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Skills of the Trade: The Tufts Cost-Effectiveness Analysis Registry

Teja Thorat, Michael Cangelosi, and Peter J. Neumann

Abstract

The Tufts Cost-Effectiveness Analysis (CEA) Registry (www.cearegistry.org) is a publicly available comprehensive database of cost-utility analyses of health interventions published in the peer-reviewed medical and public health literature. This article discusses the database structure, methodology of data extraction, current trends in cost-utility analyses and impact of the Registry.

KEYWORDS: CEA Registry, cost-utility analysis, Tufts Medical Center, Center for the Evaluation of Value and Risk in Health

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Researchers at the Center for the Evaluation of Value and Risk in Health at the Institute for Clinical Research and Health Policy Studies, Tufts Medical Center Boston, MA developed and maintain the Tufts Cost-Effectiveness Analysis (CEA) Registry (www.cearegistry.org). The CEA Registry is a unique database containing detailed information on published cost-utility analyses (cost-effectiveness analyses that measure health benefits in terms of gains in quality-adjusted life years [QALYs]).

Cost-utility analysis (CUA) provides an analytical method to compare the relative costs and benefits of diverse interventions for a wide range of conditions. QALYs numerically represent the weighting of time spent in a particular health state, ranging from perfect health to death (1 to 0, respectively). CUAs provide incremental cost-effectiveness ratios (ICERs), calculated as:

$$\text{ICER} = \frac{\text{Cost}_{\text{intervention}} - \text{Cost}_{\text{comparator}}}{\text{QALY}_{\text{intervention}} - \text{QALY}_{\text{comparator}}}$$

The CEA Registry is a publicly available, comprehensive database providing information on cost per QALY ratios for medical procedures, drugs, medical devices, and other interventions published in the peer-reviewed medical and public health literature. It currently contains data through 2010 (updates are regularly provided), comprising 2735 CUAs, along with 7100 cost-utility ratios, and more than 10,000 utility weights.

The Registry's objectives are: (1) to help decision-makers identify society's best opportunities for targeting resources to improve health, (2) to assist policymakers in healthcare resource allocation decisions, and (3) to move the field towards the use of standard methodologies. The contents of the Registry allow researchers to conduct benchmark and trend analyses and to identify cost-effective treatments for a variety of diseases, interventions, and populations.

Methodology

Candidate articles for the Registry undergo a formal review protocol (Figure 1). The CEA Registry team searches MEDLINE for English-language articles using keywords "QALYs", "quality-adjusted" and "cost-utility analysis". Abstracts from these articles are screened to determine if the paper contains an original cost-utility estimate. We exclude review, editorial, and methodological articles, along with cost-effectiveness analyses that do not use QALYs to quantify health benefits.

For abstracts meeting inclusion criteria, two reviewers with training in decision sciences and cost-effectiveness analysis independently review each

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article and record information using a standardized set of forms and instructions. These two reviewers then convene for a consensus audit to resolve any potential discrepancies. For each article included, a physician within the Registry team then assigns to each article a disease classification based on the International Classification of Diseases, 10th Revision (ICD-10).

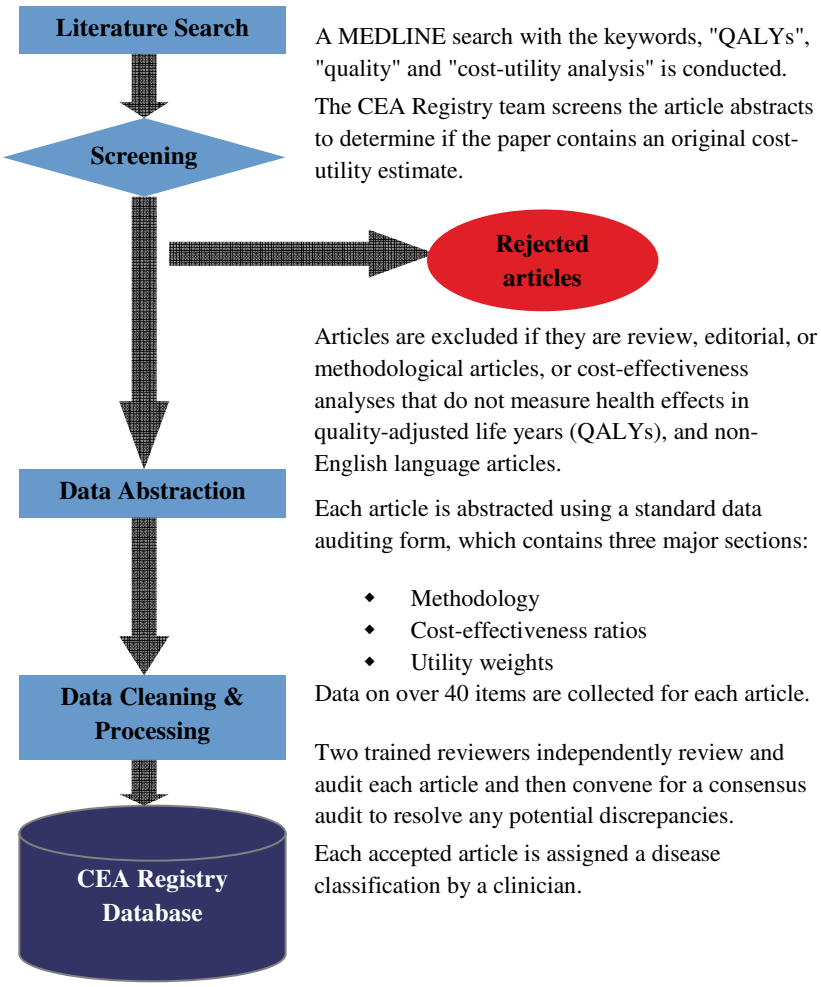

Figure 1 Review protocol for cost-utility studies

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Data Collection

We collect data on over 40 fields, grouped by information pertinent to: the methods that guide the analysis, the intervention and ratios examined, and the utility weights of the health states reported in the analysis.

Methods

The Registry reports data on the type of intervention evaluated, the prevention stage of the condition (primary, secondary or tertiary), the country of the analysis, the funding source, the analytic time horizon, and the perspective of the analysis (e.g., societal or healthcare payer) used in the study. With respect to costs, we collect and report information on the discount rate used, the denomination of currency, and types of costs (e.g., healthcare related or productivity costs). Other information recorded include whether and what type of sensitivity or uncertainty analyses are reported in the article and the threshold used for identifying "acceptable" cost-effectiveness ratios. Finally, we provide a subjective assessment regarding our assessment of the article's overall quality on a Likert scale from 1 (low) to 7 (high). Evaluation of quality is based on factors such as whether articles present: a correct computation of the incremental cost-effectiveness ratios (ICERs); a comprehensive characterization of uncertainty; an explicit specification of assumptions; and an appropriate and explicit estimation of utility weights.

Ratios

We collect detailed information on each cost-effectiveness ratio reported in the article, including the health intervention considered, the alternative intervention to which the main intervention is compared, and the target population eligible for the intervention. The incremental costs and health benefits associated with both the intervention and comparator are also reported. Finally, we also report the cost per QALY ratio calculated directly from the disaggregated cost and health benefit information in the article. Disaggregated costs and QALYs are provided, to present the magnitudes of these items, which are masked in the cost per QALY ratio.

Utility Weights

We collect data on the health utilities used by authors to construct the QALYs. We collect data on the utility values and the associated health state used in each CUA. Furthermore, we include information on the utility elicitation method, the

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measurement scale, population source surveyed (e.g., general population, patient, care giver) and sample size.

The information regarding methods, ratios, and utility weights data is publicly available on our website (www.cearegistry.org).

Trends in Published Cost-utility Analyses (CUAs)

Figure 2 displays the growth in total number of CUAs present in the CEA Registry along with different interventions examined from 1976 to 2010. In terms of interventions represented among the 2735 published CUAs, approximately 46% examined pharmaceuticals, followed by surgical interventions (14%), care delivery (12%), and medical procedure (12%). (Note that some analyses contain more than one type of intervention.)

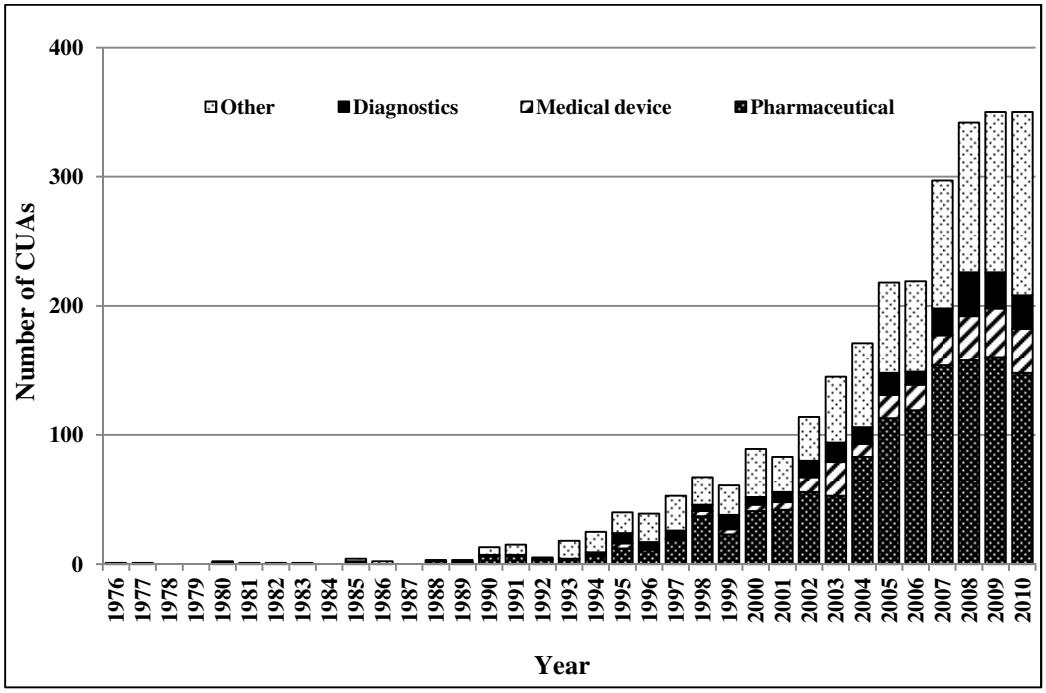

Figure 2 CUAs by year and intervention from 1976 to 2010 (n=2735).

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Figure 3 displays CUAs by country. The United States accounts for the largest percent of CUAs in the Registry (43%), followed by the United Kingdom (17%), and Canada (7%). Over the past few years the proportion of studies published by US-based investigators has declined, whereas the proportion of those conducted in the UK has increased.

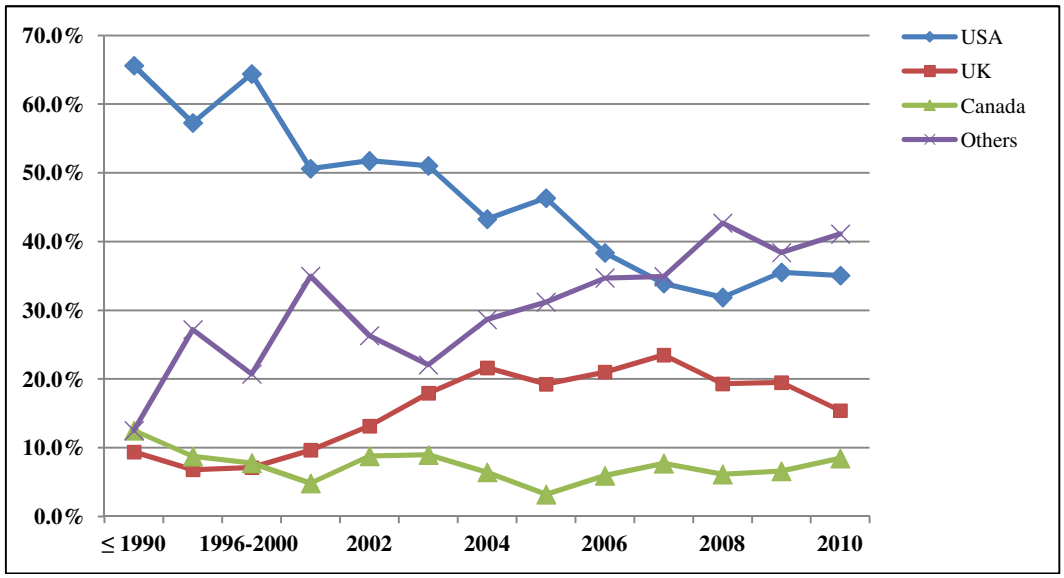

Figure 3 CUAs by country and year from 1976 to 2010 (n=2735).

In terms of study funder or "sponsor", 26.5% of the studies were funded by government agencies followed by studies funded by the pharmaceutical or device industries (25.3%), non-profit foundations (4.4%), and healthcare organizations (1.0%).

In terms of journals in which CUAs were published, *Pharmacoeconomics* (4.6%) has been the most frequent contributor, followed by *Value in Health* (3.5%), *International Journal of Technology Assessment in Health Care* (2.8%), *Current Medical Research & Opinion* (2.6%), and *Annals of Internal Medicine* (2.4%).

Limitations

The CEA Registry is limited to articles published in the health and medical literature containing original cost per QALY analysis. Studies reporting results in other units (e.g., cost per disability-adjusted life years, cost per life year gained, etc.) are excluded. The Registry does not include systematic reviews, editorials or

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commentary. The CEA Registry is restricted to English-language cost-utility studies. The CEA Registry data are updated three times per year, resulting in a several months lag between the actual publication date of an article and its inclusion in the Registry. This is due to time taken to extract and review information along with quality control checks on the data.

The Registry's Impact

To date, the CEA Registry has been the source of data for almost 50 peer-reviewed papers (a full list is provided at www.cearegistry.org). It has been used or cited in analyses performed by the Environmental Protection Agency, the Food and Drug Administration, the Institute of Medicine, and the Medicare Payment Assessment Commission. It has also been cited in *Forbes*, *The New York Times*, *The Washington Post*, and *The Boston Globe*. The CEA Registry is also listed on the National Library of Medicine's website as an important health economics resource. The website is expected to receive over 28,000 visitors and 220,000 page views in 2011.

Projects that have utilized Registry data include planning and implementing value-based insurance design (Neumann et al. 2010), evaluating the relationship between Medicare national coverage determinations and cost-effectiveness threshold (Chambers et al. 2010), determining when prevention saves money (Cohen et al. 2008), and evaluating cost-effectiveness trends in orthopedic surgery and efficient resource allocation decisions (Brauer et al. 2007). Furthermore, CEA Registry data have also been utilized to understand trends in health utilities used in published CUAs (Brauer et al. 2006), barriers and opportunities in using cost-effectiveness analyses (Neumann 2005), CUAs associated with diagnostic cardiovascular imaging (Otero et al. 2010), and trends in pharmaceutical CUAs from 1976 to 2006 (Neumann et al. 2009).

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