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## The Changing Face of the Cost-Utility Literature, 1990–2012



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### ABSTRACT

**Objectives:** Cost-utility analyses (CUAs) have been published widely over the years to measure the value of health care interventions. We investigated the growth and characteristics of CUAs in the peer-reviewed English-language literature through 2012. **Methods:** We analyzed data from the Tufts Medical Center Cost-Effectiveness Analysis (CEA) Registry, a database containing more than 3700 English-language CUAs published through 2012. We summarized various study characteristics (e.g., intervention type, funding source, and journal of publication) and methodological practices (e.g., use of probabilistic sensitivity analysis) over three time periods: 1990 to 1999, 2000 to 2009, and 2010 to 2012. We also examined CUAs by country, region, and the degree to which diseases studied correlate with disease burden. **Results:** The number of published CUAs rose from 34 per year from 1990 to 1999 to 431 per year from 2010 to 2012. The proportion of studies focused on the United States declined from 61% during 1990 to 1999 to 35% during 2010 to 2012 ( $P < 0.0001$ ). Although

still small compared with CUAs in higher income countries, the number of CUAs focused on lower and middle-income countries has risen sharply. A large fraction of studies pertain to pharmaceuticals (46% during 2010–2012). In recent years, most studies included probabilistic sensitivity analysis (67% during 2010–2012). Journals publishing CUAs vary widely in the percentage of their studies funded by drug companies. Some conditions, such as injuries, have high burden but few CUAs. **Conclusions:** Our review reveals considerable growth and some change in the cost-utility literature in recent years. The data suggest growing interest in cost-utility methodology, particularly in non-Western countries.

**Keywords:** cost-effectiveness analysis, cost-utility analysis, quality-adjusted life-year, review.

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### Introduction

For several decades, cost-effectiveness analyses (CEAs) have occupied an important part of the health policy landscape. As health costs have risen, policymakers have naturally become more interested in measuring the value of services and in finding ways to deliver care more efficiently. CEAs can inform these efforts by quantifying the incremental costs and health benefits of interventions compared with alternative uses of resources. Although explicit use of CEA has varied across countries, payers, and other perspectives, the vast amount of cost-effectiveness information available influences perceptions about value. Thus, it is useful to scrutinize the growing cost-effectiveness literature to understand the characteristics of published studies and how they have changed over time.

Cost-utility analysis (CUA) is a special case of CEA in which health effects are measured in terms of quality-adjusted life-years (QALYs) gained. Such analyses have been recommended by consensus groups, because they capture in a single measure gains from both prolongation and quality of life, because they incorporate the value or preferences people place on different health outcomes, and because they provide a convenient means

of comparing analyses of diverse interventions and conditions [1,2]. This article analyzes the cost-utility literature through 2012, focusing on studies that measure outcomes in terms of cost per QALYs. This study updates and expands our earlier analysis, which covered the field through 2001 and found a growing number of CUA publications across diverse applications and targeting the United States, Canada, Australia, and Western European countries [3].

### Methods

#### The Tufts Medical Center Cost-Effectiveness Analysis Registry

We analyzed data from the Tufts Medical Center Cost-Effectiveness Analysis Registry ([www.cearegistry.org](http://www.cearegistry.org)), a database containing detailed information on more than 3700 English-language CUAs published in peer-reviewed journals through 2012 (updates are provided regularly). The search protocols and inclusion criteria for the registry have been detailed elsewhere [3,4]. Briefly, analysts searched MEDLINE for English-language publications using the keywords “QALY,” “quality adjusted,” and

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“cost-utility analysis.” The retrieved abstracts were screened to identify articles that contain an original CUA while excluding systematic reviews, editorials, non-English-language articles, and methodological articles. Note that our review focused on CUAs; we did not consider CEAs in the form of cost per life-years gained, nor did we examine studies that used disability-adjusted life-years as the measure of benefit.

Each article was reviewed using standardized data collection forms and an accompanying manual to ensure completeness, clarity, and uniformity. Two reviewers with expertise in decision analysis and cost-effectiveness independently reviewed each article and convened for a consensus audit to resolve discrepancies. The forms were based on “checklists” developed by the Panel on Cost-Effectiveness in Health and Medicine [5,6], and on other established guidelines and recommendations for collecting information from the cost-effectiveness literature [7–9]. We collected data on more than 40 variables, including descriptive detail on the intervention, comparator, target population, and other study features, as well as information on methods and reporting practices, and the reported incremental cost-effectiveness ratios. We standardized incremental cost-effectiveness ratios by converting the numerator to 2013 US dollars using currency exchange rates and the consumer price index.

### Data Analysis

We analyzed the growth and characteristics of published CUAs through 2012. To characterize changes over time, we divided the CUAs into three publication time periods: 1990 to 1999, 2000 to 2009, and 2010 to 2012. We chose to present the data by decade because it provides a convenient demarcation for showing general trends and provides sufficient sample size for each category. We then summarized key features, such as country of study, study sponsorship, author affiliation, disease category, prevention stage, journal of publication, and intervention type by time period. We also reviewed several methodological and reporting practices, such as use of discount rates for costs and QALYs, reporting of economic data alongside clinical trials, performance of probabilistic sensitivity analyses, and inclusion of cost-effectiveness acceptability curves. We performed a Cochran-Armitage trend test to evaluate changes in study features and methodological quality over time.

We identified “high-volume” CUA journals (those publishing >25 CUAs through 2012) and computed the proportion of CUA articles published by each that were funded by the

pharmaceutical or medical device industry. We also explored the geographic distribution of CUAs. In particular, we tabulated the number of CUAs by country and across world regions, on the basis of the United Nations Geoscheme [10], and across high-, middle-, and low-income countries using World Bank classifications in 2012 [11]. For each of these geographic categories, we also identified the most common health conditions studied. Finally, for each of the three regions (the Americas, Europe, and the Western Pacific), we analyzed the association between the burden of leading diseases (disability-adjusted life-years per 100,000 population in 2011) and the number of CUAs published from 2000 to 2011.

## Results

### Growth and Characteristics of CUAs, 1990–2012

The number of CUAs published has risen from 34 per year during the 1990s to 212 per year during the 2000s and 431 per year from 2010 to 2012 (Fig. 1). Notably, 45% more CUAs were published during 2012 ( $n = 538$ ) than during 2011 ( $n = 372$ ).

The characteristics of published CUAs have shifted over time (Table 1). Studies from the United States comprise a declining portion of published English-language CUAs, decreasing from 61% during 1990 to 1999 to 35% during 2010 to 2012 ( $P < 0.0001$ ). In terms of diseases studied, CUAs have focused most frequently on cardiovascular diseases (18% of the studies overall), cancer (15%), and infectious diseases (15%). The most common interventions addressed by CUAs include pharmaceuticals (47%), followed by surgeries (13%), screening (12%), and medical procedures (12%). Most CUAs have targeted treatments (65%), followed by secondary (19%) and primary (16%) prevention.

The proportion of studies sponsored by pharmaceutical and medical device companies increased from 17% (1990–1999) to 34% (2010–2012) ( $P < 0.0001$ ), whereas the proportion of government-funded studies declined during the period from 40% (1990–1999) to 35% (2010–12) ( $P = 0.096$ ). The proportion of studies not disclosing their funding source declined from 39% (1990–1999) to 15% (2010–2012) ( $P < 0.0001$ ). The proportion authored by individuals affiliated with pharmaceutical companies increased from 6% (1990–1999) to 25% (2010–2012) ( $P < 0.0001$ ), while the proportion of studies with authors affiliated with private consulting firms increased from 7% (1990–1999) to 24% (2010–2012) ( $P < 0.0001$ ). Most of the studies (88% overall) continue to have at least one academic author.

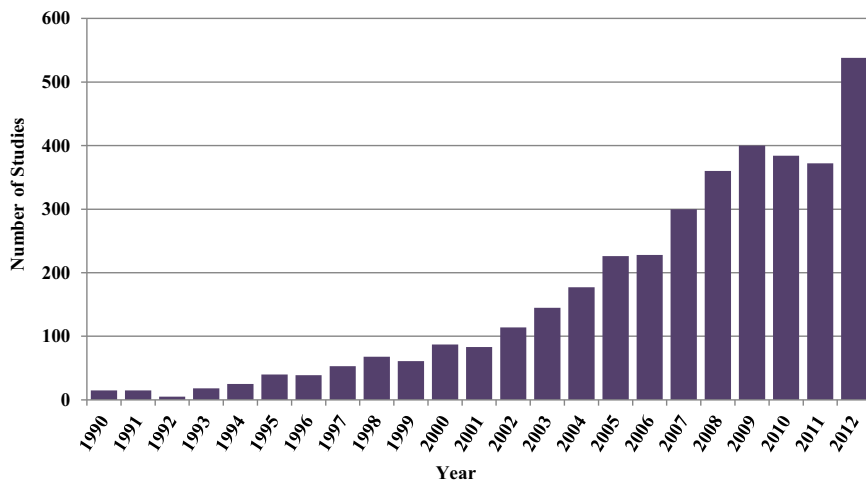


Fig. 1 – Growth in the number of CUAs. The CEA Registry includes 19 CUAs published before 1990. The first CUA published in the CEA Registry is from 1976. CEA, cost-effectiveness analysis; CUA, cost-utility analysis.

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