Decision Analysis as a Basis for Estimating Cost-Effectiveness: The Experience of the National Institute for Health and Clinical Excellence in the UK

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Outline

• Something briefly on NICE’s process
• Requirements for decision-making
• Why not trial-based economic analysis?
• Methods issues
The National Institute for Health and Clinical Excellence (NICE)

- Following election of Labour government 1997
- Prolonged controversy about ‘post code prescribing’ in the UK National Health Service
- Wish to ‘de-politicize’ decisions about which technologies to cover in NHS
- Desire to use best available methods to address difficult questions
The NICE process

Selection → Assessment → Appraisal

- Specific technologies
- Lacking in transparency
- Subject to some criteria

- Independent group
- Review plus model
- Good methods supported
- Assess company submissions
- 6 months or more
- Companies can also provide unpublished data

- Multi-disciplinary committees
- Take information from range of sources
- Range of decisions possible
The requirements of economic evaluation for ‘NICE-type’ decision making

Objective function → Generic measures of health; QALYs

Decision problem → Clarity about population; full specification of options

Appropriate time horizon → Time over which options might differ

Evidence base → Inclusion of all relevant evidence

Context → Relevant to specific decision maker(s)

Uncertainty → Quantify decision uncertainty; feed in research prioritisation
Is trial-based economic evaluation the answer?
What is trial-based economic evaluation?

**Health care facilities**
- Unit costs (prices) of resources

**Single RCT**
- Patient level data on:
  - Resource use
  - Health-related events

**Sample of public**
- ? Utility data to value health events

**Cost-effectiveness analysis**
- Costs & effects averaged across trial sample
- Time horizon = trial follow-up
- External data for valuation only
(A selection of) problems with trial-based economic evaluation

**Time horizon**  
Follow-up often < time horizon

**Comparison**  
Trials compare selected options not all strategies

**Evidence base**  
Typically there are other trials and sources

**Context**  
Trials undertaken in multiple locations

**Uncertainty**  
Partial comparison and evidence means uncertainty not appropriately quantified
What is the appropriate framework for economic evaluation?

Evidence synthesis

• Systematic review
• Meta-analysis
• Mixed treatment comparisons
• Differing endpoints and follow-up
• Patient-level and summary data

Decision analysis

• Structure reflecting disease
• Incorporation of evidence on range of parameters
• Facilitates extrapolation and separation of baseline and treatment effects
• Probabilistic methods
Methods issues for (NICE-type) decision making
Synthesising evidence – indirect comparison

Diagram:
- Placebo
  - A
  - B
  - C
  - D
Methods issues with NICE-type decision making

Synthesising evidence – mixed treatment comparison
Case study – Glycoprotein IIb/IIIa antagonists in acute coronary syndrome

Strategy 1: GPA as part of initial medical management [7 trials]

Strategy 2: GPA in patients with planned percutaneous coronary interventions (PCIs) [1 trial]

Strategy 3: GPA as adjunct to PCI [10 trials]

Strategy 4: No use of GPA
## Limitations with GPA trials

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<th>Trial characteristic</th>
<th>Modelling method</th>
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<td>Extensive trial evidence on treatment effect</td>
<td>Random effects meta-analysis of relative risks</td>
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<td>Partial comparison</td>
<td>Pooled relative risks from trials applied to common baseline risks</td>
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<td>UK-specific baseline risks from observational study. Relationship between baseline risks &amp; treatment effect explored with meta-regression</td>
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<td>No resource use data</td>
<td>Resource use data from UK observational study attached to clinical events</td>
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<td>Short-term time horizon</td>
<td>Extrapolation from 6 months based on Markov model populated from UK observational study</td>
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Decision uncertainty

ICER: £5,738 per QALY
94% at £30,000

Maximum willingness to pay for an additional QALY (£)
When is it appropriate to require additional evidence?

- What is the probability of the wrong decision?
- Joint effect of uncertainty in all inputs

\[
\text{Decision uncertainty} \times \text{Implications of getting it wrong} = \text{Value of perfect information}
\]

- Sets an upper bound on the value of further research
- Can be calculated overall and for individual parameters
- Calculated per patient and across a population of patients
GPA example: value of information

Assumes research is useful for 10 years and a QALY is valued at £30,000.
References


