Economic Evaluation of Healthcare Innovations

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What is economic evaluation?

“the comparative analysis of alternative courses of action in terms of both their costs and consequences”

Drummond (2005)

• The objective of economic evaluation is to compare the costs and effects between an existing and a new healthcare intervention:
  – The existing intervention can also be a policy of doing nothing – a common approach in (societal) cost benefit analysis.
Use of economic evaluation

- To be reimbursed through the *Health Insurance Act (Zvw)*, new – evidence based – healthcare interventions or pharmaceutical products need to be shown to be cost effective using the guideline (*Richtlijn*) of the Dutch *National Health Care Institute (ZiN)*:
  - Guideline stipulates state-of-art approaches to the measurement of costs and effects and provides guidance on the appropriate perspective and time frame of the evaluation.
  - Guideline is updated frequently in consultation with leading health economists in the Netherlands.
Use of economic evaluation

- In deciding on healthcare purchasing, municipalities and other responsible authorities rely partially on (societal) cost-benefit analysis of available interventions.
  - The *Netherlands Bureau for Economic Policy Analysis (CPB)* provides a guideline (*Leidraad*) for performing (societal) cost-benefit analysis in general.
  - Currently domain-specific manuals (*Werkwijzers*) are being developed:
    - The Social Domain manual was released recently.
Types of economic evaluation

<table>
<thead>
<tr>
<th>Type of analysis</th>
<th>Measurement &amp; valuation of costs</th>
<th>Identification of consequences</th>
<th>Measurement &amp; valuation of consequences</th>
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</thead>
<tbody>
<tr>
<td>Cost analysis (CA)</td>
<td>Monetary units</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Cost-effectiveness analysis (CEA)</td>
<td>Monetary units</td>
<td>Single effect of interest</td>
<td>Health outcomes</td>
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<tr>
<td>Cost-utility analysis (CUA)</td>
<td>Monetary units</td>
<td>Single or multiple effects</td>
<td>Quality-adjusted life-years</td>
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<td>Cost-benefit analysis (CBA)</td>
<td>Monetary units</td>
<td>Single or multiple effects</td>
<td>Monetary units</td>
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</table>

- The choice of analysis depends on objectives, data availability and policy guidelines.
- Cost-utility analysis is the preferred method in the Netherlands.
- (Societal) Cost-benefit analysis is gaining ground but additional research is required.
Steps in economic evaluation: Determine perspective

• Patient perspective: Takes into account all costs and benefits accruing to the patient – including non-monetary costs such as suffering.

• Payer perspective: Takes the vantage point of the insurance company or whoever pays the bill – disregards non-priced services such as informal care.

• Societal perspective: Includes all society-wide monetary and non-monetary costs and benefits regardless of where and by whom they are received or paid – preferred perspective.
Steps in economic evaluation: Costs

• Guidelines are generally accompanied by costing manuals, which indicate tariff prices for medical services.

• Costs arising due to decrease in labor force participation can be valued through foregone wages or the time it takes to replace a worker.

• Non-priced services such as informal care can be assessed through validated questionnaires such as the Care-related Quality of Life Instrument (CareQol).
Steps in economic evaluation:
Costs

• Challenges:
  – Costs outside the healthcare sector (e.g., education or criminal justice) are generally hard to assess.
  
  – Prices used to assess costs can be sensitive to the intervention itself – if a disease is reduced due to the intervention, the cost of treatment may change.
  
  – Future costs need to be discounted to today to make them comparable – the choice of discount rate matters crucially for this.
Steps in economic evaluation: Effects

• Cost Analysis: Outcomes are ignored.

• Cost-Effectiveness Analysis: Outcomes are measured in terms of health outcomes such as changes in depression scores or improvement in self-sufficiency.

• Cost-Utility Analysis: Outcomes are measured with a common, non-disease specific, metric such as a Quality Adjusted Life Year (QALY).

• Cost-Benefit Analysis: A monetary value is attached to QALYs and added to other benefits.
Steps in economic evaluation: Effects

QALYs are assessed using validated questionnaires such:
- EuroQol EQ-5D-5L is the preferred Dutch option.
- Administered using a survey.
- Survey responses are combined to provide a score between 1 (perfect health) and 0 (death.)
Steps in economic evaluation: Effects

• Challenges:
  – The preferred EQ-5D-5L tool is mainly aimed at adults:
    • Questionnaires for children, especially very young ones, currently don’t exist.
  – Conversion of QALYs into monetary units is controversial:
    • There is no official Dutch conversion rate.
  – Outcomes
Steps in economic evaluation: Compare costs and effects

• Let costs be $C_O$ be the costs of the existing intervention and $C_A$ that of the new one.
  – The change in costs is then given by:
    
    $$C_A - C_O$$

• Similarly the change in the effectiveness is given by:
  
  $$E_A - E_O$$

• Combining the two gives the Incremental Cost Effectiveness Ratio:
  
  $$ICER = \frac{C_A - C_O}{E_A - E_O}$$
  
  – ...indicates the costs required to achieve an additional unit of the desired effect.
Steps in economic evaluation: Compare costs and effects

Figure 1: Comparing an existing intervention (O) to its alternative (A) in terms of cost and effect allows us to draw a cost-effectiveness plane.
Steps in economic evaluation: Compare costs and effects

• In a societal cost benefit analysis effects are monetarized:
  – ...allows us to determine the cost-benefit balance,
  • ...positive indicates a gain, negative a loss.
• Often not all benefits can be measured or monetarized properly:
  – ...in that case a reciprocal cost-benefit analysis can help,
  – ...it indicates how much value we would have to attach to a non-measured concept for the balance to be positive.
Summary

“the comparative analysis of alternative courses of action in terms of both their costs and consequences”

• Used for reimbursement and procurement decisions.
• Different options: Cost Analysis, Cost Effectiveness Analysis, Cost Utility Analysis, Cost Benefit Analysis.
• Requires explicit choice of perspective.
• Identify costs and benefits in line with perspective using validated methods to determine the Incremental Cost Effectiveness Ratio.
• Be aware of the challenges!
Further reading


• ZiN (2015) *Richtlijn voor het uitvoeren van economische evaluaties in de gezondheidszorg*.

• CPB (2013) *Algemene leidraad voor maatschappelijke kosten-batenanalyse*.

• CPB (2016) *Werkwijzer voor kosten-batenanalyse in het sociale domein*