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

Mark Sculpher, PhD
Professor of Health Economics
Centre for Health Economics
University of York, UK

THE UNIVERSITY of York

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Centre For Health Economics

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

- 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- Companies can also provide unpublished data

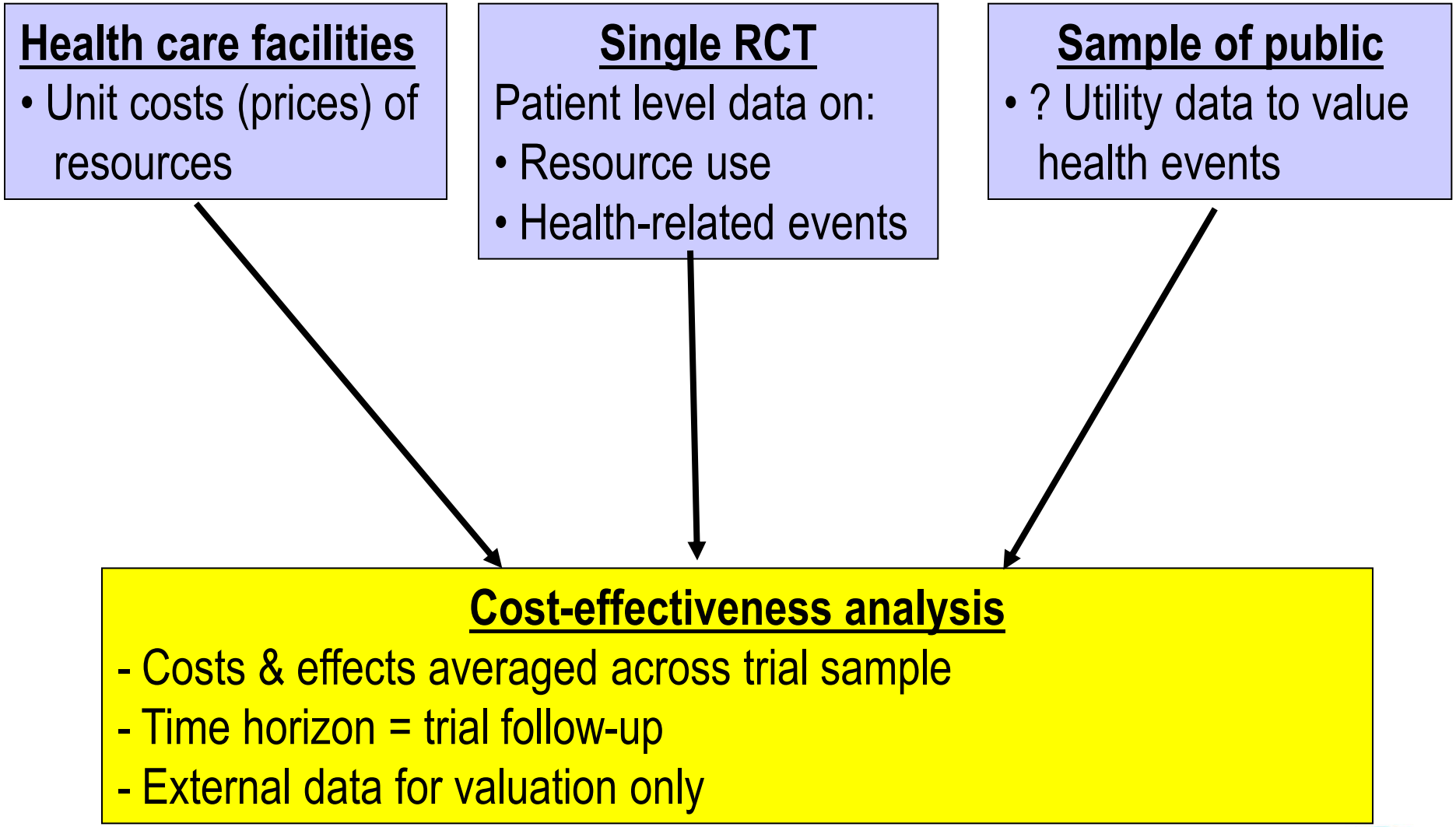
- Multi-disciplinary committees
- Take information from range of sources
- Range of decisions possible

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?



(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 →

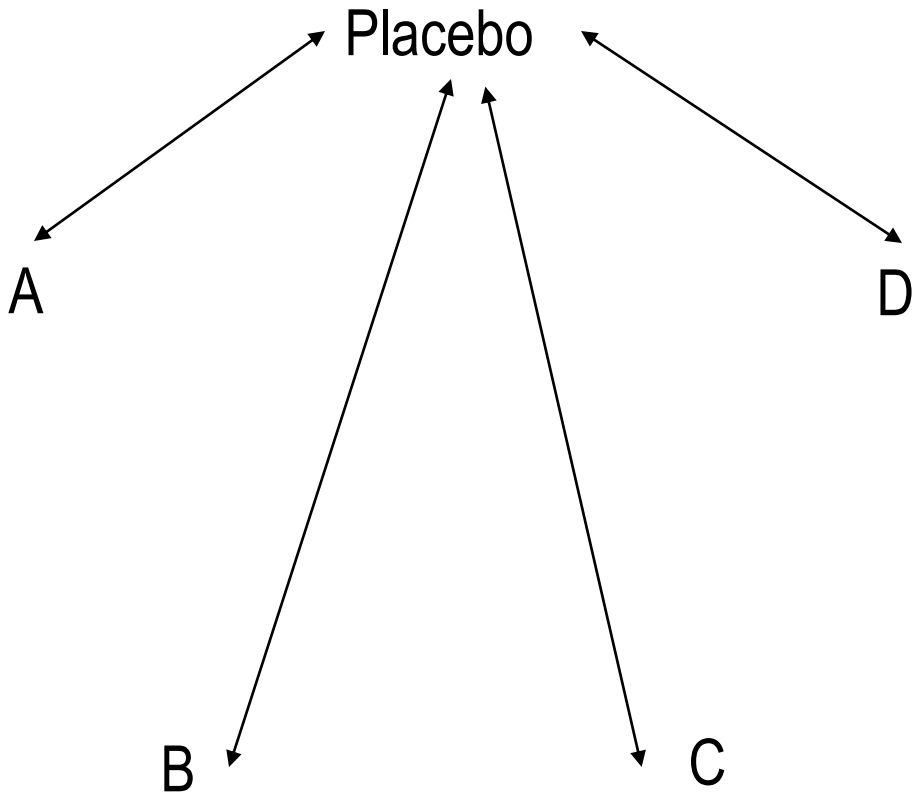
- Systematic review
- Meta-analysis
- Mixed treatment comparisons
- Differing endpoints and follow-up
- Patient-level and summary data

Decision analysis →

- Structure reflecting disease
- Incorporation of evidence on range of parameters
- Facilitates extrapolation and separation of baseline and treatment effects
- Probabilistic methods

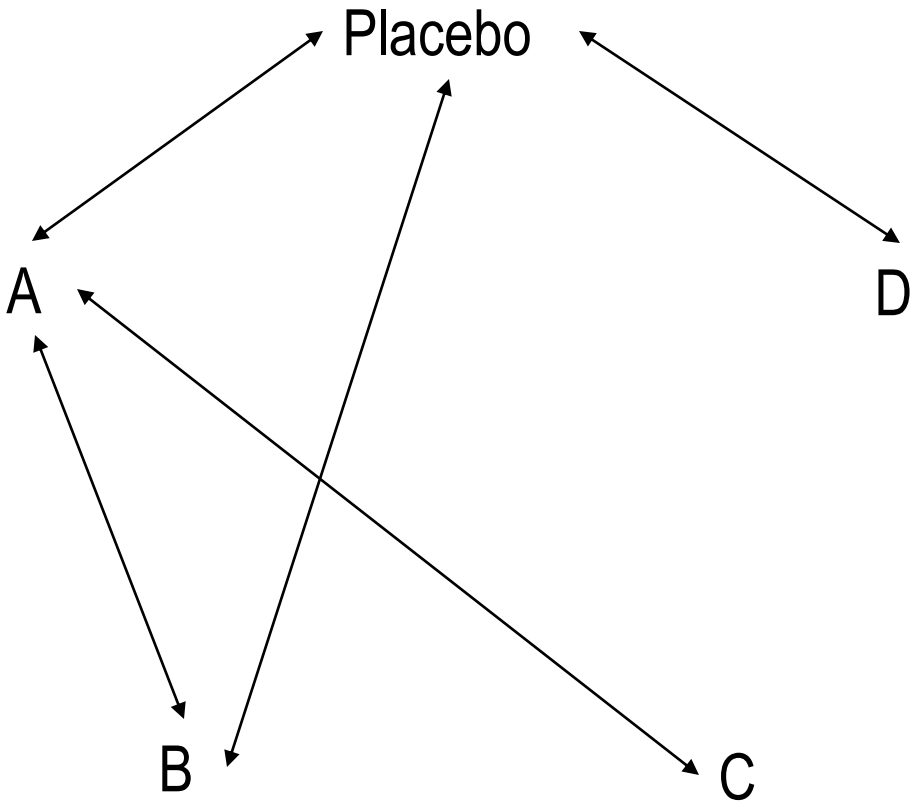
Methods issues for (NICE-type) decision making

Synthesising evidence – indirect comparison



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]

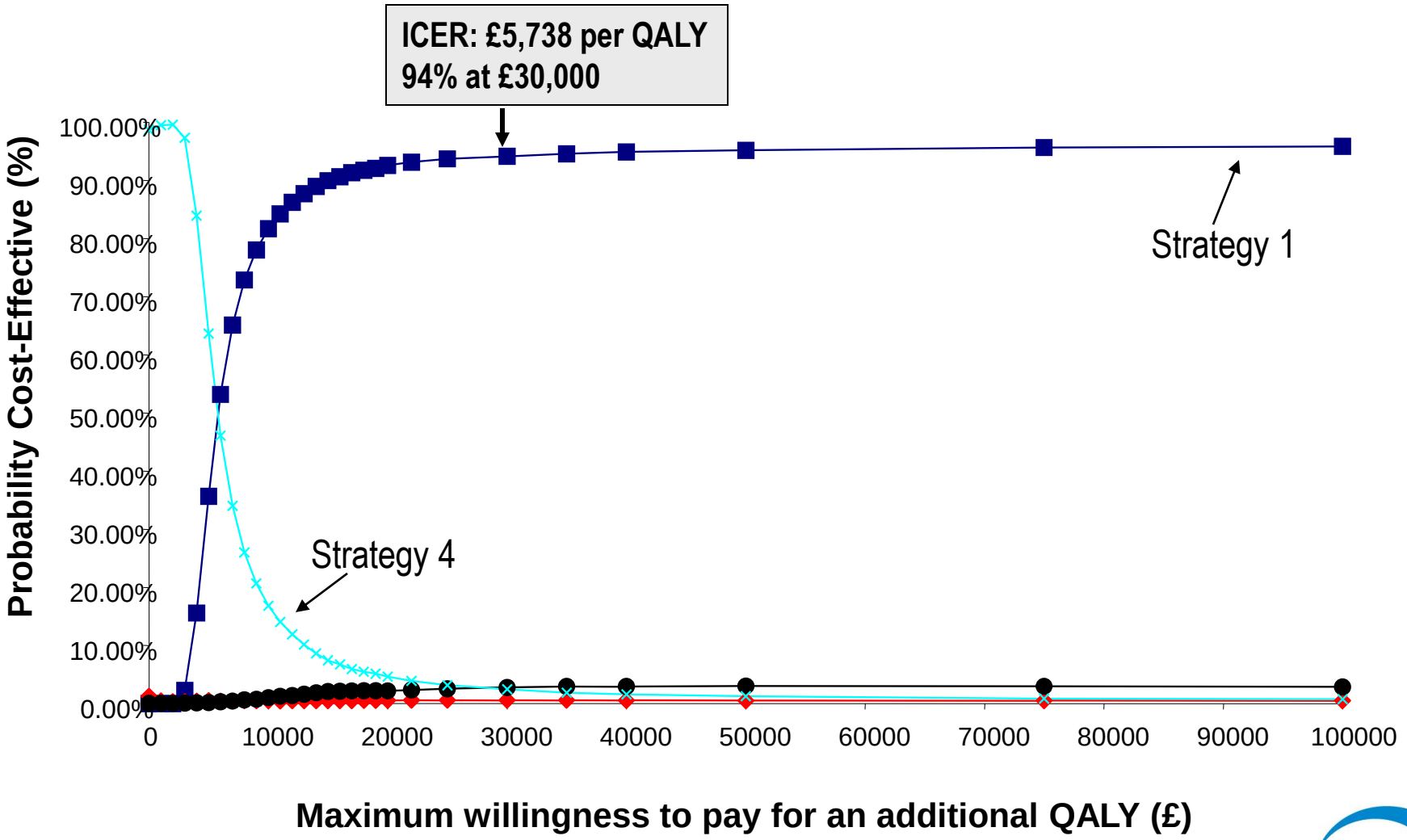
Strategy 3: GPA as adjunct to PCI [10 trials]

Strategy 4: No use of GPA

Limitations with GPA trials

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

Decision uncertainty



When is it appropriate to require additional evidence?

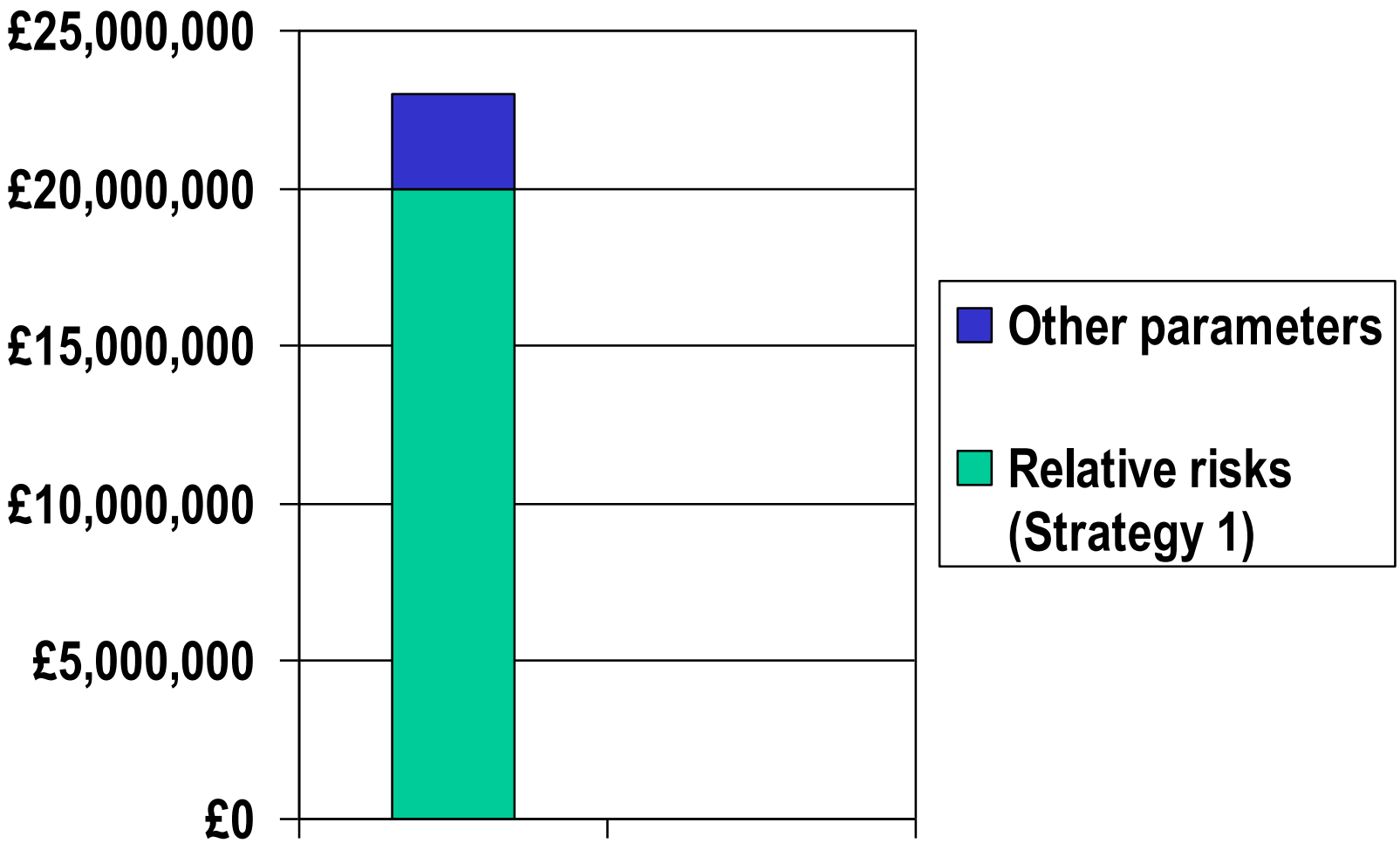
Decision uncertainty	X	Implications of getting it wrong	=	Value of perfect information

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

What are the implications of a wrong decision in terms of resources and health?

- 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

Ades AE *et al.* Bayesian methods for evidence synthesis in cost-effectiveness analysis. *Pharmacoeconomics* 2006;24:1-19.

Palmer S *et al.* Management of non-ST-elevation acute coronary syndromes: how cost-effective are glycoprotein IIb/IIIa antagonists in the UK National Health Service? *International Journal of Cardiology* 2005;100:229-240.

Philips *et al*. Priority setting for research in health care: an application of value of information analysis to glycoprotein IIb/IIIa antagonists in non-ST elevation acute coronary syndrome. *International Journal of Technology Assessment in Health Care* 2006;22:379-387.

Sculpher *et al*. Whither trial-based economic evaluation for health care decision making? *Health Economics* 2006;15:677-687.