Methods and challenges in measuring the value(s) of a QALY(s)

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Symposium 10th May Rotterdam
“The value of health: what is the threshold?”
Weighting and valuing quality-adjusted life-years using stated preference methods: preliminary results from the Social Value of a QALY Project

R Baker, I Bateman, C Donaldson, M Jones-Lee, E Lancsar, G Loomes, H Mason, M Odejar, JL Pinto Prades, A Robinson, M Ryan, P Shackley, R Smith, R Sugden and J Wildman (the SVQ Research Team)
Outline

• Valuing QALYs in the UK: a brief history
• NICE and UK health policy

UK SVQ

• project and feasibility of monetary value of a QALY
  • Example questions and research design
  • Methodological issues and observations
  • What did we learn?

EuroVaQ

• Methodological development and a refined chained approach
• A direct approach and ‘QALY types’
• Outstanding issues for research and discussion
UK cost effectiveness threshold: a brief history

National Institute for Health and Clinical Excellence (NICE) established in 1999

“To provide guidance to the NHS on clinical- and cost-effectiveness”

- Technology appraisals
- Clinical guidelines
- Interventional procedures programme
The emergence of a threshold

First 22 technology appraisals:

With one exception, only recommended if cost per QALY < £30,000

BMJ 2004 Rawlins and Culyer

“NICE would be unlikely to reject a technology with a ratio in the range of £5000-£15 000/QALY solely on the grounds of cost ineffectiveness but would need special reasons for accepting technologies with ratios over £25 000-£35 000/QALY as cost effective.”
Professor Rawlins admitted that the threshold was not based on “empirical research” as no such research existed anywhere in the world. He told us instead that the threshold was:

• “…really based on the collective judgment of the health economists we have approached across the country. There is no known piece of work which tells you what the threshold should be “
The price of life: it was £20,000. Now an NHS agency recalculates.

Drugs body Nice says it will act quickly to implement findings of new studies.
NHS ordered to place more value on life
Kidney cancer patients denied life-saving drugs by NHS rationing body NICE

By DAILY MAIL REPORTER
Last updated at 12:55 AM on 29th April 2009

Thousands of kidney cancer patients are likely to lose out on life-prolonging drugs.

The NHS rationing body, NICE, has confirmed a ban on three out of four new treatments.

It has reversed its position on just one, Sutent, which will now be allowed for patients with advanced cancer.
Costly life-saving drugs: you have to draw the line somewhere

The press reported Avastin's life-saving properties with an anecdote about one person, totally ignoring the treatment's reality.

Ben Goldacre
The Guardian, Saturday 28 August 2010
Article history
UK Social Value of a QALY project (SVQ)

• 2003-2007

• Collaboration between Universities of Newcastle, East Anglia and Aberdeen
SVQ: three related studies

**Synthetic**

Estimating a WTP-based value of a QALY from existing contingent valuations for prevented fatalities and injuries

**Survey-based**

*Feasibility of eliciting money values (n=420):*
  - If not feasible/robust, try to understand why
  - If feasible and robust, a subsequent full study would estimate value of a QALY in a representative sample

*Deriving distributional weights (n=600):*
  - Are some QALYs worth more than others?
  - How much more, and how justified?
SVQ: three related studies

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Basic approach to SVQ monetary valuation survey – ‘chaining’

1. **Describe illness** (Symptoms, duration)
2. **Utility value** (standard gamble)
3. **Money value** (willingness to pay)
4. **WTP/QALY**
Monetary Value of a QALY: simple calculation

Suppose WTP to avoid 12 months of illness = £1000

Quality of life (utility) value for the same illness = 0.95

The QALY loss from that illness is = 0.05

Value of a QALY = £1000 ÷ 0.05 = £20,000
Example of SVQ illness state description:
Head, 3 months

• You will have episodes of throbbing pain across the front of your head and you will feel sick and may occasionally be sick. You will feel like you want to lie still in a darkened room.

• During the next 3 months you will suffer an episode of head pain and sickness every couple of weeks, with each episode lasting between 8 hours and 2 days.

• These episodes will interfere with many of your usual activities.

• After these 3 months you return to your current health with no further effects from this illness.
Questionnaire survey

1. **Warm up questions**
   - Own current health
   - Ranking illness descriptions – Stomach and Head, 3 months, 12 months, rest of life, plus ‘sudden painless death’

2. **WTP to prevent:**
   - I. Certainty of 3 months illness (S,H)
   - II. Certainty of 12 months illness (S,H)
   - III. % risk of illness (5%, 10%) (S,H) (3, 12 months and life)

3. **Standard gamble questions:**
   - I. certainty of 3-month illness vs risky treatment with recovery to full health or 12-month illness
   - II. certainty of 12-month illness vs risky treatment with recovery to full health or illness for rest of life
   - III. certainty of lifelong illness vs risky treatment with recovery to full health or immediate death

4. **Background questions:**
   - Demographic, socio-economic, qualitative exploratory questions
Questionnaire survey

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4 versions of SVQ questionnaire

- **Version 1**
  - Stomach pain
  - WTP risk: 10%
  - N = 105

- **Version 2**
  - Stomach pain
  - WTP risk: 5%
  - N = 108

- **Version 3**
  - Head pain
  - WTP risk: 10%
  - N = 99

- **Version 4**
  - Head pain
  - WTP risk: 5%
  - N = 91
Some results: WTP

WTP to prevent certain 12-month:

• S: mean £1867.37 median £500
• H: mean £3252.35 median £1000

WTP to prevent certain 3-month:

• S: mean £810.27 median £150
• H: mean £1495.88 median £250
Mean WTP/mean QALY loss
12-month scenario

**Stomach:**
- Average WTP £1,870 to avoid 12-month S
- Average QALY benefit of 0.104
  - £1,870 ÷ 0.104 = £17,980 per QALY

**Head:**
- Average WTP £3,250 to avoid 12-month H
- Average QALY benefit 0.144
  - £3250 ÷ 0.144 = £22,570 per QALY
Mean WTP/mean QALY loss
3-month scenario

**Stomach:**

- Average WTP £810 to avoid 3-month S
- Average QALY benefit of 0.026
- £31,150 per QALY

**Head:**

- Average WTP £1,495 to avoid 3-month H
- Average QALY benefit 0.036
- £41,530 per QALY
Risk reduction

- results under certainty look reasonable...
- WTP for risk reduction may be more theoretically appealing...
- WTP for a QALY based on risk reduction?
### SVQ WTP QALY feasibility study

<table>
<thead>
<tr>
<th>WTP Duration of health state</th>
<th>WTP Risk</th>
<th>Head/ stomach illness</th>
<th>WTP/ QALY (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>12 months</td>
<td>Certainty</td>
<td>Head</td>
<td>22,600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stomach</td>
<td>18,000</td>
</tr>
<tr>
<td>3 months</td>
<td>Certainty</td>
<td>Head</td>
<td>41,600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stomach</td>
<td>31,200</td>
</tr>
<tr>
<td>12 months</td>
<td>10%</td>
<td>Head</td>
<td>43,300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stomach</td>
<td>87,900</td>
</tr>
<tr>
<td>3 months</td>
<td>10%</td>
<td>Head</td>
<td>112,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stomach</td>
<td>144,600</td>
</tr>
<tr>
<td>12 months</td>
<td>5%</td>
<td>Head</td>
<td>121,800</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stomach</td>
<td>86,900</td>
</tr>
<tr>
<td>3 months</td>
<td>5%</td>
<td>Head</td>
<td>265,200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stomach</td>
<td>177,200</td>
</tr>
</tbody>
</table>
Problems with risk reduction (elimination) questions

Lack of sensitivity to the size of the risk

• between sample comparisons of 5% and 10% risk

Mean WTP for eliminating 5% chance of head illness was *higher* than for 10%

Leads to ‘soaring’ WTP/QALY values
More problems with WTP for ‘small fractions’ of QALYs..

Suppose the implied QALY loss for a respondent is 0.0001

Then the same respondent states a WTP of £500 to avoid being in the same health state for 12 months

The implied, individual WTP/ QALY = £500/ 0.0001 = £5,000,000

• The mean of such ratios will be inflated by these responses

• Medians are likely to be more grounded

• Or calculate mean WTP/ mean QALY
Improving methods and developments in EuroVaQ...

- 10 countries
- two approaches
  - A new version of the chained approach
  - A ‘direct’ approach to valuing QALYs
The direct approach

Representing whole QALYs using diagrams, customised to respondents’ age, health and subjective life expectancy?

Amenable to explore different QALY types

*life extending QALYs* (gain in duration now, or in the future)

*quality of life improvements* (no extension to life)

Diagrams need to be explained carefully before WTP questions are posed
Your Age and Health

Throughout this questionnaire you will be asked some questions about how much you would pay to avoid being in certain situations and states of health. So that we can make these questions relate to you and your circumstances, please enter the following information:

<table>
<thead>
<tr>
<th>Your age now in years</th>
<th>52</th>
</tr>
</thead>
<tbody>
<tr>
<td>The age you expect to live to (your life expectancy)</td>
<td>80</td>
</tr>
</tbody>
</table>

How healthy are you? Look at the health thermometer opposite. If 100 is the best health imaginable for your age, and zero represents death, mark your own health by dragging the blue pointer on the health thermometer.

Current health | 90 |
Imagine that, in one year’s time, rather than living the next 4 years in your current health, you will experience a medical condition which reduces your health by 25 points on the health thermometer scale.

For you this means your health will drop from 90 to 65 at age 53 as shown on the graph below.

After these 4 years, at age 57, you will return to your current health for the remaining years of your life.

Would you be willing to pay something **NOW**, even if it was a small amount, for a simple, safe and painless treatment which would prevent you from experiencing this drop in health?

- Yes
- No
Valuing Health

Imagine that, in one year’s time, rather than living the next 10 years in your current health, you will experience a medical condition which reduces your health by 10 points on the health thermometer scale.

For you this means your health will drop from 90 to 80 at age 53 as shown on the graph below.

After these 10 years at age 63, you will return to your current health for the remaining years of your life.

Would you be willing to pay something NOW, even if it was a small amount, for a simple, safe and painless treatment which would prevent you from experiencing this drop in health?

- [ ] Yes
- [ ] No

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![Health Graph](image-url)
At your current age you are informed by a doctor that there is now a new treatment available which would reduce your chances of dying in any given year by a very small amount.

Over your whole life time this would mean that your life expectancy would be increased by 13 months. You would spend these extra 13 months in your current health.

The treatment would involve taking one tablet at your current age. It is perfectly safe and has no harmful side effects.

Would you be willing to pay something NOW for this treatment?

- Yes
- No
Imagine that you are diagnosed with a medical condition which is terminal if untreated. Death from this medical condition would occur within a few months of the diagnosis if treatment is not received.

Imagine that there is a simple, safe and painless treatment available which would give you 13 months extra in your current health.

Would you be willing to pay something NOW for this treatment?

- Yes
- No
Valuing Health

Please use the mouse to click and drag each of the money amounts (shown below) into one of the three boxes below. Don't worry if you're not sure at first, you can move them about until you are happy with them.

To prevent you from experiencing a **25 point** drop in health for **4 years**, in 12 months' time.

- **Unwilling to pay**
  - £ 8,000
  - £ 10,000
  - £ 15,000
  - £ 20,000
  - £ 30,000
  - £ 50,000
  - £ 80,000
  - £ 150,000
  - £ 300,000

- **Ursure**

- **Willing to pay**
  - £ 10
  - £ 50
  - £ 100
  - £ 200
  - £ 500
  - £ 1,000
  - £ 1,500
  - £ 2,000
  - £ 3,000
  - £ 5,000

The highest amount you said you **WOULD** be willing to pay was **£5,000**.

The lowest amount you said you **WOULD NOT** be willing to pay was **£8,000**.

What is the **MAXIMUM** amount you would be willing to pay?
It could be **£5,000 or £8,000**, or something in between.

[Blank space for input] 7000
### Scenarios and numbers of respondents

<table>
<thead>
<tr>
<th>Scenario description</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 points over 4 years</td>
<td>8511</td>
</tr>
<tr>
<td>10 points over 10 years</td>
<td>8374</td>
</tr>
<tr>
<td>QALY at end of life</td>
<td>8955</td>
</tr>
<tr>
<td>Coma</td>
<td>8933</td>
</tr>
<tr>
<td>Terminal illness</td>
<td>8745</td>
</tr>
<tr>
<td>Risk-based – 10% chance 10 points over 10 years</td>
<td>4077</td>
</tr>
<tr>
<td>Risk-based – 10% chance 25 points over 4 years</td>
<td>4370</td>
</tr>
<tr>
<td>Risk-based – 5% chance 25 points over 4 years</td>
<td>4370</td>
</tr>
<tr>
<td>Scenario</td>
<td>Mean</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>25 points over 4 years</td>
<td>10,744</td>
</tr>
<tr>
<td>10 points over 10 years</td>
<td>11,425</td>
</tr>
<tr>
<td>Year at end of life</td>
<td>10,878</td>
</tr>
<tr>
<td>Coma</td>
<td>18,798</td>
</tr>
<tr>
<td>Terminal illness</td>
<td>29,062</td>
</tr>
<tr>
<td>Risk-based – 10% chance 10 points over 10 years</td>
<td>81,740</td>
</tr>
<tr>
<td>Risk-based – 10% chance 25 points over 4 years</td>
<td>119,975</td>
</tr>
<tr>
<td>Risk-based – 5% chance 25 points over 4 years</td>
<td>177,996</td>
</tr>
</tbody>
</table>
Direct approach

Less theoretically appealing?

Respondents valuing large QALY gains so perhaps there is a budget constraint issue?

But...

Pilot work suggests that the diagrams appear to be meaningful to people

The direction of differences between mean values is supported by our insights from focus groups

Risk questions were still problematic

And...

Useful information about the relative value of QALY types?
Some final, general thoughts

1. All methods described have taken an individual valuation approach
   individuals value potential health gains
   aggregation of individuals = societal value
   potential for citizens’ values to be different? (e.g. End of life)

2. Is such a high number of zeros in the online EuroVaQ survey a problem?
   genuine zeros should be included in means/medians but what if these reflect a lack of engagement in exercise?

3. Relative value of QALYs to different beneficiaries

4. Are different QALYs (e.g. End of life QALYs, cancer QALYs) valued differently?
publications

Emily Lancsar, John Wildman, Cam Donaldson, Mandy Ryan, Rachel Baker (2011) Deriving distributional weights for QALYs through discrete choice experiments Journal of Health Economics 30: 466-478

Cam Donaldson, Rachel Baker, Helen Mason, Michael Jones-Lee, Emily Lancsar, John Wildman, Ian Bateman, Graham Loomes, Angela Robinson, Robert Sugden, Jose Luis Pinto Prades, Mandy Ryan, Phil Shackley and Richard Smith (2011) The social value of a QALY: raising the bar or barring the raise? BMC Health Services Research 11: 8
http://www.biomedcentral.com/1472-6963/11/8

http://www.hta.ac.uk/fullmono/mon1427.pdf

