Economic Evaluation

INGER SMITH - WHITE BOX HEALTH ECONOMICS
Agenda

- Need for economic evaluation
- Economic evaluation methods
- Clinical trial vs. reality
- Other considerations
Need for Economic Evaluation

- Gain Reimbursement
- Expand usage
- Defend price
In 2017, the most expensive Model X, was the P100D, at $160,000. Now that same model is around $100,000. Thanks Tesla for the great deals

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https://www.quora.com/How-much-is-the-most-expensive-Tesla
Economic evaluation methods

A health economic analysis is a comparative analysis of alternative courses of action in terms of both their costs and consequences.

How do we measure consequences?
How is this measured?

The incremental cost effectiveness ratio is expressed as:

\[
\frac{\text{Total costs of therapy A} - \text{Total costs of therapy B}}{\text{Effectiveness of therapy A} - \text{Effectiveness of therapy B}} = \text{The ‘ICER’}
\]

(Incremental Cost Effectiveness Ratio)

An example with two treatment alternatives:

Treatment A: Costs £20,000 and provides 10 years in life expectancy

Treatment B: Costs £10,000 and provides 8 years in life expectancy

- **ICER:** \[
\frac{£ \ 20,000 - £ \ 10,000}{10 \ \text{years} - 8 \ \text{years}} = £ \ 5,000 \ \text{per life-year gained}
\]

**Interpretation:**
If the payer is willing to pay £5,000 or more per additional life-year gained => treatment A is considered “good value for money”
What about quality of life?

Need to measure of health-related quality of life

Quality Adjusted Life Year - Accounts for both *quality and quantity* of life

Uses a scale where ‘full health’ = 1 and ‘dead’ = 0 to give a utility score

- If an intervention provides one additional year of life at a utility score of 0.8, then the intervention provides 0.8 QALYs.

Favoured by NICE as it allows cost-effectiveness of different treatments to be compared across therapeutic areas
Use of utility scores to calculate QALYs

- Diabetes without complications: 0.785
- Blindness in one eye: 0.711
- Coronary insufficiency: 0.677
- Amputation: 0.505
- Stroke: 0.621
- Ischaemic heart disease: 0.695
- Coronary thrombosis: 0.730
- Diabetes without complications: 0.785

Perfect health = 1.000

Mortality = 0.000

Amputation
Coronary insufficiency
Blindness in one eye
Diabetes without complications
Calculating QALYs

Measured using EQ-5D
Total QALYs is
\((1+0.95+0.83+0.75+0.47) = 4\)
An example with two treatment alternatives:

Treatment A: Costs £20,000 and provides an estimated 4.0 QALYs
Treatment B: Costs £10,000 and provides an estimated 3.8 QALYs

ICER: \[
\frac{£ 20,000 - £ 10,000}{4.0 \text{ QALYs} - 3.8 \text{ QALYs}} = £ 50,000 \text{ QALY gained}
\]

Is this still good value for money?
How certain can we be our cost/QALY is correct?

- What was measured in the trial?
- Were all the patients dead or ‘cured’ at the end of the study?
- Are there any long term implications with those that are ‘cured’?
‘Objective’
Exercise test versus physical functioning, $r = 0.40$

‘Subjective’
How certain can we be our cost/QALY is correct?

- What was measured in the trial?
- Were all the patients dead or ‘cured’ at the end of the study?
- Are there any long term implications with those that are ‘cured’?
- What about conditions that are treated by not cured, e.g. Type 1 diabetes?
- What costs might be incurred?
Did we measure QALYs or did we model expected QALYs?

Diabetes example

**Surrogate endpoints**
- Biochemical changes
  - HbA1c, blood pressure
  - Serum lipid levels, BMI
- Patient population
  - Gender, age
  - Microalbuminuria, progression to proteinuria
  - Background and proliferative retinopathy

**Long-term endpoints**
- Clinical
  - Life expectancy
- Complications - Cost & impact of QoL
  - Time to onset of complications
- Synthetic
  - Quality-adjusted life expectancy
Health Technology Assessment

- Health Technology Assessment using QALYs well accepted in UK (NICE, SMC & AWMSG), Australia, Sweden...
- Cost effectiveness threshold (£20k - £30k per QALY vs. current standard of care)
- Post approval assessment, re-assess every 3 to 5 years
- Incorporation into clinical guidelines
Payer questions about clinical trials

- Are the trials in the ‘right’ patient population?
  - What is the background/previous therapy?
  - Are patients diagnosed at the appropriate stage to be treated?

- Will treatment be as per the protocol?
  - How long will patients be treated?
  - Will patients continue on therapy?
  - What happens when patients stop therapy?

- Will the therapy have the same effectiveness in clinical practise?
  - Specialist versus general setting?
Other considerations

- Patient preference
- Budget impact
- Newer therapies
- Equality
- Patient acceptability
Questions?