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Cost-effectiveness analysis for radiology

Ongoing advances in technology provide radiology with solutions that have improved diagnostic quality, reduced the harm posed to patients, helped address large and diverse populations and supported clinical needs. Cutting-edge technology does however come at a very steep price which challenges its value against the cost.

In reality most people cannot afford to have access to the latest screening and diagnostic tests available today and decision makers turn to scientific methods to determine which health technologies they will choose to maximise the allocation of their limited resources.

Cost-effectiveness analysis (CEA) is a form of economic evaluation and one of the methods that help decision makers in radiology decide how to appropriate spending limited healthcare resources. In essence the idea of cost-effective analysis is to weigh the costs against the effectiveness of a specific healthcare technology relative to one or more alternatives, using an incremental cost-effectiveness ratio (ICER), meaning the ratio of incremental cost and incremental effectiveness of the studied health technology relative to the reference.

In the Unites States there has been a steady growth of published cost-effectiveness studies on various health technologies increasing from 34 per year in the 1990s to over 500 every year between 2010-2014. Healthcare administrators, public/private payers, public health officials and policy makers use information from CEAs to form their decisions, validate clinical guidelines and create treatment recommendations.

Using CEA in radiology may be more challenging than other areas of healthcare as the effect of imaging on health outcomes is not direct. Researchers performing CEA of imaging technologies are mainly interested in the different patient outcomes due to differences in characteristics of every imaging modality. In contrast to medication, the effect of imaging on diagnostics varies not only by patient but by provider and the differences in training and experience.

In addition, the percentage of cases in which imaging was crucial in making patient management decisions and alter treatments, present better outcomes in patients who had imaging compared to those who did not, further establish the difficulty of estimating value of imaging as it is dependent on follow-up treatments. An imaging technology may not affect patient outcomes if it does not alter the course of treatment.

When conducting CEA in radiology, therefore, potential follow-up testing and treatment options, including no treatment need to be included in the decision model. This requirement will make

adjusting the parameters and performing the analysis more challenging, but CEA results that do not include these requirements may not be valid. Results from CEAs have impacted several radiology related health policies.

CEA is taking on an increasingly import role in health decision making, this tool can help determine how to best allocate resources to achieve maximum health benefits when funding is limited. It is necessary to have the input of radiologists in order to result in high-value and relevant clinical research. Radiologists have the chance to help develop evidence to influence new policies that will directly affect the practice of radiology. Radiologists are important stakeholders in CEA.

Key concepts of CEA

The objective is to start by formulating a well-defined and answerable study question including definitions and the targeted population such as all patients with a specific health condition, the health technology you are considering and one or more of its alternatives.
When conducting CEA researchers choose the perspective of the analysis based on the party they are aiming to inform, which dictates which costs and effects should be measured.

Those performed by the healthcare sector focus on direct costs of treatment in terms of medications and diagnostic tests for example paid by patients or other payers and effect on individual patients. On the other hand CEAs from a societal perspective also include considerations for indirect costs and effects beyond the patient, such as the effect on the family, caregivers, the general public, overall productivity, consumption, environment and others.

When taking into consideration the time horizon, financial and health outcomes of health interventions vary with those taken in intensive care units within days or weeks to those that may need decades like the study of vaccination programs. The study of the time horizon must be relevant to the specifics of the health condition to reflect all relevant costs and effects.

A visual representation called a conceptual model is then selected to illustrate plausible courses of health outcomes according to each measured course of action of each health condition with the aim to guide the analysis and explain the analysts determination of the studied subject.

Measuring costs is fairly straightforward, yet there are many possible ways to measure health outcomes with varying degrees of advantages and disadvantages. In order to accurately compare the value of one health technology over an alternative using a single measure (ICER), the health outcomes for different technologies must be factored using the same metric.

The decision maker prespecifies a threshold by which an assessment is made whether the technology is a good value for money using the ICER indications of how much money is required to achieve additional health benefit using the technology in question.

To evaluate the costs and value of alternative health technologies approaches include randomized controlled trials (RCT) or models. These are very different approaches with each having both advantages and disadvantages.

There are threats to the validity of a CEA in the forms of structural uncertainty stemming from the model assumptions, so all possible outcomes of the technology examined must be included; parameter uncertainty because most models are based on sample data the values are calculated with a degree of uncertainty considered the standard error or confidence interval. Different input values of any parameter can change the resulting conclusion.

The central goal of the CEA is to assist decision makers in informing their choices based on “real world” conditions. The inclusion of stakeholders including the patients, providers, payers, policymakers, product manufacturers and general public at different stages is imperative for determining likely outcomes and important issues.

Source: Academic Radiology
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