

What are the more popular measures of benefits in the health sector and why?

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Abstract:

It is often said that 'Economist know the price of everything but the value of nothing'. One might ask, how we can put a price on such a thing like life, after all most would agree that life is indeed priceless. Or alternatively, others might question how one can evaluate and therefore prioritise a person's health in monetary terms, to the person concerned (and/or, their family and friends) an illness is still an illness whatever it is or however it comes. This and the equity of the distribution of these resources are the main ethical dilemma faced by most policy makers whilst evaluating health care.

In this web page, we attempt to describe the more popular methods for valuing health care. The three main methods we will describe are the Cost Benefit Analysis (CBA), Cost Effectiveness Analysis (CEA) and Cost Utility Analysis (CUA).

There are apparent drawbacks to using cost benefit and cost effectiveness analysis in evaluating health care. In this web page, we therefore focused most of our attention on the latter method which is vast becoming the most popular method for evaluating health care. Unlike, the other two methods it measures benefits in quality adjusted life years (QALYs).

As, a integral part of CUA , we have also be described and discussed briefly the three main methods for valuing health states. These are the Rating scale (RS), Standard Gamble (SG) and Time trade off (TTO).

Why is it important to measure benefits of health care?

The government allocates a lot of resources to the health sector in the UK. Government spending for 2000/2001 was £44.9bn. Given the limited resources and fixed budget constraint as well as unlimited wants by society, policy makers are under pressure to ensure that resources are fully utilised in the best possible way.

“The aim of priority setting is to ensure that health benefits resulting from health care are maximised and that the opportunity cost of health care are minimised”¹

Therefore there is a need to find an appropriate method to evaluate health care so that outcome is most beneficial to the individual in question as well as society as a whole.

How can we measure health care benefits?

There are three common measures of benefits in the health sector:

- Cost-Benefit Analysis (CBA)
- Cost-Effectiveness Analysis (CEA)
- Cost-Utility Analysis (CUA)

As, you will notice in the simple formulas below, they all use the same value for numerator i.e. cost but differ in the way benefits are calculated in the denominator.

Cost benefit Analysis (CBA):

- CBA measure health benefits in monetary terms
- It is concerned with allocative efficiency - maximising benefits given fixed resources
- General **CBA Rule**: ‘That set of programs is to be preferred that maximises the excess of benefits over cost, given the constraints in the problem’ (Drummond)
- Zweifel pg 21 gives a Simple formula for deciding a project:

$$\text{CBA} = \frac{\text{Cost in units of money}}{\text{Benefits in units of money}}$$

A Project is accepted if $\text{CBA} < 1$

Example:

Cost of project (in units) = £1000
Benefit of project (in units) = £500

In this case it is wise to reject the project if there is another alternative

- There are various other formulas which one could use to undertake CBA. Drummond uses the concept of net social benefit with a discount factor.
- Two main ways of valuing benefits in monetary terms
 - (1) Human capital approach:
 - (2) Willingness to pay (out of their own pocket)

Advantages:

- Unlike the other two methods it does focus on the financial aspect of reducing mortality and enhancing existing quality of life, which is useful for decision making given the fixed budget of the health sector.
- It can evaluate a wide variety of health projects on the same scale (both negative and positive consequences) and therefore comparison can be made e.g. comparing the cost-benefit of a hip replacement with heart surgery. It is therefore the broadest measure out of the three methods.

Disadvantage:

- In a publicly financed health care system like the NHS in the UK where government allocate a fixed budget for health. It is difficult to ask people how much they are willing to pay for health care as people attach different values to their health and also have imperfect information about prices, they tend to be more conservative.
- The moral issue of measuring life and health in monetary terms still persists

Cost Effectiveness Analysis (CEA):

- Benefit is measured in natural units (non-monetary terms)
- The difference between CBA and CEA is that CBA transforms these benefits into monetary value²
- Zweifel pg: 19 gives a Simple formula for deciding a project:

NATURAL UNITS:	
Project 1 Reduction in blood pressure	Project 2 Safety measures to avoid traffic accident
CEA = $\frac{\text{Cost in units of money}}{\text{Benefits in mm Hg}}$	Or $\frac{\text{Cost in unit of money}}{\text{Benefit in additional life years}}$
CLINICAL OUTCOME	LENGTH OF LIFE IN YEARS
Of the two projects, the one with the lowest value of CEA is preferred	

Advantages:

- Can successfully compare two projects which have the same outcome (cost minimisation is a special case of CEA)
- Ethical issue of valuing life in monetary terms do not prevail.

Disadvantage:

- In, its simplest form, only useful in considering outcomes which uses the same unit of benefit e.g. blood pressure reduction. Therefore not very comprehensive when comparing between programs
- CEA only considers one outcome of interest when in fact there are may be various outcomes e.g. Strokes prevented or extension of life or Short term side effects Vs long term illness and therefore fails to incorporate the absolute quality of life and preferences (Gold et al 1995)
- Doesn't take into consideration benefits which spillover to a third party or society as a whole.
- Has no weight on which outcome. There may be outcomes which have more value e.g reduction in bleeding may be more important than extension of life.
- Quite difficult to apply in practice

Cost Utility Analysis (CUA):

- Outcome measured in generic rather than specific units. In which the main measure is the Quality adjusted life years (QALYs) which combines a wide range of health states together into a single measure taking into account the quality (morbidity) and quantity (mortality) aspect of life. Other generic units include health days e.g. HYE and utility.
- You can calculate QALYs for various projects, this can then be tabulated into a league table which can be useful for decision making.
- CUA was created as response to the problems being faced using CEA

$$\text{CUA} = \frac{\text{Cost in units of money}}{\text{Benefits in quality adjusted life years}}$$

When comparing two projects the one with the lowest CUA is preferred.

Methods for valuing health states:

There are three main methods to generate valuations for health states.

- Rating Scale (RS) in which the Visual Analogue Scale (VAS) is widely used
- Standard Gamble (SG)
- Time Trade Off (TTO)

The Rating Scale (RS) or Visual Analogue Scale (VAS)

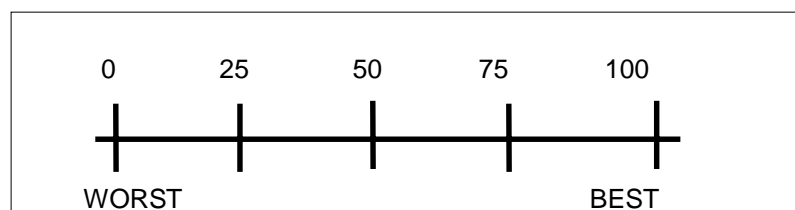
There are many versions of the scaling methods namely:

The Rating Scale (RS)

The Visual Analogue scale (VAS) - interval scaling i.e. scale on a page

Category rating - health states are placed in different categories

In the simple rating scale method, you are asked to rate a variety health state from a scale from 0 (death) to 100 (perfect health). The intervals between different health states also hold significance since they show strength of preference for a health state.



Time trade off (TTO) :

Developed by Torrance et al (1972)

You are asked to choose between two certain states :

- 1) Living in perfect health for a given shorter time period (n years) or
- 2) Living in poor health for a longer time period

This is varied until you are indifferent between the two states

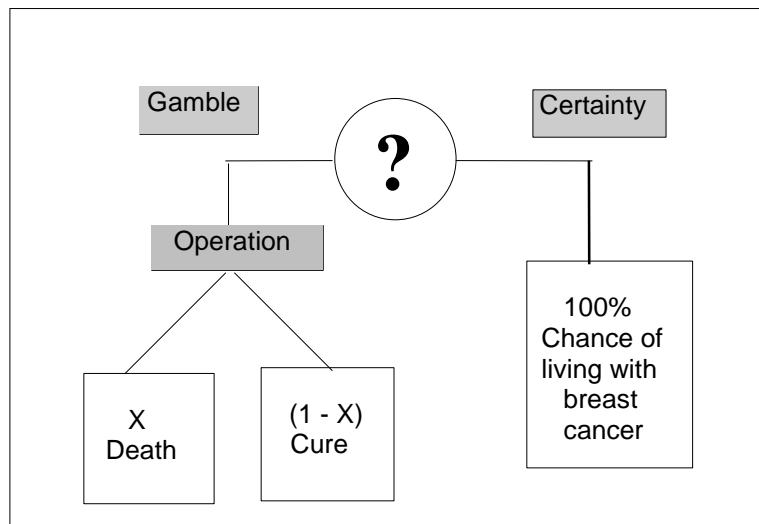
Standard Gamble (SG):

Based on axiom of utility theory (Von Neumann & Morgenstern 1953?)

You are asked to choose between:

- 1) Living in a certain health state e.g. living with breast cancer or
- 2) Taking a gamble with death where you have $P(X)$ or $P(1-X)$ of being cured (which is better than the certain health state) whilst undergoing operation.

P(X) is varied until you are indifferent between outcomes



On the whole there is no overall agreement about which method to use to value health states.

RS and other variants of it are relatively simple however unlike the other two methods it doesn't make allowance for choice or some form of trade off between two health states as respondents simply rate their preferences. Also outcomes in across different rating methods do not produce the same result even same problem is presented to them.

SG takes into account risk since there is uncertainty involved i.e. the more risk you take, the more improved your health is going to be. However utilities generated under this approach will tend to be higher because individuals are risk averse when dealing with death.

TTO takes into account discounting whereby people are impatient about consuming health care i.e. preferring to benefit today rather than tomorrow. It is arguably better than SG since it takes into account health states, duration and value all in one measure. For a fuller discussion on measuring health states and its impact practically you should consult the handbook of health economics.

Conclusion

Although there are benefits to using CBA there are certain drawbacks. The willingness to pay approach requires a flexible budget to reflect people responses however in the NHS this isn't the case as the government allocates a fixed budget to the health sector. CBA also faces the ethical issue of valuing life and health in monetary terms and therefore this makes it an unpopular method to use amongst policy makers.

The CEA and the CUA however help to overcome the problem of measuring health in monetary terms. CEA measures benefits in natural units which at its simplest form, pictures health in a unidimensional fashion. As we know our health is simply not only about a reduction in blood pressure or the number disability days avoided but it is about our overall wellbeing and implication this has on our ability to function within society. CUA has been created as result of the 'overall quality issue' lacking within CEA. As it takes a multidimensional picture of health. There are some commentators who doubt whether one is able to measure all aspects of health in a single measure.

Depending on what we are measuring, different methods prove better at valuing health benefits e.g. Cost effectiveness is useful when comparing two drugs with the same outcome and Cost Utility might be useful when the quality of a patient life is more important than the extension of life.

From our investigation into the number of studies conducted of the different types of analysis we found that there was more literature on CEA (2739 studies) compared to CBA (203) and CUA (381) in the York university website.

However, in overall terms, cost utility analysis seems to provide an advantage over the two other methods with its ability it measure health both in terms of the quality and quantity of life.

Notes:

- 1 Donaldson and Mooney, ref: Priority setting pg: 134
2. Frank. A. Sloane pg 101 Valuing health care (Quote by Mishan 1976 pg: 101)

References:

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NHS website.

York university website www.york.ac.uk/inst/crd

