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Measuring
outcomes

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Learning objectives

- By the end of the session students should be able to
 - Explain how different methods of economic evaluation may be appropriate in different circumstances;
 - Describe the methods involved in obtaining quality of life values for use in QALYs;
 - Calculate QALYs gained, given data on life expectancy and health status;
 - Demonstrate familiarity with EQ-5D, the NICE-recommended instrument for calculating QALYs;
 - Start to appraise the value of QALYs, given the theoretical, methodological and ethical challenges that they pose.

Outline

- Choice of evaluation type
- QoL measures
- Calculating QALYs using EQ-5D
- Methods for obtaining QoL values
- Brief appraisal of QALY methodology

Outcomes in economic evaluation

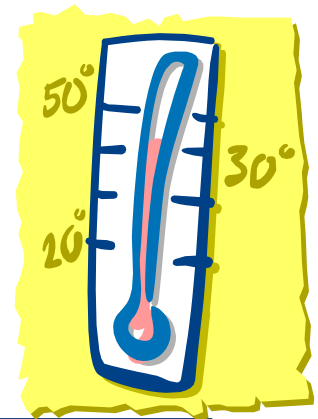
- Economic evaluation involves comparative analysis of two or more interventions in terms of both costs AND benefits
- Outcome measurement therefore important
- What sorts of outcomes do we want?

Depends on what we want to compare...

- When only want to compare alternatives within a condition:
 - CEA - measures benefits in terms of some standard clinical outcome or effectiveness, e.g. change in blood pressure.
- When want to compare across conditions:
 - CEA – life years gained – but what about other impacts?
 - CUA - impacts on both the quality and quantity of life, e.g. QALYs
 - CBA - measures both the resource costs and health benefits in monetary terms

Valuing outcome for CEA

- Must choose ONE single outcome
 - Proxy outcome (not ideal)?
 - E.g. cancers detected
 - E.g. change in blood pressure
 - Life years gained?

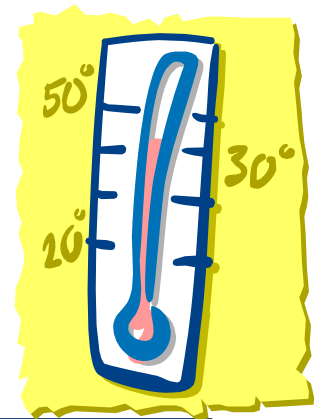


Problems of multiple outcomes

	<i>Cost</i>	<i>Effect on life expectancy</i>	<i>Effect on Quality of life</i>
A	Low	No change	Large improvement
B	High	Modest improvement	Modest improvement

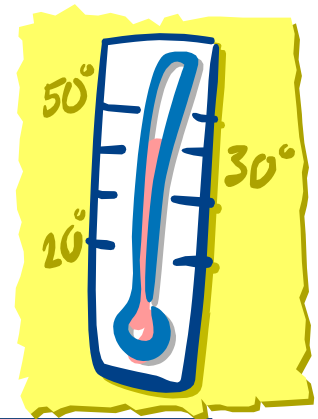
Valuing outcome

- Must choose ONE single outcome
 - Proxy outcome (not ideal)?
 - E.g. cancers detected
 - E.g. change in blood pressure
 - Life years gained?
 - Money difficult in practice...
 - Quality-adjusted life-year (QALY)?

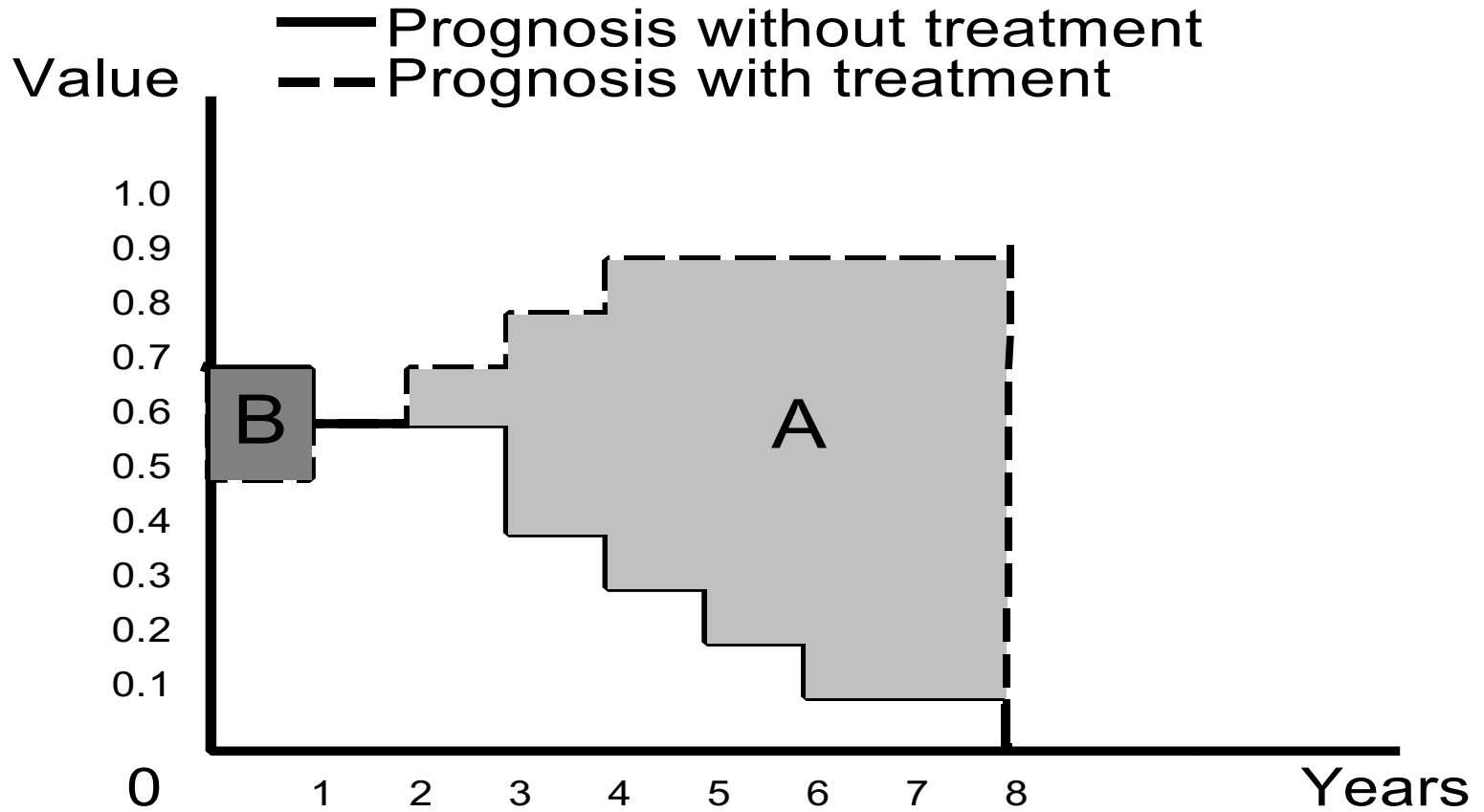


What are QALYs?

- Combines length and quality of life into single unit
- Weights used to adjust survival data
- Involves valuing health states on a cardinal (interval or ratio) scale with maximum value of 1 (perfect health) and value of 0 equal to death
- Used to weight life years
- $QALY = (length\ of\ life) \times (QoL)$



QALYs



Calculating QALYs

- Prognosis without treatment

$$(0.7 \times 1) + (0.6 \times 2) + (0.4 \times 1) + (0.3 \times 1) + (0.2 \times 1) + (0.1 \times 2) = 3.0$$

- Prognosis with treatment

$$(0.5 \times 1) + (0.6 \times 1) + (0.7 \times 1) + (0.8 \times 1) + (0.9 \times 4) = 6.2$$

- Total gain in QALYs

$$6.2 - 3.0 = 3.2$$

LY – Life Years

- Life years can be obtained from life tables
 - Average life expectancy
 - *For example: Life expectancy at birth by health and local authorities in the United Kingdom 1991-1993 to 2002-2004, including revised results for England and Wales 1991-1993 to 2000-2002 accessed via <http://www.statistics.gov.uk/statbase/Product.asp?vlnk=8841>*
- Some evaluations require information about survival linked to the intervention

QA –Quality Adjustment

- What sort of quality adjustment is required?
- What do we mean by quality of life?

Specific versus generic measures

- Specific measures
 - Aim for a narrow assessment of health related to a particular condition
 - Can only be used for that particular condition
 - Examples: Dermatology Life Quality Index, Beck Depression Inventory, Arthritis Impact Measurement Scale (AIMS)
 - Are more sensitive to the particular condition under investigation
 - Cannot be used to compare across conditions
 - GENERALLY NOT HELPFUL FOR ESTIMATING QALYs

Specific versus generic measures

- Generic measures
 - Aim for a broad assessment of health related QoL
 - Can be used across all different conditions
 - Examples: Nottingham Health Profile, SF36, COOP WONCA charts, EQ-5D, HUI
 - Can be insensitive to some problems
 - OR can be very long as they try to look comprehensively across the whole of health

Profile versus index measures

- Profile measures
 - Aim to provide a profile of an individual's health
 - Questions can be summed into sub-categories
 - Profiles can be clustered by disease or condition group
 - Examples: Sickness Impact Profile, Nottingham Health Profile, SF-36
 - GENERALLY NOT HELPFUL FOR ESTIMATING QALYs

Profile versus index measures

- Examples of profile measures
 - Nottingham Health Profile
 - 13 dimensions, 45 items
 - Physical mobility, pain, sleep, energy, social isolation, emotional reactions, employment, social life, household work, sex life, home life, holidays, interests, hobbies
 - SF-36
 - 8 dimensions, 36 items
 - Physical functioning, vitality, social functioning, bodily pain, general mental health, general health perceptions, role limitations – physical, role limitations - emotional

Profile versus index measures

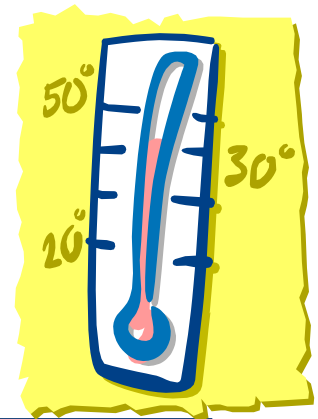
- Index measures
 - Aim to provide a single index value representing an individual's health
 - Aims to be comprehensive but trade off between number of dimensions and ability to obtain an index value
 - Incorporates social preferences / weights so that the index numbers are “meaningful”
 - Examples: EQ-5D, SF-6D, 15D, HUI

Profile versus index measures

- Examples of index measures
 - EQ-5D
 - 5 dimensions, 3 items
 - Mobility, self care, usual activities, pain / discomfort, anxiety / depression
 - HUI2
 - 7 dimensions, 7 items
 - Sensation, mobility, emotion, self care, cognition, pain, fertility

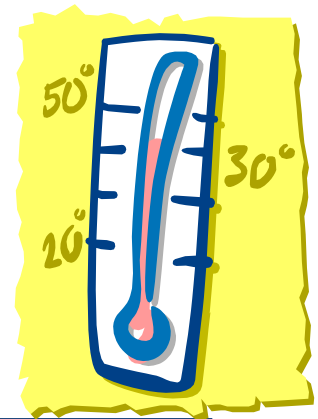
Estimating QALYs using an index measure

- EQ-5D (EuroQol)
- Health Utilities Index (HUI II and HUI III)
- Quality of Well-Being Scale (QWB)
- 15D
- SF-6D (derived from SF-36)



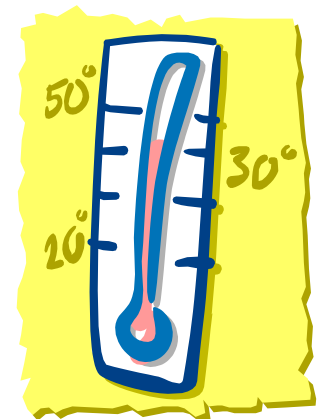
EQ-5D

- Five dimensions:
 - Mobility
 - Self care
 - Usual activities
 - Pain/discomfort
 - Anxiety/depression
- Each with three levels
- PLUS thermometer (VAS)



Examples of EQ-5D questions

- **Mobility**
 - I have no problems in walking about
 - I have some problems in walking about
 - I am confined to bed
- **Pain/Discomfort**
 - I have no pain or discomfort
 - I have moderate pain or discomfort
 - I have extreme pain or discomfort



Valuing health

QALYs gained

QoL with treatment:

11111 (value 1.0) for
10 years

QoL without treatment:

21212 (value 0.743) for
10 years

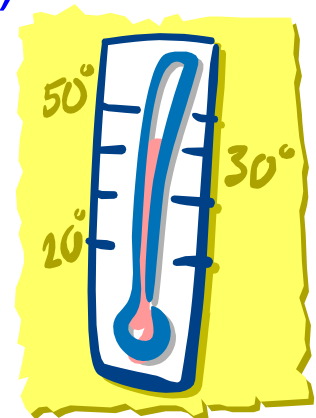
= QALYs with treatment
- QALYs without treatment

= treatment (QoL x LE)
- non-treatment (QoL x LE)

= (1.0 x 10) - (0.743 x 10)

= 10 - 7.43

= 2.57 QALYs gained



Important aspects

- Importance of value judgements
 - Who will make judgements?
 - What will be the dimensions?
 - Numbers (values) to be assigned
 - Should a QALY be a QALY be a QALY? i.e. should the valuation of a QALY be the same, irrespective of who is involved?
- Weights must have interval properties
- Scale must be anchored consistently at death and good health

