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Cost-Effectiveness Analysis: What Every Manager Needs to Know



Author

Associate Hospital Director
Teknon Medical Center
Barcelona, Spain
sondateguiparra@partners.org

also: Adjunct Assistant Professor
Boston University School of Medicine
Boston, US**A**

The fundamental principle of economic analysis is that choices have to be made between alternative uses of resources, as there is a finite pool of resources with which to provide all medical care possible to each individual. This principle is not debated. By providing estimates of outcomes and costs, these analyses illustrate the tradeoffs involved in choosing among a variety of clinical interventions to provide the best healthcare. Never before has it been more apparent than in our current healthcare environment that these tradeoffs are inevitable.

The application of economics to clinical practice in healthcare does not necessarily mean that less money should be spent, but rather that the use of resources might be more efficient. Broadly speaking, the tools of clinical economics can be applied to the analysis of medical practice to improve decisions on how to allocate resources for clinical interventions.

Here, we will define each type of economic evaluation, highlight the basic similarities and differences, and then focus on the principle components of conducting and reporting a cost-effectiveness analysis, one of the most commonly used economic evaluations used in clinical medicine.

Cost-Identification or Cost-Minimisation Analysis

Cost-identification analysis is used to describe and quantify the cost of a particular type of medical care or the economic burden of a disease. This type of analysis, also referred to as "cost-minimisation analysis," asks the question, "What is the cost?". An implied assumption is that the health outcomes of different preventive, diagnostic or therapeutic strategies are considered equivalent. E.g., an analysis that assumes the effectiveness of abdominal hysterectomy and laparoscopic-assisted vaginal hysterectomy are equivalent, and that women's preferences for each are equivalent, might simply report the costs associated with each. Although these types of analyses may identify the least costly way of obtaining an appropriate outcome, they cannot specifically predict what the relationship of cost to health outcome will be.

Cost-Effectiveness Analysis (CEA)

Cost-effectiveness analysis incorporates information about both costs and health outcomes to describe the value of a particular healthcare programme. CEA evaluates an intervention through the use of a cost-effectiveness ratio. In the ratio, all health outcomes (compared with a clearly stated alternative intervention) are included in the denominator, and all costs or changes in resource use (compared to a clearly stated alternative intervention) are included in the numerator.

This type of analysis can be used to compare more intensive forms of an intervention with less intensive forms (e.g., screening every year vs. every three years for cervical cancer); a new technology with the standard of care (e.g., laparoscopy vs. laparotomy); prevention of a problem versus treating it (e.g., behavioural school interventions to reduce rates of sexually transmitted diseases in teens vs. a school-based clinic to provide early treatment of these infections). These types of analyses define the "opportunity cost" of each choice, and provide important data to decision-makers in diverse settings for making informed decisions about interventions.

The particular type of cost-effectiveness analysis that uses Quality- Adjusted Life Years (QALYs) as the measure of outcome is sometimes referred to as a cost-utility analysis (CUA), although may alternatively be referred to as one type of cost-effectiveness analysis. Cost-utility

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analysis is a methodological approach to assessing the value of a given health technology programme, or intervention. As such, it can be considered a process innovation designed to inform decisions about utilisation and coverage of medical interventions.

Cost-Benefit Analysis

Cost-benefit analysis differs from CEA in that it values both health outcomes and costs of medical interventions in dollars. Because clinical benefit is measured in terms of currency, a net benefit or net cost can be calculated by subtracting the cost from the benefit. The criteria that cost-benefit analysis relies on is whether the benefits of a preventive, diagnostic or therapeutic programme outweigh the costs, the premise being that if clinical programmes that fulfil those criteria are adopted, decisions will be made that will result in an "optimal" solution within the economic welfare framework.

The most common methods of assigning dollar value to health outcomes are willingness to pay and human capital. Willingness to pay, a monetary measurement obtained by estimating an individuals willingness to pay for life-saving or health-improving interventions, can be assessed by a survey that relies on an approach called "contingent valuation", or it can be indirectly inferred from decisions that have actually been made that involve tradeoffs between health and money. Human capital values health in terms of the productive value of individuals in the economy.

Despite these difficult measurement issues (i.e., the assignment of a dollar value to outcomes like mortality, functional status and quality of life), cost benefit analyses do appear in the clinical literature. Because it requires valuing all outcomes in monetary terms, it allows for comparison to other sectors of society where benefits are not clinical health outcomes (i.e., environment, education, and defence spending).

Cost-Effectiveness Ratio

Cost-effectiveness ratio is the measure used to express the results of a cost-effectiveness analysis and represents the incremental price of obtaining a unit health effect (i.e., dollars per year of life saved or per quality-adjusted life year saved) as a result of a given clinical intervention when compared to the next best alternative. In this ratio, two alternatives are being compared with the difference in their costs being divided by the difference in their effectiveness. Cost-effectiveness ratios should be reported as dollar per unit of effectiveness stating the year of the costs, for example, 25,000 dollars per life year saved (1998 dollars).

Cost-effectiveness analyses are always incremental with the ratios comparing each intervention to the next most effective alternative. This means that the costs and clinical benefits associated with the intervention of interest should be compared to existing practice and to all other reasonable options. When all possible alternatives are not included, there is a risk of coming to an incorrect conclusion that an intervention is cost-effective, but only because it was compared with a cost-ineffective alternative.

Cost-Effectiveness Analysis and Resource Allocation

A systematic consideration of cost-effectiveness in decisions concerning the implementation of healthcare technologies would contribute to the efficiency of the healthcare system. This goes further than the initial decision to finance a new healthcare technology based on a favourable cost-effectiveness ratio. A systematic approach should raise and solve questions of broader resource allocation. The opportunity costs involved with implementing a new technology should not be restricted to the 'old' substituted technology but to all resources available to the healthcare funder.

An imaging test with highest diagnostic accuracy is not necessarily the test of choice in clinical practice. The decision to order a diagnostic imaging test needs to be justified by its impact on downstream health outcomes. Decision analysis is a powerful tool for evaluating a diagnostic imaging test on the basis of long-term patient outcomes when only intermediate outcomes such as test sensitivity and specificity are known. The basic principles of decision analysis and "expected value" decision-making for diagnostic testing are introduced.

The appearance of more CEAs in the literature in the future will create new insights into the reasons for the high cost of medical care and uncover ways to decrease unnecessary expenditures. Readers of this literature must become familiar with the basic vocabulary, rationale, and standard methods of CEA. By improving our knowledge and understanding of this state-ofthe- art research tool, the healthcare community will have a greater ability to participate in healthcare policy setting and decisionmaking locally and nationally.

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