NICE National Institute for Health and Care Excellence

National Collaborating Centre for Women's and Children's Health

Combining health economics with clinical evidence

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NICE and health economics

"NICE is required, in both its appraisals and guidelines programmes, to take both cost and clinical effectiveness into account to develop its guidance."

Professor Sir Michael Rawlins, *Lancet* 2005

Why?

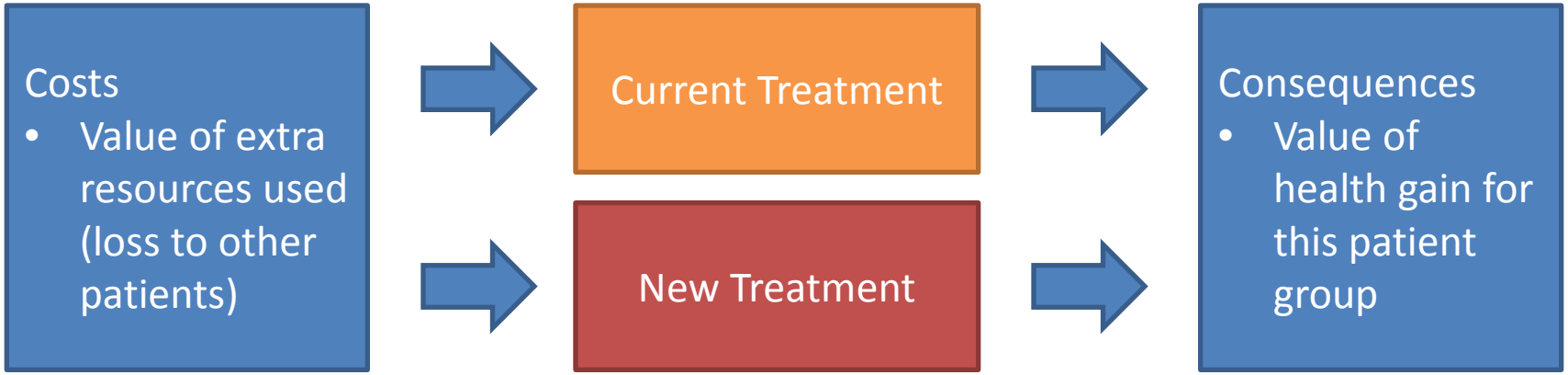
- Everyone wants better health and healthcare

- But health resources are limited / scarce
  - Resources are limited
    - People e.g. doctors and nurses
    - Facilities e.g. hospitals
    - Equipment e.g. CT scanner
    - Consumables e.g. Drugs

Economic evaluation

"... the comparative analysis of alternative courses of action in terms of both their costs and consequences."

Drummond, Stoddard & Torrance, 1987



Why?

- There is an 'opportunity cost' involved i.e. the value of the best alternative use of resources
- If the health service spends more on one thing, it has to spend less on something else.
- But how can we decide?

Why consider health economics

Health economics uses economic evaluation to help allocate these scarce resources

Focuses on choices and the consequences of those choices

Helps prioritise interventions with a high health gain per £ spent

What health economic evaluation is NOT …

Health economics is not about identifying the cheapest option

- Treatments that are costly but work well in relation to the alternatives can be recommended
- Treatments that are less expensive but that provide no/little additional benefit should not be recommended

Health economics aims to **maximise health benefit** not to **minimise cost**

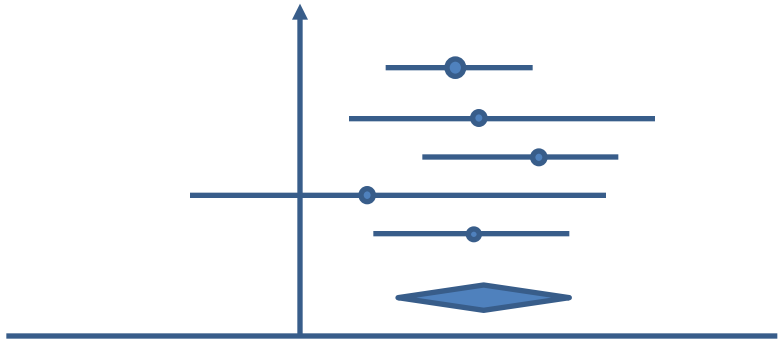
What is needed for health economics?

Data on

- Clinical effectiveness
- Costs
- Quality-adjusted life years (QALY) value

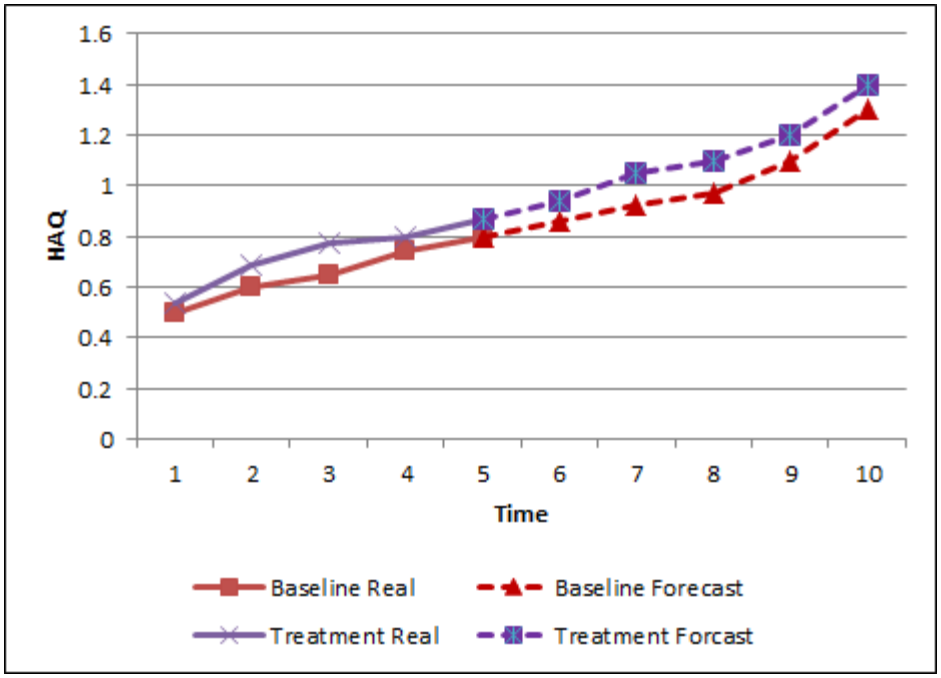
Clinical effectiveness

- There is no 'health economics' without 'clinical data'
- Relative effectiveness
  - Ideally from a meta-analysis of several RCTs all done in the UK in the last few years
    - Realistically use whatever is found
    - Can use one good quality study [if available]
  - Models can be used to explore limitations with the clinical data

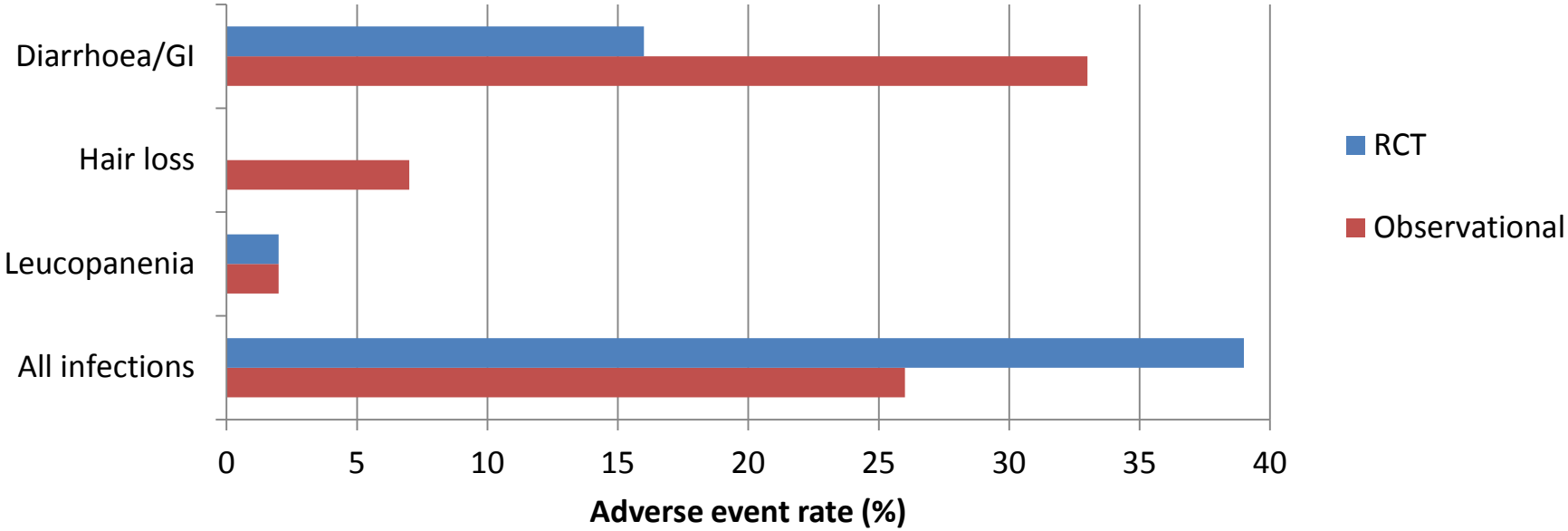


Clinical data – natural history

- Natural history
  - Data may be required to model long-term effects of treatment and the condition
  - Usually large cohort studies
    - placebo arms can be used



Adverse events



RCTs are not always representative of adverse event rates in clinical practice

- Populations atypical
- Co-morbidities not covered

Observational data and expert opinion (i.e. GDG) used

Which costs should be included?

Perspective

- NHS reference costs for all NICE evaluations
- Costs of time off work not included as could lead to:
  - Inequities – would value treatments for those who are working over those for children or the elderly

Which costs should be included?

Time horizon

- Consider long term (lifetime) impact on healthcare use
- Include immediate costs of treatment + cost of treating complications - savings from reduced risks of related illness

How to estimate costs

1) Estimate resource use per patient for each intervention
   - E.g. numbers of GP visits, outpatient visits, tests
   - Sometimes reported in clinical trials or other studies
   - May need assumptions from GDG or other experts

2) Multiply by unit costs for each resource
   - Some standard national sources (e.g. BNF for drugs)
   - Sometimes available from clinical studies
   - May sometimes have to use local estimates

Sources for unit costs

Type of cost	Source for the cost
Drugs	NHS Drug tariff http://www.ppa.org.uk British National Formulary http://www.bnf.org
Other technologies	NHS Supply Chain Catalogue http://my.supplychain.nhs.uk/catalogue
Staff time	'Unit costs of health and social care' http://www.pssru.ac.uk
Hospital procedures/stays, outpatient visits, tests	Department of Health Tariff and NHS reference costs http://www.dh.gov.uk

Types of Economic Evaluation

Type of analysis	Value of resources	Value of health gain
Cost-effectiveness	£	Single indicator: bilirubin levels cases of cerebral palsy averted, life years saved…
Cost-utility	£	Combined index: Quality adjusted Life Years (QALY)
Cost-benefit	£	Monetary value: Willingness to pay (£)

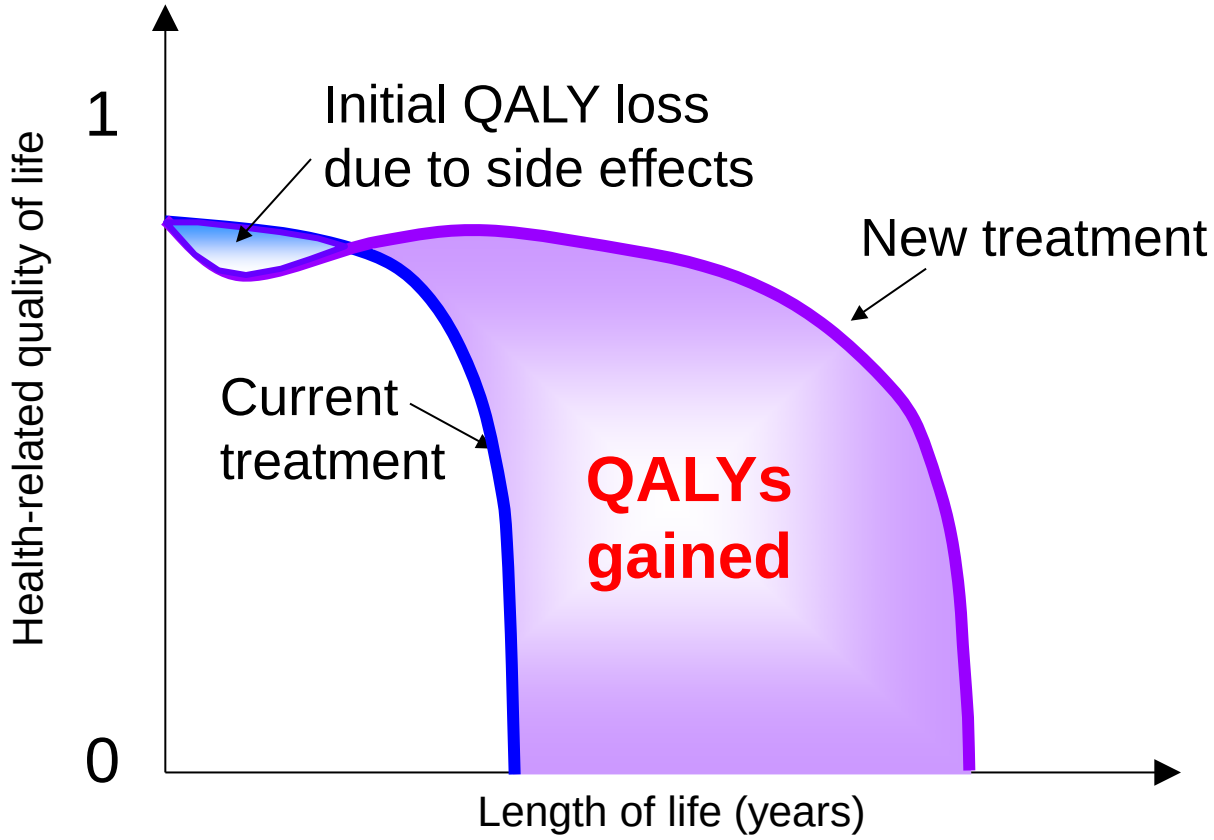
The QALY

- QALY - Quality Adjusted Life Year

- Principle goals of health care
  - improved life expectancy
  - improved quality of life

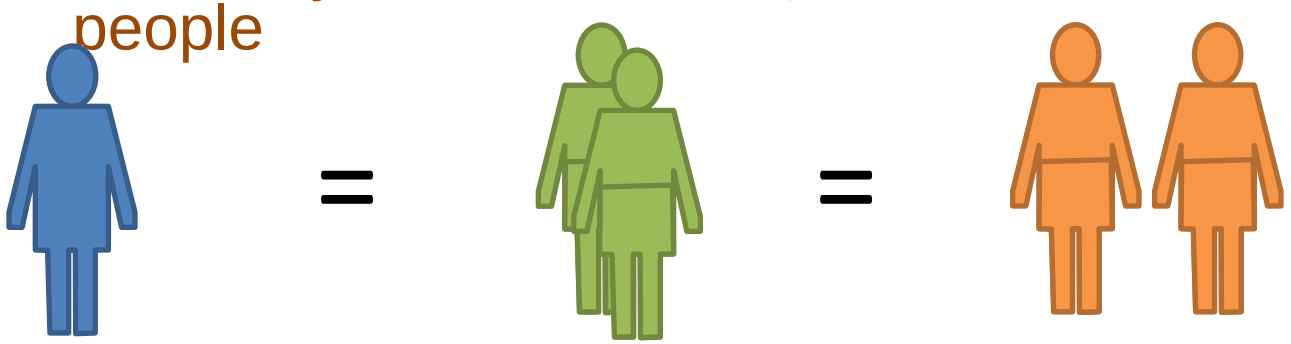
- A year of life weighted between 0-1
  - perfect health = 1
  - death = 0

Quality Adjusted Life Year

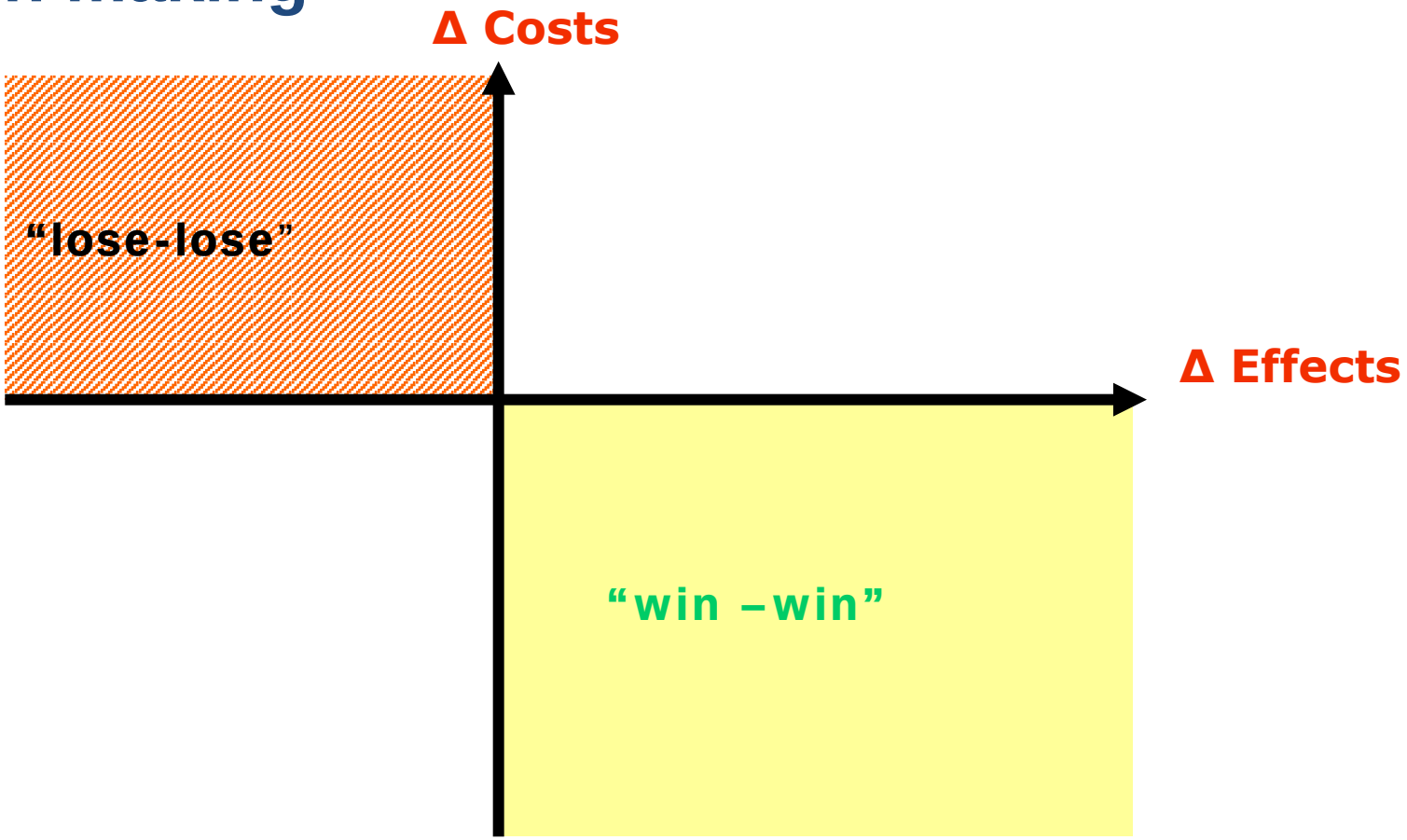


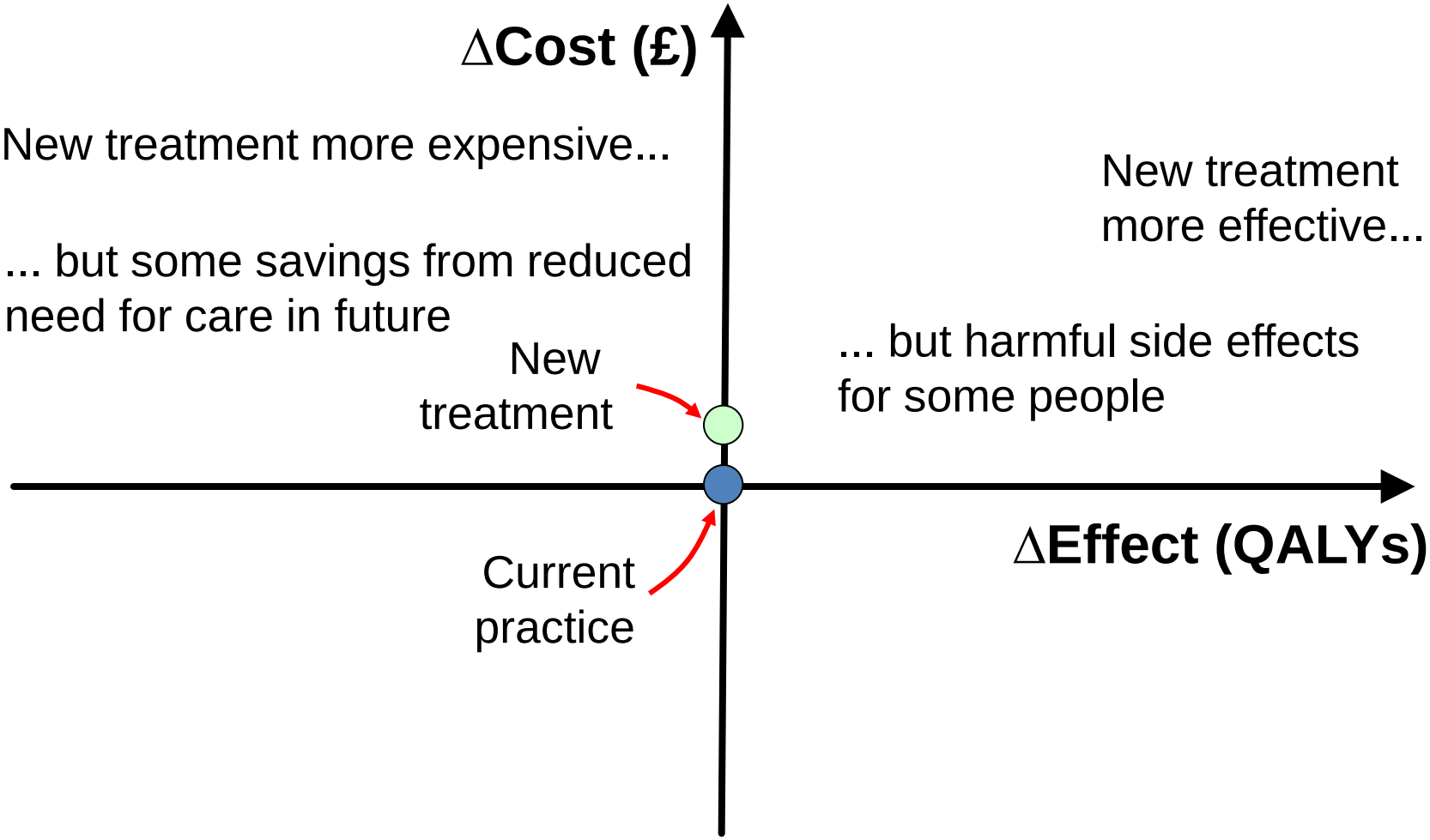
"A QALY is a QALY is a QALY"

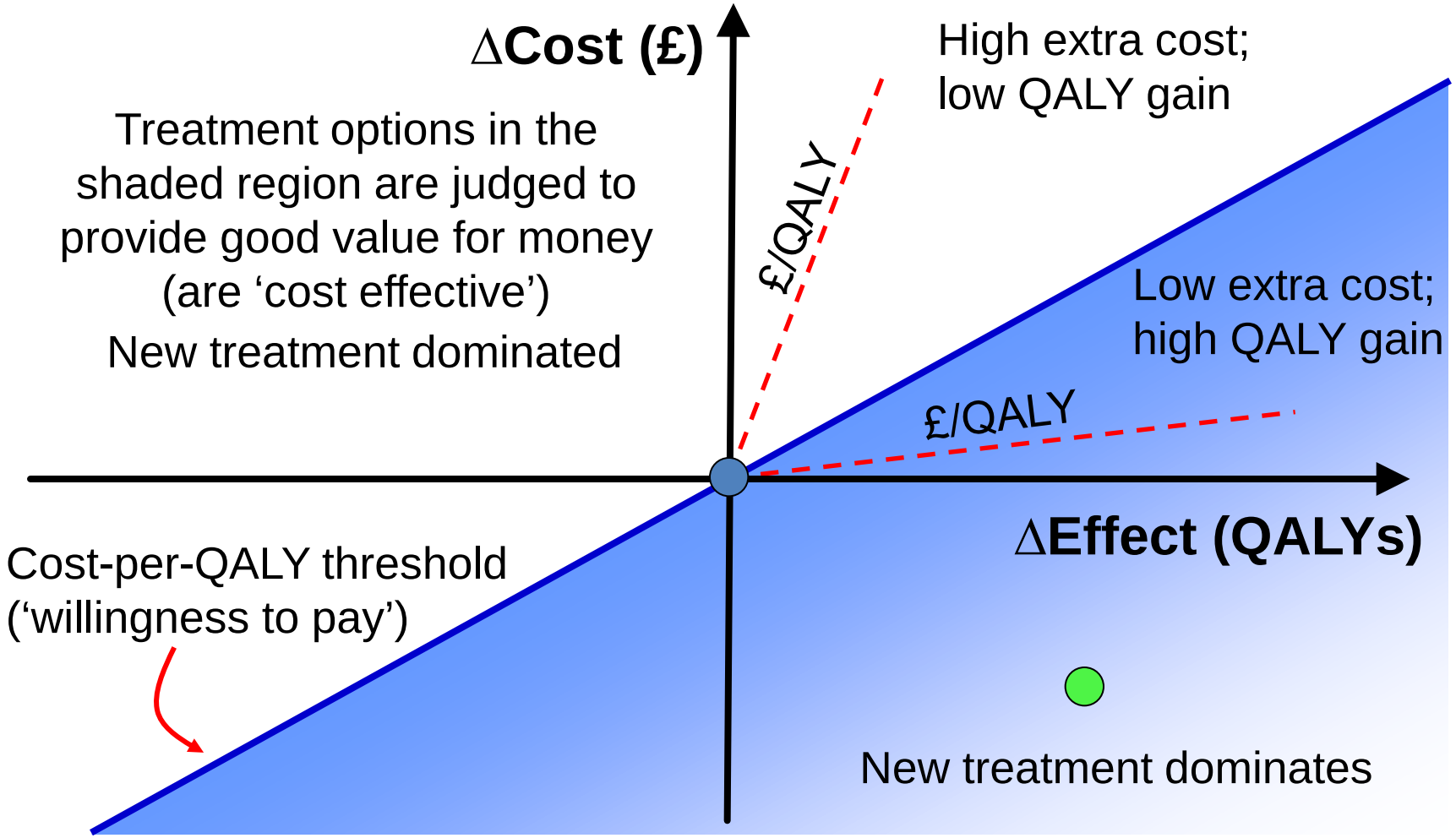
- Usual value judgements used to calculate QALYs:
  - Allows the effectiveness of different technologies for different people to be compared
- 1 QALY:
  - One year of 'perfectly' health life for one person
  - OR two years of life with QoL of 0.5 for one person
  - OR one year of life with QoL of 0.5 each for two people



Assessing cost effectiveness
Decision making




ΔCost (£)
New treatment more expensive...
... but some savings from reduced need for care in future
New treatment more effective...
... but harmful side effects for some people
New treatment
Current practice
ΔEffect (QALYs)


ΔCost (£)
Treatment options in the shaded region are judged to provide good value for money (are 'cost effective')
New treatment dominated
£/QALY
High extra cost; low QALY gain
Low extra cost; high QALY gain
£/QALY
ΔEffect (QALYs)
Cost-per-QALY threshold ('willingness to pay')
New treatment dominates

The threshold

- "The Appraisal Committee **does not** use a precise ICER threshold above which a technology would automatically be defined as not cost effective or below which it would.

- ….but advisory £20,000 - £30,000 per QALY

Prophylactic phototherapy - Cerebral palsy

HEALTH STATE	LIFE EXPECTANCY	HEALTH STATE UTILITY	QALY	Discounted QALY
No Cerebral palsy	80	1.00	80	27.68
Mild cerebral palsy	75	0.84	63	22.95
Severe cerebral palsy	37	0.04	1.48	0.85

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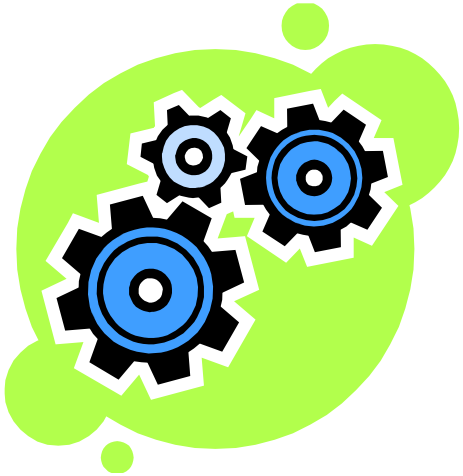
THE ROLE OF MODELLING



Why do we need to model

- Trials are of limited duration and so may not capture all costs and benefits
- A single trial may not capture all the relevant information
  - Not all the relevant outcomes (e.g. adverse effects, quality of life, costs)
  - Not all the relevant comparators
- More than one study may addresses the clinical decision
- Trials often report intermediate outcomes
  - e.g. Blood pressure
- There may not be a trial
- Trials can be very expensive

What is a health economic model?

- A mathematical structure used to combines different sources of data

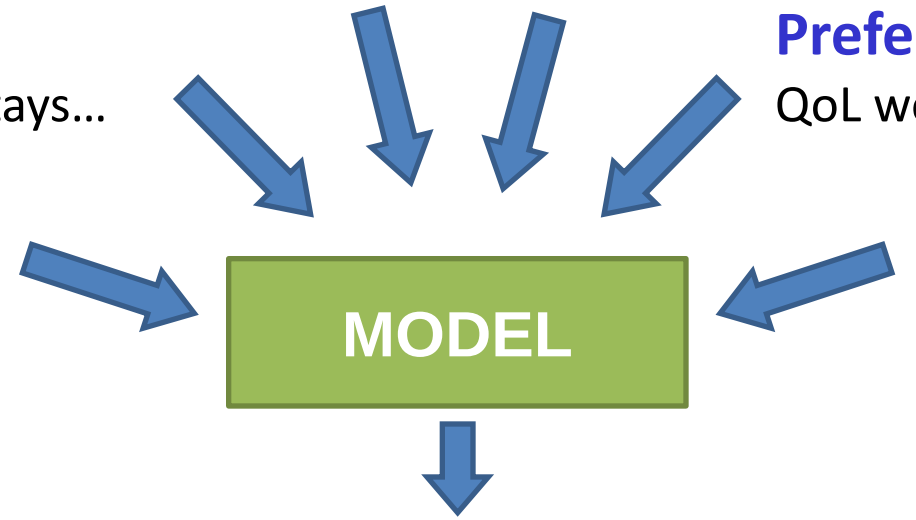
Test accuracy
Sensitivity/specificity

Treatment effects
Survival, health status

Resource use
GP visits, inpatient stays…

Preferences
QoL weights

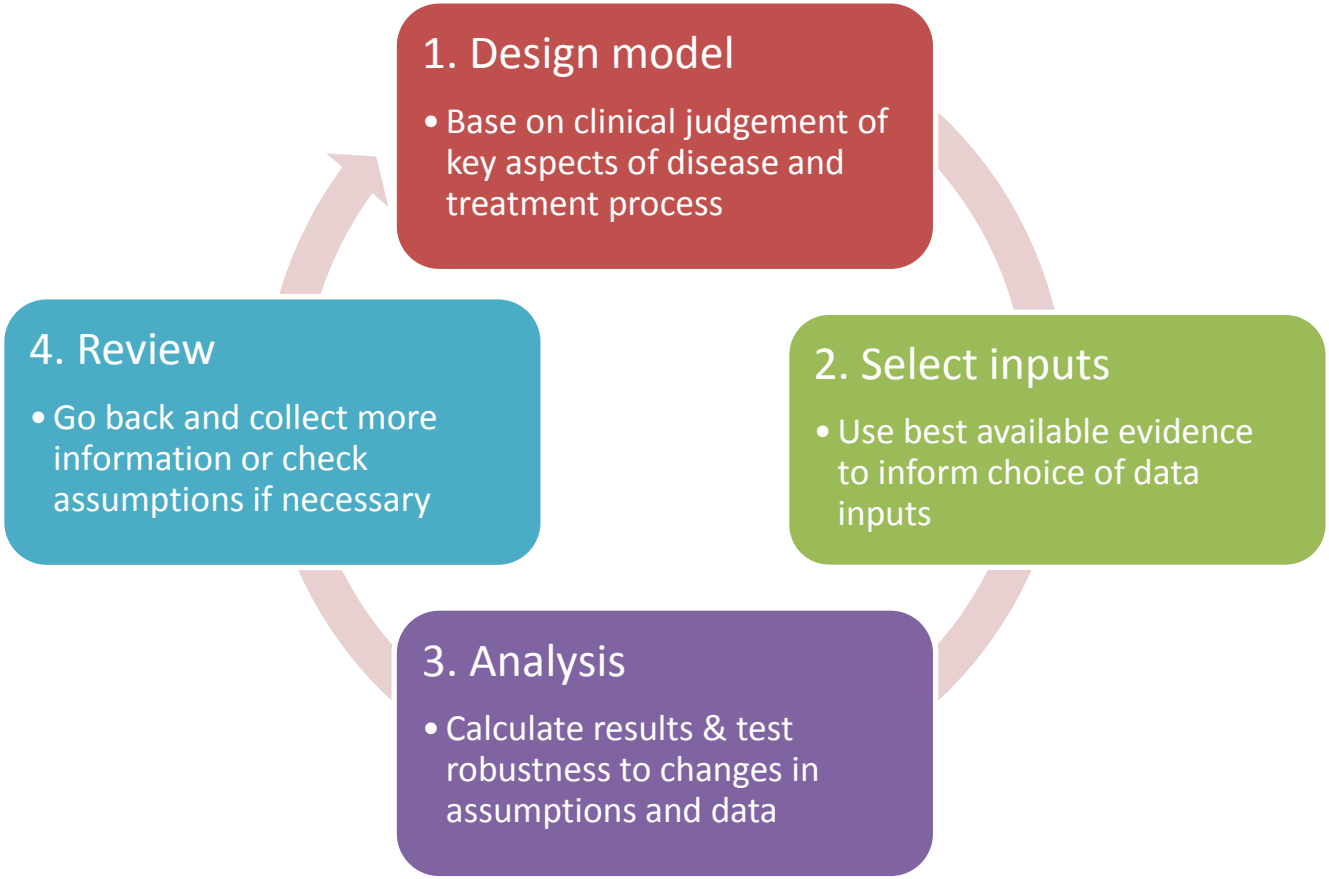
Unit costs
e.g £ per GP visit



Epidemiology
Baseline risks, sub-groups

Cost Effectiveness
£/QALY

The modelling process



Developing clinical guidelines, G-I-N 2013

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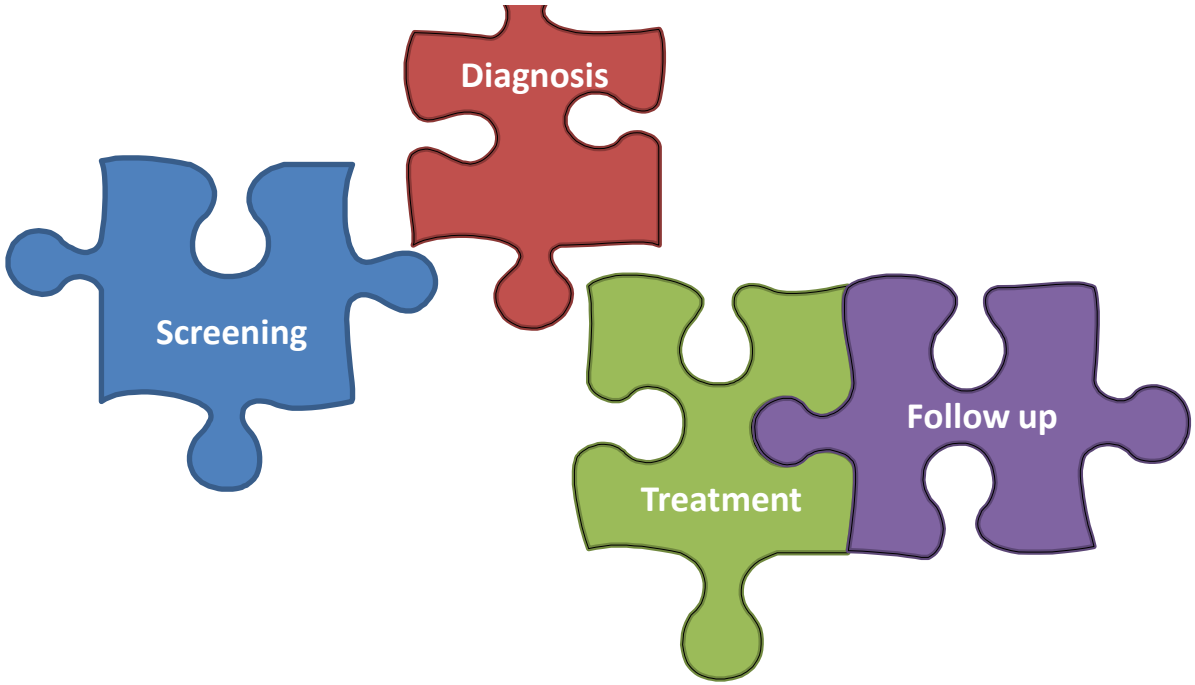

ECONOMICS IN NICE GUIDELINES

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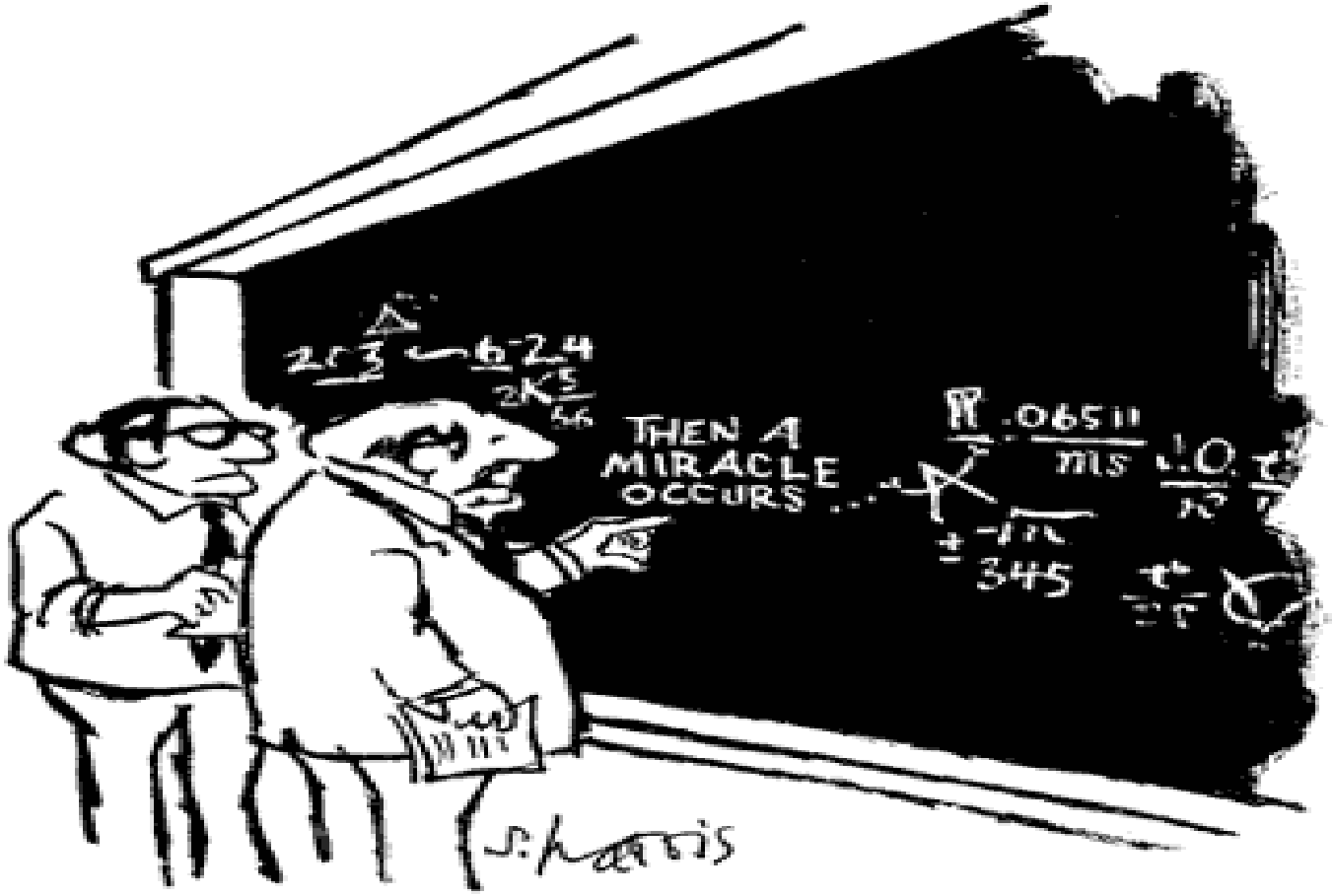
Role of GDG and HE



"I think you should be more explicit here in step two."

Prioritising questions for HE analysis

Prioritise based on

1. Potentially large benefits/harms
2. Potentially large cost impact to NHS (+ve/-ve)
3. Recommendations may lead to a change from current practice
4. Clinical uncertainty

Modelling used in Neonatal jaundice guideline

Cost effectiveness of a more intensive testing strategy for neonatal jaundice

Strategies compared:

1. Current practice
2. Blood test (TSB) for all babies with visible jaundice
3. Meter reading (TCB) then TSB for all babies with visible jaundice

What the evidence says

- visual inspection good at ruling out jaundice
- Serum bilirubin and transcutaneous biliriubin readings - equivalence at intermediate levels
- Have to use TSB if high levels
- Broad equivalence between strategies 2 and 3

Method used to get around this:

- Cost minimisation based cost of a kernicterus case avoided

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Any questions