EQ-5D-5L: development of the first national tariffs

ISPOR Symposium
The EuroQol Group
May 2015, Philadelphia, USA

Disclosure

• This symposium is sponsored by The EuroQol Research Foundation, a not-for-profit organization
Overview of Presenters

• EQ-5D-5L: an international approach to valuing health
  Speaker: Simon Pickard

• An EQ-5D-5L value set for England
  Speaker: Ben van Hout
Overview of Presenters

• A user’s perspective on the EQ-5D-5L
  – considerations for users

  Speaker: Kristina S. Boye

• Future directions
  – Initiatives
  – applications beyond economic evaluations

  Speaker: Jan van Busschbach

An international approach to valuing health

A. Simon Pickard, PhD
Professor, University of Illinois at Chicago
Chair of Executive Committee, EuroQol Group
Overview

• EuroQol Group
• Overview of EQ instruments
• EQ-5D-5L: status
  – Descriptive system
  – Value sets
• EQ-VT valuation protocol

Vision

The EuroQol Group aims to improve decisions about health and health care throughout the world by developing, promoting and supporting the use of instruments with the widest possible applicability for the measurement and valuation of health.
**EQ-5D Instruments: 2015 Status**

**EQ-5D-3L Translations**
- >170 languages in self-complete paper format

**EQ-5D-5L Translations**
- >120 languages in self-complete paper format

**EQ-5D-Y Translations**
- >30 languages
- Youth between 8-11 years

**Available versions**
- Electronic (Web, PDA, Tablet)
- Telephone, IVRS
- Proxy, Face-to-face

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**EQ-5D-3L**

- Brief, concise
- Defines 243 health states
- We wanted to improve descriptive richness and discriminatory power
**EQ-5D-5L**

- Added 2 levels per dimension
- Development of EQ-5D-5L descriptive system

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**EQ-5D-5L: Measurement properties**

- A multi-country, cross-sectional study was conducted in 8 patient groups that compared the performance of the EQ-5D-3L and EQ-5D-5L.
- In general, EQ-5D-5L improved discriminative ability and reduced ceiling effects
- Since 2013, 10 more studies in various countries and disease groups have reported similar results
EuroQol valuation research aims

• Take advantage of advances in technology – computer based methods (valuation task and data collection)
  – The EuroQol Valuation Technology or “EQ-VT”
• Provide a fully documented, standardized protocol to enhance consistency between valuation studies by investigators around the world
• Refine the valuation methods and protocol as we learn

EuroQol Group’s Valuation Technology: The EQ-VT

• Data collection
  – computer assisted personal interviews (CAPI) approach
  – Visually displays tasks
  – automates the iterative procedures in TTO
  – captures and time stamps participant responses
• Uses underlying block design to present health states
• Facilitates protocol compliance + data quality monitoring ➔ QC Tool
• Accompanying EQ-VT: interview script; interviewer training resources; guidance on modelling.
**EQ-VT valuation protocol**

### Introduction
- Self reported health on the EQ-5D-5L descriptive system
- Self reported health on the EQ-VAS
- Background questions

### Composite Time Trade-Off
- Instructions and example of TTO task
- TTO valuation of 10 EQ-5D-5L states
- TTO debriefing/structured feedback

### Discrete Choice
- Instructions and example of DC task
- DC valuation of 10 pairs of EQ-5D-5L states
- DC debriefing/structured feedback

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**TTO task: better than dead (values>0)**

\[ U(h_i) = \frac{x}{t} \]

where \( x \) is time in full health and \( t \) is time in health state \( h_i \) at the respondent’s point of indifference

Example shown:
\[ U(h_i) = \frac{5}{10} = 0.5 \]
**TTO task: states worse than dead**

- \( t = 20 \) years
- lead time (LT) = 10 yrs

\[
U(h_i) = \frac{(x-LT)}{(t-LT)} = \frac{(x-10)}{10}
\]

Min value = -1

Example shown:
\[
U(h_i) = \frac{(5-10)}{10} = -0.5
\]

**Discrete choice tasks**
Conducting an EQ-5D-5L valuation study: Required resources

- The EQ-VT protocol
- EQ-VT Software, including QC Tool
- Interviewer training resources
- Translation services
- Technical support & advice
- Guidance on reporting

An EQ-5D-5L value set for England

Ben van Hout, HEDS, SchARR, University of Sheffield, United Kingdom
Project team

- Project team from OHE & University of Sheffield: Nancy Devlin and Ben van Hout (PIs); Koonal Shah (project manager); Brendan Mulhern and Yan Feng

- In collaboration with:
  - Sub-contractor (data collection): Ipsos MORI
  - The EuroQol Group (copyright holder of EQ-5D-5L and EQ-VT)
  - Aki Tsuchiya (Pret-AS data)
  - Ethics approval granted by the research ethics committee of the University of Sheffield’s School of Health and Related Research

Study design

- Research protocol developed by the EuroQol Research Foundation
- Stated preference data collected in face-to-face computer-assisted personal interviews
- n = 1000 members of the adult general public of England, selected at random from residential postcodes
- Sample recruitment sub-contracted to Ipsos MORI
- Each respondent valued 10 health states using TTO, randomly assigned from 86 health states in an underlying design; and seven DCE tasks, randomly assigned from 196 pairs of states
- ‘Composite’ TTO approach: conventional TTO for values > 0 and ‘lead time’ TTO for values < 0
- The EuroQol Valuation Technology software (EQ-VT) was used to present the tasks and to capture respondents’ responses
**Data**

- Interviews conducted between Nov 2012 and May 2013
- 996 completed the valuation questionnaire (response rate approx. 40%)
- Close attention paid to data quality: daily monitoring of uploaded data and follow-up with interviewers
- Sample broadly representative of English adult general public, although a somewhat larger proportion of retired individuals and a smaller proportion of younger individuals

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**DCE data**

![Graph showing Proportions choosing A and B based on relative severities of A and B](image)

Misery index of state A minus misery index of state B

Proportions choosing A and B based on relative severities of A and B

% B

% A

delta sum of scores
**TTO data**

- Fewer values $< 0$ (worse than dead) compared to Dolan (1997) value set – as expected.
- Clusters of values at -1, 0, 0.5 and 1
- Logical inconsistencies (e.g. 55555 $>$ than other states)
- ‘Unusual’ valuations e.g. mild states being valued $< 0$
- Interviewer effects apparent

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**Distributions, by state**

![Density plots for different TTO data states](image-url)
Distributions, by state

54231 mean= 0.473

33253 mean= 0.465

12334 mean= 0.463

23514 mean= 0.460

31525 mean= 0.428

23152 mean= 0.435

53244 mean= 0.148

52444 mean= 0.148

55555 mean= 0.016

52465 mean= 0.12

NA mean= NA
Descriptive statistics

Interpretation of the data

- Our process for examining the individual-level data:
  - Let’s look at all our respondents
  - Put expected value according to DCE on x axis
  - Put values on Y axis
  - And stare at 1,000 graphs
Examination of individual-level data

Decisions regarding the data

- Excluded 23 respondents who gave all 10 health states the same value; and 61 respondents who valued 55555 (misery score = 25) no lower than the value they gave to the mildest health state included in their block (misery score = 6)
- The core modelling dataset includes 912 respondents, with 10 TTO observations for each
- Censored 105 individuals/477 zeros with >2 states at zero (that is out of 1,315 zeros)
- Censored 68 individuals/142 data points with inconsistent negative data
Modelling

- The main specifications included models with 5, 9, 10 and 20 parameters (four parameters for each of the five dimensions reflecting a utility decrement for each severity level)
- All models were estimated for both TTO and DCE data, and ‘hybrids’ of these
- Values at -1 treated as censored
- Values at +1 are treated as censored
- The variance decreases with an increasing value of the value (heteroskedasticity)
- Heterogeneity explored via random coefficient models, which estimate value functions for every individual member of the sample

The relatively low value of the good health states
**Heterogeneity**

- The coefficients beta which reflect weights for dimensions and levels are normally distributed over the population.
- The shape of the value as a function of $x'\beta$ follows a:
  - Normal distribution
  - Lognormal distribution
  - Multinomial distribution
    - (3 latent classes)

<table>
<thead>
<tr>
<th>EQ-5D-5L value set for England</th>
</tr>
</thead>
<tbody>
<tr>
<td>constant</td>
</tr>
<tr>
<td>Mobility</td>
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<tr>
<td>slight</td>
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<tr>
<td>moderate</td>
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<td>severe</td>
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<td>unable</td>
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<td>slight</td>
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<td>moderate</td>
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<tr>
<td>severe</td>
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<td>Usual activities</td>
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<td>Anxiety/depression</td>
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<td>moderate</td>
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<tr>
<td>severe</td>
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<td>extreme</td>
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Comparison with 3L and crosswalk

<table>
<thead>
<tr>
<th></th>
<th>5L value set</th>
<th>Crosswalk value set</th>
<th>3L value set</th>
</tr>
</thead>
<tbody>
<tr>
<td>% health states</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>worse than dead</td>
<td>3.2% (100 out of 3,125)</td>
<td>26.66% (833 out of 3,125)</td>
<td>34.57% (84 out of 243)</td>
</tr>
<tr>
<td>Preferences</td>
<td></td>
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<td>regarding dimensions (from the most important to the least important)</td>
<td>Pain/Discomfort</td>
<td>Pain/Discomfort</td>
<td>Pain/Discomfort</td>
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<td></td>
<td>Anxiety/Depression</td>
<td>Mobility</td>
<td>Mobility</td>
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<td>Anxiety/Depression</td>
<td>Anxiety/Depression</td>
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<td></td>
<td>Self-care</td>
<td>Self-care</td>
<td>Self-care</td>
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<tr>
<td></td>
<td>Usual Activities</td>
<td>Usual Activities</td>
<td>Usual Activities</td>
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<tr>
<td>Value of 55555</td>
<td>-0.208</td>
<td>-0.49</td>
<td>-0.594</td>
</tr>
<tr>
<td>(33333)</td>
<td></td>
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<td></td>
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<tr>
<td>Value of 11112*</td>
<td>0.928</td>
<td>0.679</td>
<td>0.848</td>
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<tr>
<td>Value of 11121*</td>
<td>0.941</td>
<td>0.837</td>
<td>0.796</td>
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<tr>
<td>Value of 11211*</td>
<td>0.952</td>
<td>0.906</td>
<td>0.883</td>
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<td>Value of 12111*</td>
<td>0.941</td>
<td>0.846</td>
<td>0.815</td>
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<td>Value of 21111*</td>
<td>0.943</td>
<td>0.877</td>
<td>0.850</td>
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<tr>
<td>Range of values</td>
<td>[-0.208, 1]</td>
<td>[-0.490, 1]</td>
<td>[-0.594, 1]</td>
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</table>

Implications of the results

- The 5L Value set for England has a lower range of values than the current UK EQ-5D value set
- Higher minimum value for 55555 (5L) (-0.208) than 33333 (3L) (-0.56): as expected, given known issues with the Dolan (1997) value set
- The proportion of health states with negative values is considerably lower
- No ‘N3’ term – it did not improve the model
- Implies treatments for very severe conditions may have lower QALY gains than at present
- The greater descriptive sensitivity of the EQ-5D-5L will be somewhat counteracted by the nature of the 5L value set compared to the previous 3L value set
A User’s Perspective on the EQ-5D-5L

Kristina S. Boye, RPh, MS, MPH, PhD
Senior Research Advisor, Eli Lilly and Company
Deputy Chair, EuroQol Executive Committee
May 2015

Overview

• EQ-5D-3L vs EQ-5D-5L versions
• Should I use the 3L or 5L version in my study?
• Availability of EQ-5D-5L formats and translations
• Availability of EQ-5D-5L value sets
• Which value set or scoring algorithm should I use?
• Country specific considerations
• How to obtain the EQ-5D
• Do I need a license to use EQ-5D?
• Need more information?
**Example:**

*EQ-5D-3L vs EQ-5D-5L versions: Mobility*

**EQ-5D-3L**
- I have no problems in walking about
- I have some problems in walking about
- I am confined to bed

**EQ-5D-5L**
- No problems in walking about
- Slight problems in walking about
- Moderate problems in walking about
- Severe problems in walking about
- Unable to walk about

*Instructions for the 5L version: By placing a tick in one box in each group below, please indicate which statements best describe your own health state TODAY.*

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**EQ-5D-3L vs EQ-5D-5L versions**

**EQ-5D-3L VAS**

**EQ-5D-5L VAS**
**Should I use the 3L or 5L version in my study?**

- Timing
- Comparability
- Desire for a new value set or scoring algorithm
- Sensitivity
- Translations
- Mode of data collection
- Use of both instruments
- Cost

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**Availability of EQ-5D-5L Formats and Translations**

<table>
<thead>
<tr>
<th>Available Format</th>
<th>Number of translations currently available</th>
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<tbody>
<tr>
<td>Paper</td>
<td>132</td>
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<tr>
<td>Tablet</td>
<td>102</td>
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<tr>
<td>Personal Digital Assistant (PDA)</td>
<td>93</td>
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<tr>
<td>Web</td>
<td>54</td>
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<tr>
<td>Interactive voice response (IVR)</td>
<td>30</td>
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<tr>
<td>Telephone</td>
<td>14</td>
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<tr>
<td>Proxy Paper version 1(^1)</td>
<td>5</td>
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<tr>
<td>Proxy Paper version 2(^2)</td>
<td>8</td>
</tr>
<tr>
<td>Face to Face</td>
<td>1</td>
</tr>
</tbody>
</table>

\(^1\) Asking the proxy to rate how he/she (the proxy would rate the patient's HRQoL).

\(^2\) Asking the proxy to rate how he/she (the proxy) thinks the patient would rate his/her own HRQoL if he/she (the patient) was able to communicate it.

The number of available translations is still growing and new translations will be produced, if needed.
### State of play EQ-VT studies

<table>
<thead>
<tr>
<th>In preparation</th>
<th>Ongoing</th>
<th>Completed</th>
<th>Available</th>
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### State of play EQ-VT studies

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<td>Germany</td>
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</table>
Which value set or scoring algorithm should I use?

- When analyzing a multi-country clinical trial, should I analyze each country by its country specific data set or just use one value set for all the data?
  - Several schools of thought

- When should I use the available ‘crosswalk’ scoring methodology?
  - This depends on the study objectives, timing and overall needs
  - It back-translates the 5L system into the 3L and gives you 3L values which therefore do not take advantage of the 5L system

Country specific considerations

- Which version –the 3L or 5L- is preferred in each country?
  - Look to regional HTA guidance
  - Consider the study needs

- What are the differences in the 5L value sets by country?
  - Research in progress
How to obtain EQ-5D

- Go to our website euroqol.org and register your study

Do I need a license to use EQ-5D?

- Answer is Yes

Our licensing policy will determine if a fee is required
- Commercial user → fee
- Non commercial user:
  - Use for scientific research, resulting in a publication → no fee
  - Internal (clinical) use, benchmarking, routine outcome measurement etc. → modest fee
Future directions

Jan Busschbach
Chair of the Board of the EuroQol Research Foundation
Erasmus Medical Center, Rotterdam

Routine Outcome Monitoring: ROM

Individual feedback  Management information  Benchmarking
Many names

- UK
  - The PROMs initiative
- USA
  - International Consortium for Health Outcomes Measurement
  - PROMIS
- Netherlands
  - Benchmark Mental health

Many different applications

- Part of quality control
  - Benchmark
- Can be basis for science
  - Effectiveness (big) data: applied in daily practice
- Can be used for clinical feedback
  - Individual data interpreted by patient and doctor
The PROMs initiative UK

- NHS
- > 100,000 patients/year

PROMs: benchmarking

<table>
<thead>
<tr>
<th>Surgical procedure</th>
<th>Measure</th>
<th>2013’14 adjusted average health gain (Provisional, Feb 2015 release)</th>
<th>Above England average?</th>
<th>Above lower 95% control limit?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lowe 95% control limit</td>
<td>The Royal Orthopaedic Hospital</td>
<td>England</td>
</tr>
<tr>
<td>Hip replacement - Primary</td>
<td>EQ VAS</td>
<td>9.968</td>
<td>14.485</td>
<td>11.487</td>
</tr>
<tr>
<td></td>
<td>EQ-5D</td>
<td>0.417</td>
<td>0.479</td>
<td>0.436</td>
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<tr>
<td></td>
<td>OHS</td>
<td>20.674</td>
<td>23.155</td>
<td>21.340</td>
</tr>
</tbody>
</table>
Hip replacement: variations in ∆ QALYs


NHS hospitals: Cost per QALY
Daily reports EQ-VAS in multiple sclerosis


ROM brings EuroQoL back to its roots

- EQ-5D developed in the late '80
  - Many different (national) QoL questionnaires existed
  - Make data comparable: “benchmark”
  - Should have low administrative burden
- “The EuroQoL Common Core Questionnaire”
  - “The raison d’être of the EuroQoL Instrument is to provide a simple “abstracting” device, for use alongside other more detailed measures of [...] HRQoL, to serve as a basis for comparing health care outcomes using a basic “common core” of QoL characteristics which most people are known to value highly.”
  - Alan Williams
Improving the interface

- In ROM the interface becomes more important
- EuroQol ‘App’ technology

Further development of the youth version

- There is a youth version: The EQ-5D-Y
- Whose values to be used?
  - Values from the children themselves
  - Values from the parents
  - Values from the general public
- Expect:
  - Fundamental research
  - Policy papers
**Fundamental research: other than QALY values**

- Values for applications without QALY aspirations
  - Germany (IQWiG)
  - USA
- Next to TTO as used in QALY-analysis:
  - Item Response Modeling (Rasch)
  - Discrete Choice Modeling
  - VAS

**Fundamental research: increasing sensitivity**

- Experiments to ‘bolt-on’ an additional dimension
  - Moving into diseases-specific measures
- Changing the wording of the descriptive system

- Is it an improvement?
  - Backwards-compatibility is the rule in the Group
  - Test versus standard EQ-5D
Value sets for EQ-5D-5L

- Many ongoing studies use the protocol and EQ-VT
- Opportunity for international comparisons
- Also possible to examine other research questions by adding to protocol
- Opportunity to engage in EuroQol Group meetings

References for EQ-5D-5L studies

Acknowledgements

• Bernhard Slaap,
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  EuroQol Research Foundation

• Mandy van Reenen,
  Communication Officer
  EuroQol Research Foundation

EuroQol Research Foundation, Booth #1108
www.euroqol.org;
email: userinformationservice@euroqol.org

Questions?