Measuring patient outcomes for use in economic evaluations

B-Time trade-off (TTO)

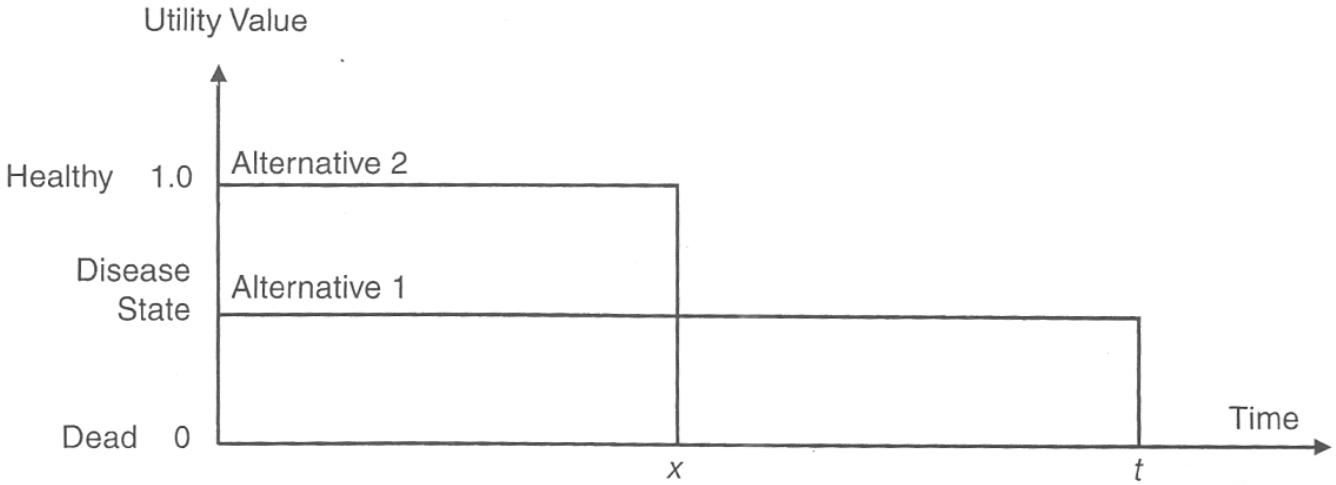
TTO method is illustrated in Figure (1) where the subject is offered two alternatives:

Alternative 1 is a certain disease state for a specific length of time (t) which is the life expectancy for a person with the disease, and then death.

Alternative 2 is being healthy for time (x), **which is less than t**. Time x is varied until the respondent is indifferent between the two alternatives. The utility score for the health state is calculated as **x divided by t**.

For example, a person with a life expectancy of 50 years is given two options: Alternative 1 is being blind for 50 years, and alternative 2 is being healthy (including being able to see) for 25 years followed by death. If the person says he or she would choose be blind for 50 years (not being sight for 25 years), the number of years (x) of being sight (healthy state) is increased until the person is indifferent between the two alternatives. If the person would choose being sight for 25 years, the number of years (x) of sight is decreased until the person is indifferent between the two alternatives. Let us say that for a person who expects to live 50 more years, the person's point of indifference is 40 years of sight versus 50 years of being blind. The utility score would be x/t = 40/50 or 0.8[(2)].

Figure (1). Time tradeoff (TTO). This TTO schematic represents the choice a respondent makes



about trading off years of life for better health for a shorter period of time. The respondent is given the choice of living a full life (to time t) with a specific condition or living fewer years (to time x) without this condition (being healthy). The time of living healthy is varied until the respondent is indifferent between living in full health x years and living with the condition for *t* years. The utility calculated for the condition is *x/t*

C- Rating scale

Depends on visual analogue scales (VAS). Figure 4.1 illustrates a typical VAS.

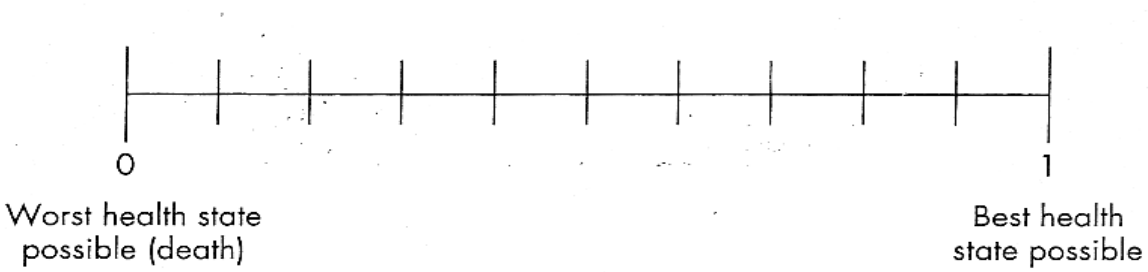


Figure 4.1 Visual analogue scale (VAS).

1- Mark on the scale where you think indicates how you feel now.

2- Mark on the VAS where you would value your health state if you had pneumonia.

The difference between (1) and (2) is the difference in your health state, as valued by you. So, if you had pneumonia, and you were given some antibiotics to cure it, that difference in health state would be the **health gain obtained by the drugs**[(1)].

3-Quality-adjusted life years [QALY]

The utility measures are used to generate **QALY.** The QALY combines survival periods (**quantity of life**) with health status valuations (**quality of life)** to provide a standard unit for measuring health gain. **One QALY is 1 year in perfect health**. One QALY could also be 2 years at 'half perfect health.

A treatment that moves a patient from 0.5 to 0.75 produces the equivalents of 0.25 QALY if it is maintained for 1 year. If applied to 4 individuals, and duration of the treatment effect is 1 year, the effect of the treatment would be equivalent to 1 completely well-year life. **If you value health states using QALYs, you can compare different treatments.** This method would let you compare the health gain from hip replacements with those due to antidepressant treatment, even though the clinical indicators for these conditions are very different [1].

A theoretical worked example using QALYs [1].

Utility data for the two alternatives available from the literature suggest that patients maintained on erythropoietin value their health states at a higher level than those maintained on blood transfusions.

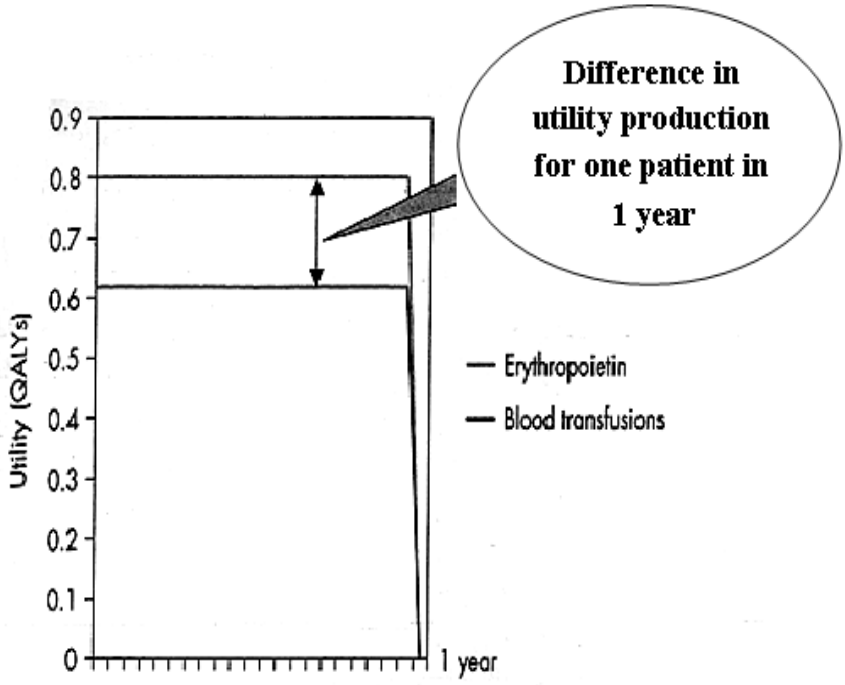


Figure 4.4 Illustration of QALYs produced by erythropoietin and blood transfusions

In a study1000 patients stated their utility for a treatment period of 10 years. The utility value for each year (when valued from 0 to 1) on erythropoietin was 0.80, whereas on blood transfusions it was 0.62. Figure 4.4 shows how those QALYs can be represented graphically.

What is the difference in utility production of the two alternatives, i.e. how many extra QALYs are produced by erythropoietin per year of treatment, for 1000 patients?

Incremental difference in utility = 0.80 - 0.62

= 0.18 QALYs per patient per annum

= 180 QALYs per 1000 patients per annum

Whose utility values should be used? [1].

Utility values can be obtained from healthcare **professionals**, **patients** and **the general public**. There are advantages and disadvantages associated with each group.

• **Healthcare professionals** are more informed about the health states and interventions but may provide a biased value owing to their continued exposure to that illness or

intervention. **Healthcare professionals have been shown to assign lower ratings than patients or the general public.**

• **Patients** are informed about the health states and interventions they have experienced. They will not be informed about interventions they have not experienced. **Patients tend to attach higher value health states than do healthcare professionals and the general public**.

• Sometimes the health state has to be valued by **proxy**الوكيل, such as the health state of a **newborn baby** or a person with advanced **Alzheimer's disease**. Therefore, it is important to remember -proxy values may be lower than the patient's values would have.

4- Expressing benefits as monetary values [1].

Another method of measuring outcome is to convert these consequences to a monetary value. The **'willingness to pay'** (WTP) method, elicits monetary values for items not typically traded in private markets, such as health.

WTP: is the use of survey to find the <u>maximum</u> amount of money a person is prepared to pay for a service that has been described using hypothetical (imaginary) scenario.

In simple terms, this method seeks to elicit how much an individual would be **willing to pay to avoid an illness or obtain the benefits of a treatment.** WTP is increasingly being applied to elicit **<u>preferences</u>** regarding the use of medicines, for example in hypertension, lipid-lowering and depression. WTP also has been used to elicit preferences for the avoidance of side effects with many drugs. The primary concern for both advocates and critics of WTP is the **hypothetical nature of the scenarios**, and hence the valuations elicited. Great efforts are made in studies to develop realistic scenarios with understandable language and minimum bias.

Example of willingness to pay[1].

Imagine you have a headache. You can have medicine A or medicine B. You are given the following information:

Medicine A and medicine B are **equally effective** for alleviating headache.

Medicine A makes **1 in 10 people** feel sick.

Medicine B **makes 3 in 10** people feel sick.

Which medicine do you prefer?

How much would you be 'willing to pay' to have medicine A?

This exercise is not asking you to guess how much medicine A or medicine B costs: it is asking you to put yourself into the situation (health state) resulting from taking one of the two medicines. Both will cure your headache, but medicine B has a higher risk of gastric upset associated with it. **What value, in dollars, do you attach to the reduced risk of feeling sick?**

How would your selection and willingness to pay change if you were told that medicine A cures 50% of headaches and medicine B cures 90% of headaches? Now you will have to decide whether you are willing to pay for an increased chance of cure associated with an increased chance of upper GI side effect.

WORKED EXAMPLE 4.4 Using WTP[(1)].

Let us go back to the erythropoietin example we looked at earlier.

A willingness-to-pay study for the two alternatives available from the literature suggests that patients maintained on erythropoietin are **'willing to pay'** for the extra perceived health benefits over blood transfusions. Fifty patients in a study stated that they would be willing to pay **a mean** of £2,000 a year for the **extra** health benefits associated with erythropoietin.

What is the difference in benefit between the two alternatives, expressed in monetary terms, i.e. how much are patients willing to pay for the health benefits of erythropoietin per year of treatment, for the 1000 patients?

Change in benefit = £2,000 more benefit per annum per patient when given erythropoietin

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