

Decision support for cost-effectiveness analysis of healthcare interventions

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Outline

Context

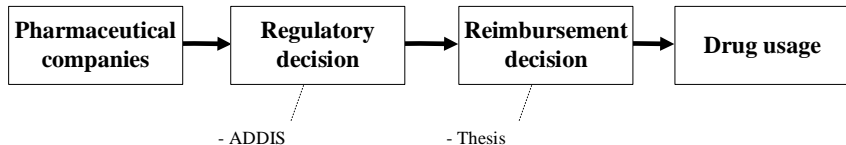
Cea-web

Live Demo

Limitations

ADDIS & Future work

Context

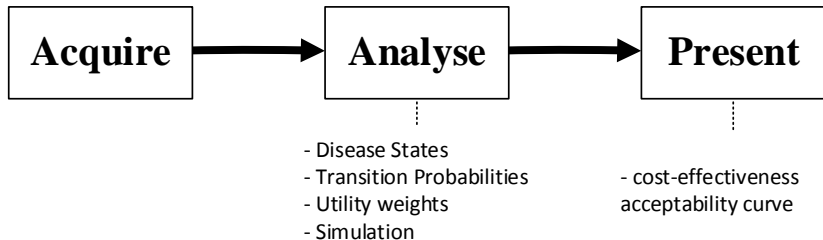


Reimbursement decision - Cost-effectiveness analysis

- Aims to inform decision maker about costs and efficacy of competing alternatives
- Is a mathematical representation of disease progression
- Based on (network of) clinical trials to measure efficacy
- Extrapolates for future effects and costs concerned with those
- Reports 'hard' outcomes, e.g. improvement of QALY by 0.6 for a cost of EUR 1506

- How can ADDIS support decision makers concerned with the reimbursement of medical interventions?
- Disease state models predominant approach in cost-effectiveness analysis
- Challenge: Each model is different, however the underlying methodology is mostly the same, with deviating modeling choices based on available data
- Assumption: All inputs are provided, only concerned with computation and presentation

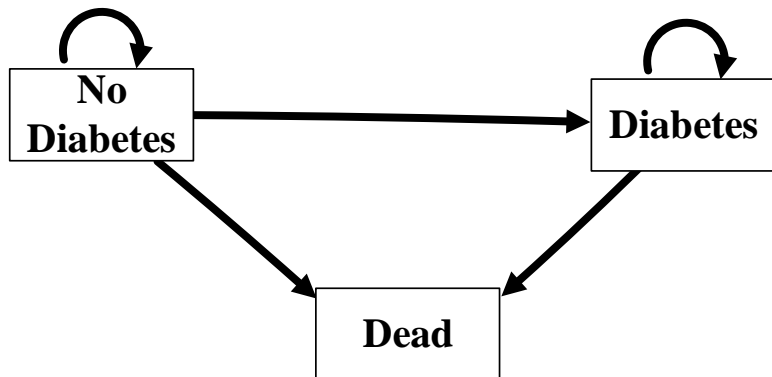
Flow



Model

- Explanation through a simplified model
- Suppose we need to make the decision to allow the reimbursement of a diabetes intervention

Disease states



Transition Probabilities

Suppose we obtained the following transition parameters for the no intervention on a yearly basis:

- Patients who do not suffer from diabetes: 90 people **do not** develop diabetes, 7 people **do** develop diabetes and 3 people die
- Patients who do suffer from diabetes: 90 people stay the same, 10 people die

From clinical trials we obtain that the intervention has a positive effect on people that do not have diabetes, a 0.8 hazard ratio is reported.

Utility Weights

Suppose we obtained the following effects with regards to diabetes:

- Patients that do not have diabetes report a 0.84 effect on quality of life on a yearly basis
- Patients that do have diabetes report a 0.65 effect on quality of life on a yearly basis

Costs

Suppose we obtained the following Costs with regards to diabetes:

- Diabetes treatment costs EUR 1805 on a yearly basis
- The intervention costs EUR 300 on a yearly basis
- Furthermore, patients that have been selected to receive the intervention have gone through a screening process, which costs EUR 400
- In accordance with zorginstituut (CvZ) guidelines we assume a yearly discount rate of 1.5% for effects and 4% for costs

Demo

- At this point the analyst resorts to Excel/R/tool of choice to obtain results
- While obtaining results can be complex, it always follows a general method
- Instead of using those tools: current integration into ADDIS, live demonstration (cea.drugis.org)

Limitations

- Does not address patient heterogeneity
- Only a select set of modeling choices available
- All inputs are just numbers. Ideally inputs are derived, in an automated way, from the available (clinical) evidence
- Computational expensive models take a long time

ADDIS

Decision support system for regulatory decisions:

- Database of clinical trials
- Automated methods for
 - Evidence synthesis (network meta-analysis)
 - Decision aiding (multi-criteria benefit-risk analysis)
- Reports data as-is, e.g. Odds- / Hazard Ratio.

Future work

Next to writing your thesis, IEM also requires each student to do an internship

- Integrate cea-web with network-meta analysis capability to assess transition probabilities, proof-of-concept

Why network meta-analysis?

- Combine a (network of) clinical trials in a consistent way
- Eliminates selection bias
- Borrows strength from indirect evidence to reduce uncertainty

Further horizon

- Better link with underlying data, its semantics and prerequisite statistical analysis
- Modeling proposition based on obtained parameters
- Faster computational methods

Questions

Thank you for your attention!

Any questions?