>
<tr>
<td><strong>Biologically based practices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>Vitamin supplementation (folic acid and cyanocobalamin) (patients between 35 and 84 years)</td>
<td>CUA, population modeling</td>
<td>Health care, 1997</td>
<td>QALY</td>
<td>Vitamin supplementation may be cost effective among many population subgroups and could have major epidemiologic benefit from primary and secondary prevention of CHD</td>
<td>23</td>
</tr>
<tr>
<td>Italy</td>
<td>n-3 polyunsaturated fatty acids (PUFA) (patients with recent myocardial infarction (MI))</td>
<td>CEA, follow-up study (5664)</td>
<td>Third party payer, 1999</td>
<td>Life years gained</td>
<td>n-3 PUFA is cost effective compared with other drugs used in the routine care of secondary prevention after MI</td>
<td>24</td>
</tr>
<tr>
<td>Sweden</td>
<td>Calcium and vitamin D3 (women aged 50 years and over)</td>
<td>CUA, population modeling</td>
<td>Health care &amp; social, 2000</td>
<td>QALY</td>
<td>Calcium and vitamin D3 is cost effective for the 50- and 60-year-old cohorts and women with identified osteoporosis or a matenal family history of hip fracture</td>
<td>25</td>
</tr>
<tr>
<td>Canada</td>
<td>Concentrated cranberry tablets versus cranberry juice (women aged between 21 and 72 years)</td>
<td>CEA, RCT (150)</td>
<td>Social, 2000</td>
<td>Urinary tract infection</td>
<td>Cranberry tablets are the most cost effective option for prevention of urinary tract infection</td>
<td>26</td>
</tr>
<tr>
<td>Australia</td>
<td>High-dose zinc and antioxidants (patients aged 55 years and over)</td>
<td>CUA, population modeling</td>
<td>Third party payer, 2001</td>
<td>QALY</td>
<td>High-dose zinc and antioxidants should be further assessed for possible implementation</td>
<td>27</td>
</tr>
<tr>
<td>Australia</td>
<td>Photodynamic therapy (PDT) (patients with reasonable and poor visual acuity)</td>
<td>CUA, population modeling</td>
<td>Health care, 2003</td>
<td>QALY</td>
<td>PDT moderately cost effective for those with reasonable visual acuity but less cost effective for those with initial poor visual acuity</td>
<td>28</td>
</tr>
<tr>
<td>Scotland</td>
<td>Multivitamin and multimineral supplementation (patients aged 65 years and over)</td>
<td>CUA, RCT (910)</td>
<td>NHS, 2003</td>
<td>QALY</td>
<td>Multivitamin and multimineral supplementation was dominated</td>
<td>29</td>
</tr>
</tbody>
</table>

CUA, cost–utility analysis; CEA, cost-effectiveness analysis; RCT, randomized controlled trial; QALY, quality-adjusted-life-year; CHD, coronary heart disease; NHS, National Health Services, UK.
conducted alongside randomized controlled trials (RCT). Costs were collected prospectively using cost diaries completed by the patient or clinical records. The QALY was used as the primary outcome measure, and all studies reported that the intervention treatment was cost-effective compared to usual care. In the Korthals-de-Bos et al. (2004) study, the authors found manual therapy to be a dominant treatment (i.e., less costly and more effective than either physiotherapy or GP care).

As highlighted in Table 1, five full economic evaluations (i.e., CUA) were identified in the domain of whole medical systems. Willich et al., Wonderling et al., Witt et al., and Thomas et al. compared acupuncture to usual care in patients with chronic neck pain, chronic headache, chronic pain in multiple sites, and chronic lower back pain, respectively. The final study in this section by Guo et al. compared hyperbaric oxygen to usual care in the treatment of diabetic ulcers. The studies involving acupuncture involved prospective data collection alongside a RCT, while Guo et al. developed a decision tree model to follow a hypothetical cohort of 1000 patients with severe foot ulcers from diabetes. The QALY was reported as the primary economic outcome and all of the studies reported that the intervention treatment was cost-effective compared to usual care. For acupuncture treatment, all of the authors concur that acupuncture should be considered an option in the medical care of patients with chronic pain. Thomas et al. (2005) further suggest that more research is required to look at other forms of care in comparison to acupuncture such as massage, chiropractic, or physiotherapy.

The majority of full economic evaluations identified were in the biologically based practices domain. The review identified seven articles that examined a range of treatment alternatives, across several countries. Franzosi et al. compared n-3 polyunsaturated fatty acids to usual care in patients post-myocardial infarction; Tice et al. compared vitamin supplementation (folic acid and cyanocobalamin) in women aged between 35 and 84 years; Willis compared calcium and vitamin D3 to usual care in women aged 50 years and over; Hopley et al. compared high-dose zinc and antioxidants to no screening or treatment in women aged 55 years and over; Hopley et al. compared photodynamic therapy to usual care for the general population; Stothers compared cranberry products as a prophylaxis against urinary tract infections in women aged between 21 and 72 years; and Kilonzo et al. compared multivitamin and multimineral supplementation to usual care for patients ages 65 years and over. Five (5) of the studies conducted a CUA and used the QALY as the primary economic outcome, with the exception of Franzosi et al. (2001) and Stothers, that adopted a CEA and used life years gained and urinary tract infections prevented, respectively, as the primary economic outcome. Three (3) of the studies collected cost data prospectively: Franzosi et al. alongside a follow-up study, and Stothers and Kilonzo et al. alongside a RCT. The remaining studies used modeling techniques and relied on secondary data. A consistent finding across all studies was that the intervention treatment was cost effective compared to usual care. Only one study suggested otherwise, with Kilonzo et al. finding that the use of multivitamin and multimineral supplements is not cost effective for use in older people.

Discussion

This research has reviewed the economic methods that have been used in CM. Using a comprehensive search strategy, the literature review identified a total of 15 full economic evaluations. No evidence was found of CM research that had used alternative economic methods such as contingent valuation or discrete choice experiments. From those 15 economic evaluations, despite variations in project design and underlying methodologies, the overall results suggest that the CM interventions, as evaluated in these studies, are cost effective compared to their respective conventional care interventions.

As health care costs continue to rise, decision makers, both consumers and policy makers, must allocate increasingly scarce resources toward those treatments that offer the best value for money. With the advent of guidelines on conducting economic evaluations that facilitate methodological consistency and scientific rigor, the opportunity now exists to promote a wider uptake of economic evaluation techniques in CM. However, it is worth noting that while the evidence base of CM has increased over the past decade, the majority of these medicines and therapies have not been comprehensively evaluated clinically. Without proven clinical effectiveness, it is meaningless to conduct economic studies on these interventions. This, at least partially, explains why the number of the existing economic studies of CM remains small.

Given the high level of CM use in the community, it is important that more attention be devoted to developing a better understanding of the economic rationale for why certain consumers prefer CM over conventional medicine. The recent advances in the development of tools to translate underlying preferences and outcomes into monetary terms provide a further opportunity to advance the science behind CM.

The implementation of high-quality economic research on CM does require a strong commitment by researchers, practitioners, and manufacturers, as well as sustained financial support. Nevertheless, this commitment is essential if the public and healthcare providers are to have sufficient information to realize the full social and economic benefits of CM.

Acknowledgments

Funding for this research was provided by the University of Western Sydney and the Cardiac Health Institute through a UWS Research Partnership Grant. The authors appreciate the constructive suggestions from two anonymous reviewers.

Disclosure Statement

No competing financial interests exist.

References


Address correspondence to:
Dennis H.-T. Chang, Ph.D.
Centre for Complementary Medicine Research
University of Western Sydney
Locked Bag 1797
Penrith South DC, New South Wales 1797
Australia
E-mail: d.chang@uws.edu.au
This article has been cited by:

1. 2010. RECENT LITERATURE. *Focus on Alternative and Complementary Therapies* **15**-**4**, 324-333. [CrossRef]