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# Economic Evaluation of Healthcare Innovations

Healthwise congres 4 november 2016

Centre of Expertise Healthwise

Health (Care) Economics, Business, and Management

Jochen Mierau (j.o.mierau@rug.nl)

# 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:
    - Social Domain was released recently.

# Types of economic evaluation

Type of analysis	Measurement & valuation of costs	Identification of consequences	Measurement & valuation of consequences
Cost analysis (CA)	Monetary units	None	None
Cost-effectiveness analysis (CEA)	Monetary units	Single effect of interest	Health outcomes
Cost-utility analysis (CUA)	Monetary units	Single or multiple effects	Quality-adjusted life-years
Cost-benefit analysis (CBA)	Monetary units	Single or multiple effects	Monetary units

- 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 (CareQoI).



# 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 blood pressure 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.)

## MOBILITY

- I have no problems in walking about
- I have slight problems in walking about
- I have moderate problems in walking about
- I have severe problems in walking about
- I am unable to walk about

## SELF-CARE

- I have no problems washing or dressing myself
- I have slight problems washing or dressing myself
- I have moderate problems washing or dressing myself
- I have severe problems washing or dressing myself
- I am unable to wash or dress myself

## USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)

- I have no problems doing my usual activities
- I have slight problems doing my usual activities
- I have moderate problems doing my usual activities
- I have severe problems doing my usual activities
- I am unable to do my usual activities

## PAIN / DISCOMFORT

- I have no pain or discomfort
- I have slight pain or discomfort
- I have moderate pain or discomfort
- I have severe pain or discomfort
- I have extreme pain or discomfort

## ANXIETY / DEPRESSION

- I am not anxious or depressed
- I am slightly anxious or depressed
- I am moderately anxious or depressed
- I am severely anxious or depressed
- I am extremely anxious or depressed

# 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.
  - Questionnaires for individuals in care facilities are currently being developed and tested (e.g., ICECAP-O and ASCOT).
- Conversion of QALYs into monetary units is controversial:
  - There is no official Dutch conversion rate – values between € 20,000 and 200,000 have been suggested.

# 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

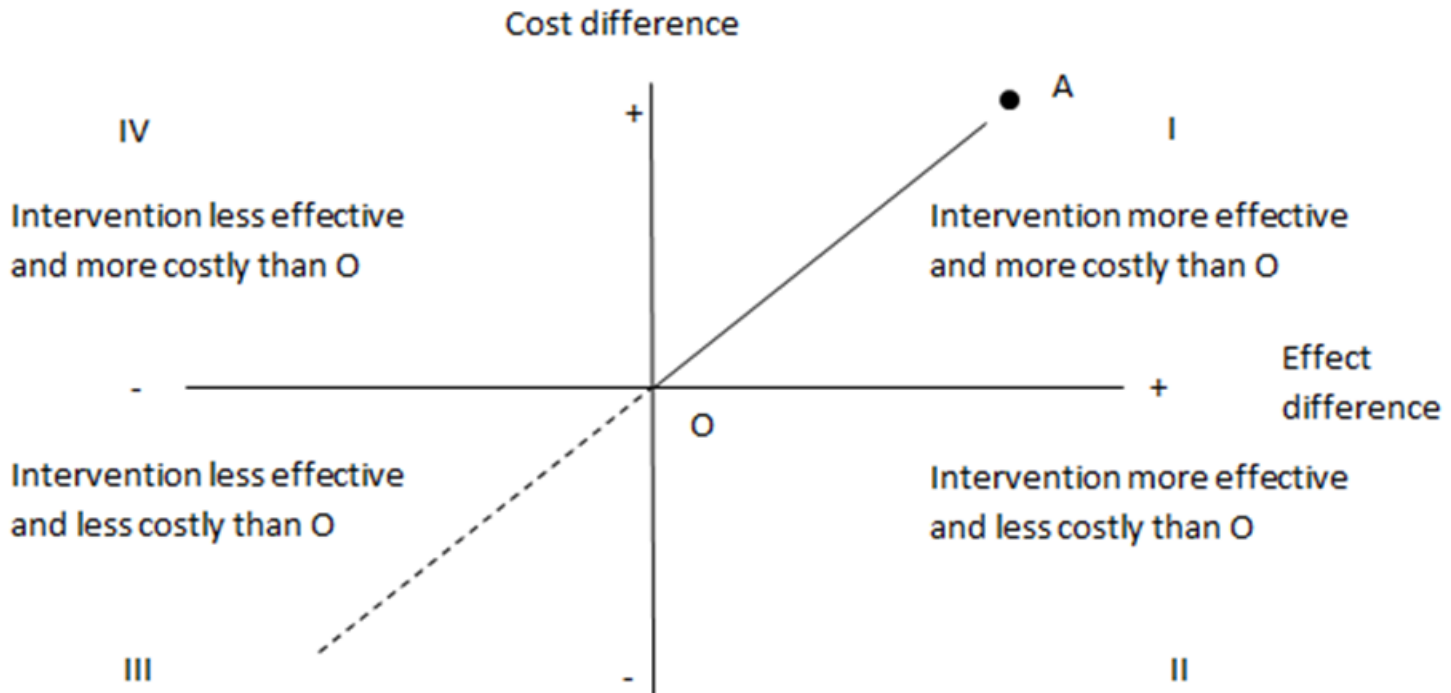


Figure 1: Comparing an existing intervention (O) to its alternative (A) in terms of cost and effect allows us to draw a *cost-effectiveness plane*.

# 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.

# Evaluating system innovations

- › The economic evaluation toolbox is optimized for single interventions in clinical settings:
  - ...many current healthcare innovations are outside the clinical setting and involve multiple interventions at once.
- › How to determine the “clinical effect”?
  - ...use observational data in combination with econometric techniques.
- › How to determine the economic effect?
  - ...feed the clinical effect into a simulation model.



# Summary

“the comparative analysis of alternative courses of action in terms of both their costs and consequences” Drummond (2005)

- > 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

- › Drummond, M. (2005). *Methods for the economic evaluation of health care programmes* (3rd ed.). Oxford: Oxford University Press.
- › ZiN (2015) *Richtlijn voor het uitvoeren van economische evaluaties in de gezondheidszorg*.
- › CPB (2013) *Algemene leidraad voor maatschappelijke kosten-batenanalyse*.