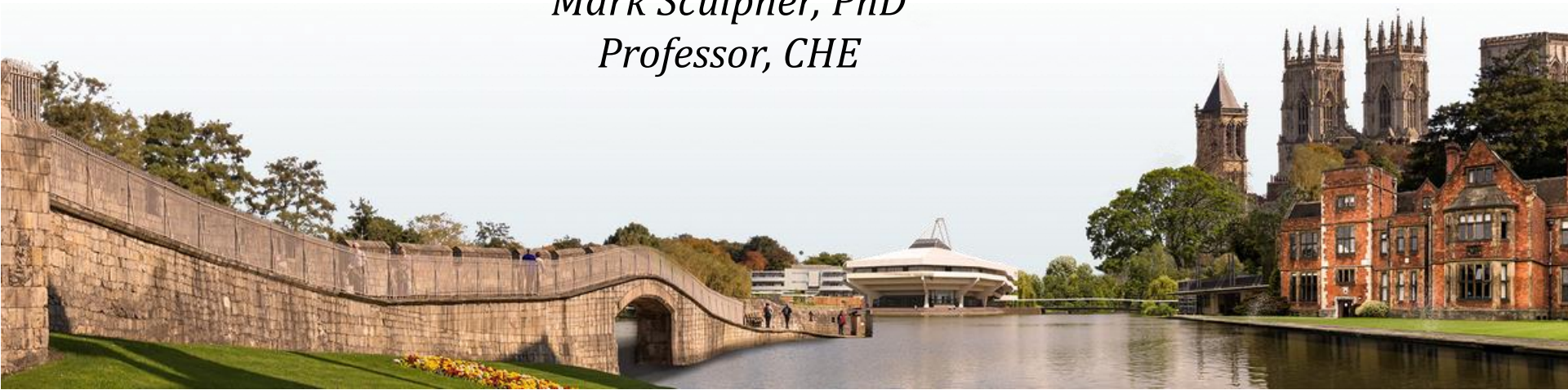
Online Advanced Methods for Cost-Effectiveness Analysis

Presentation 4: Populating Models: Costs and Outcomes
4.3: Routes to QALYs

Mark Sculpher, PhD
Professor, CHE



Objectives

- Understand different ways of estimating QALYs
- Further clarify differences between measurement of health and valuation
- Understand generic preference-based measures of HRQoL
  - Example of EQ5D
- Appreciate the importance of mapping approaches

The two stages of QALY estimation

Stage 1

Describing health states

(Measuring (health-related) QOL)

- Generic vs. disease-specific
- Source of measurement?

Stage 2

Valuing health states

(Valuing (health-related) QOL)

- Method of valuation
  - Choice-based
  - Other
- Source of values
  - Patients
  - Public

Alternative valuation methods

- Rating scale
- Standard gamble
- Time trade-off
- Others

See Drummond MF, Sculpher MJ, Claxton K, *et al*. *Methods for the Economic Evaluation of Health Care Programmes.* Fourth Edition. Oxford: Oxford University Press, 2015, Chapter 5

Whose values?

- Patients
  - Ultimate recipient of the change in health
  - Experienced with (some of) the relevant health states
  - (May be) aware of the process of adaptation
- Public
  - Payer
  - Behind the veil of ignorance regarding which health they will experience
  - No experience of the relevant health states
  - Unaware of the process of adaptation in patients

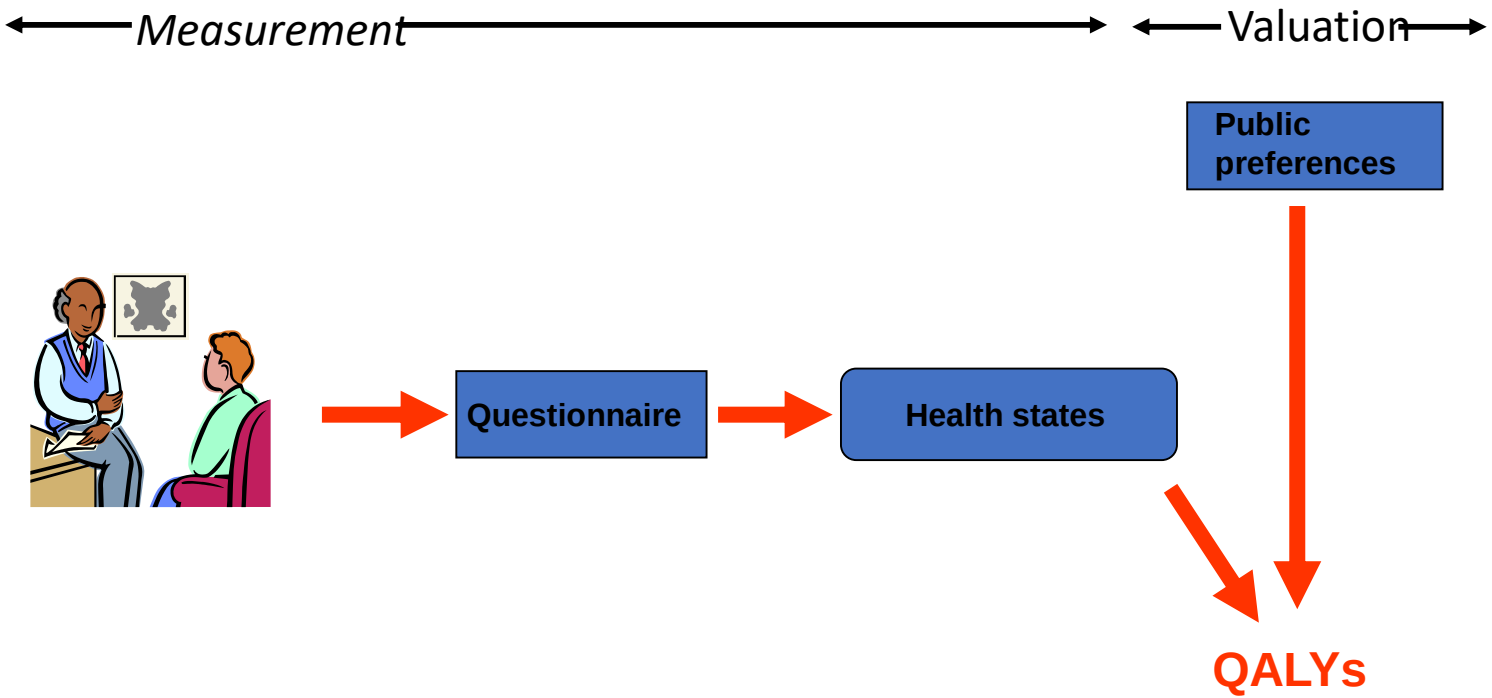
Brazier *et al.* (2005) Should patients have a greater role in valuing health states? *Applied Health Economics and Health Policy*; 4: 201-208

Alternative routes to a QALY

Direct head-to-head standardised data

Measurement	▪ Use of standardised descriptive system ▪ In study comparing interventions of interest ▪ Example: randomised trial; observational study
Valuation	▪ Pre-established set of values with descriptive system

Preference-based systems



EQ-5D 3L descriptive system

Mobility
I have no problems in walking about
I have some problems in walking about
I am confined to bed

Self-care
I have no problems with self-care
I have some problems washing and dressing myself
I am unable to wash and dress myself

Usual activities (eg. work, study, housework, family or leisure activities)
I have no problems with performing my usual activities
I have some problems with performing my usual activities
I am unable to perform my usual activities

Pain/discomfort
I have no pain or discomfort
I have moderate pain or discomfort
I have extreme pain or discomfort

Anxiety/depression
I am not anxious or depressed
I am moderately anxious or depressed
I am extremely anxious or depressed

An EQ-5D health state

Mobility	Self care	Usual acts	Pain & dis	Depres'n
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3

See www.euroqol.org

EQ-5D 5L

Under each heading, please tick the ONE box that best describes your health TODAY.

MOBILITY

- I have no problems in walking about ☐
- I have slight problems in walking about ☐
- I have moderate problems in walking about ☐
- I have severe problems in walking about ☐
- I am unable to walk about ☐

SELF-CARE

- I have no problems washing or dressing myself ☐
- I have slight problems washing or dressing myself ☐
- I have moderate problems washing or dressing myself ☐
- I have severe problems washing or dressing myself ☐
- I am unable to wash or dress myself ☐

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

- I have no problems doing my usual activities ☐
- I have slight problems doing my usual activities ☐
- I have moderate problems doing my usual activities ☐
- I have severe problems doing my usual activities ☐
- I am unable to do my usual activities ☐

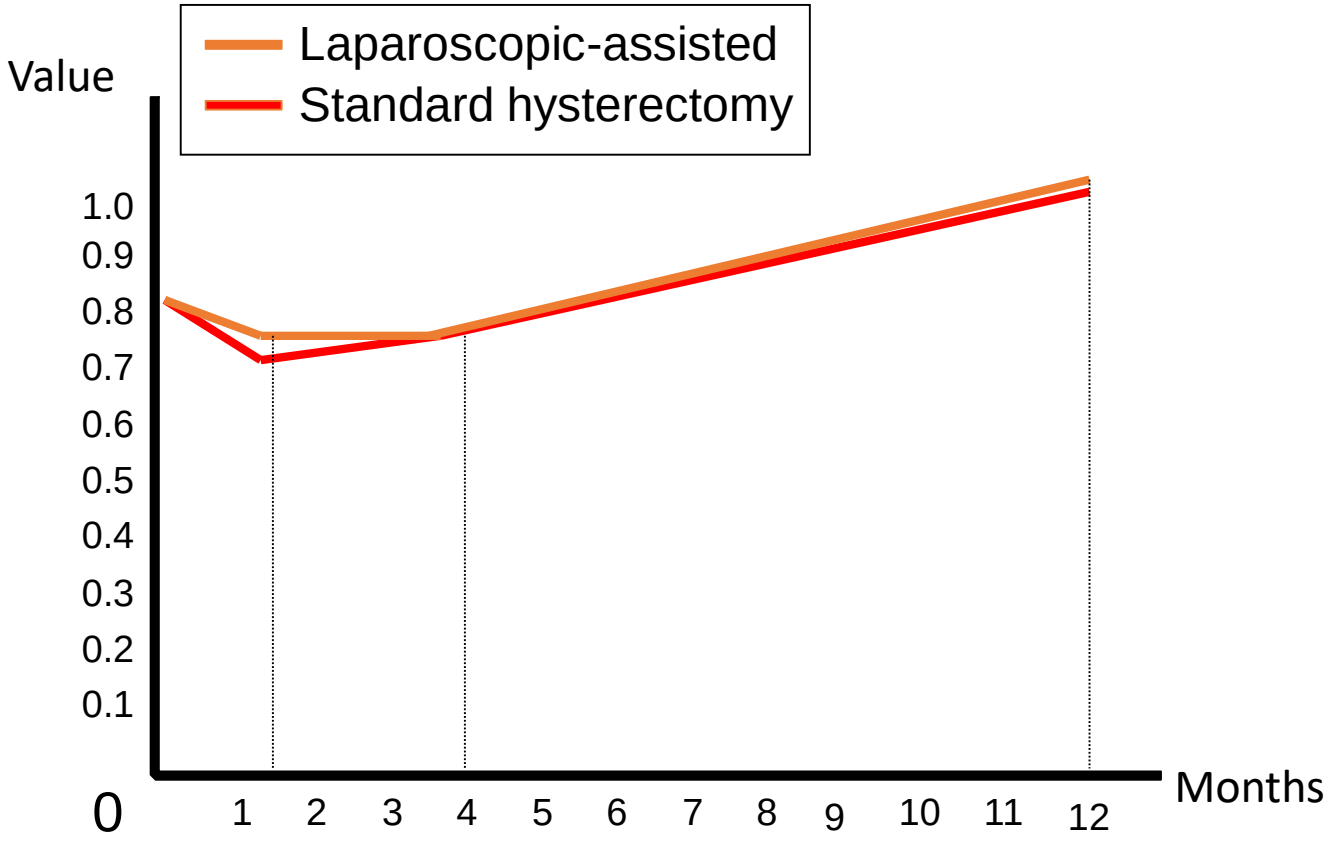
PAIN / DISCOMFORT

- I have no pain or discomfort ☐
- I have slight pain or discomfort ☐
- I have moderate pain or discomfort ☐
- I have severe pain or discomfort ☐
- I have extreme pain or discomfort ☐

ANXIETY / DEPRESSION

- I am not anxious or depressed ☐
- I am slightly anxious or depressed ☐
- I am moderately anxious or depressed ☐
- I am severely anxious or depressed ☐
- I am extremely anxious or depressed ☐

Example: Laparoscopic hysterectomy



Sculpher *et al. BMJ* 2004; 328: 134

Alternative routes to a QALY

Direct head-to-head disease-specific mapped to a generic system

Measurement	▪ Use of standardised disease-specific descriptive system ▪ Not preference-based ▪ In study comparing interventions of interest ▪ Example: randomised trial; observational study
Valuation	▪ Pre-established set of values with descriptive system

Example: Mapping an asthma-specific measure to the EQ-5D (1)

Sample of 3000 patients in UK general practices

EQ-5D = Fn (Asthma Quality of Life Questionnaire)

Generic descriptions Preferences	32 items (7 levels each) 4 domains (symptoms, activities, emotions, environment)

Tsuchiya *et al.* ScHARR Discussion Paper 02/01, 2002

Guidance on mapping

VALUE IN HEALTH 20 (2017) 18–27

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/jval

Mapping to Estimate Health-State Utility from Non–Preference-Based Outcome Measures: An ISPOR Good Practices for Outcomes Research Task Force Report

Allan J. Wailoo, MA, PhD[1,], Monica Hernandez-Alava, MSc, PhD[1], Andrea Manca, MSc, PhD[2], Aurelio Mejia, MSc[3], Joshua Ray, MSc[4], Bruce Crawford, MA, MPH[5], Marc Botteman, MS, MA[6], Jan Busschbach, PhD[7]*

[1]*School of Health and Related Research, University of Sheffield, Sheffield, UK;* [2]*Centre for Health Economics, University of York, York, UK;* [3]*Instituto de Evaluación Tecnológica en Salud, Bogota, Colombia;* [4]*F. Hoffmann-La Roche, Basel, Switzerland;* [5]*IMS Health, Tokyo, Japan;* [6]*Pharmerit International, Bethesda, MD, USA;* [7]*Department of Psychiatry, Section Medical Psychology and Psychotherapy, Erasmus Medical Center, Rotterdam, The Netherlands*

Alternative routes to a QALY

Linking a clinical measure to a generic preference-based measure

Measurement	▪ Key clinical measures of effect, severity or events ▪ Mapped to a generic system (e.g. EQ-5D)
Valuation	▪ New sample for valuation

Example from continuous positive airway pressure for the treatment of obstructive sleep apnoea-hypopnoea syndrome

Utility	Coefficient	Standard error	P-value	95% confidence interval	
OLS model for utility based on SF-6D (n=294)					
ESS	-.0095213	.0013849	0.000	-.0122512	-.0067915
Baseline ESS	.0050331	.0011942	0.000	.0026791	.0073871
Baseline utility	.5588972	.0534972	0.000	.4534455	.6643489
Constant	.8067555	.0115013	0.000	.7840845	.8294265
OLS model for utility from EQ-5D (n=94)					
ESS	-.0096984	.003947	0.016	-.0175364	-.0018604
Baseline ESS	.0029526	.0033693	0.383	-.0037382	.0096435
Baseline utility	.6287684	.1346153	0.000	.3614492	.8960877
Constant	.8925207	.0286109	0.000	.8357052	.9493363

Weatherly *et al. International Journal of Technology Assessment in Health Care* 2009; 25: 26-34

Harvesting existing data

Preference-Based EQ-5D Index Scores for Chronic Conditions in the United States

Patrick W. Sullivan, PhD, Vahram Ghushchyan, PhD

Background. *The Panel on Cost-Effectiveness in Health and Medicine has called for an "off-the-shelf" catalogue of nationally representative, community-based preference scores for health states, illnesses, and conditions. A previous review of cost-effectiveness analyses found that 77% did not incorporate community-based preferences, and 33% used arbitrary expert or author judgment. These results highlight the necessity of making a wide array of appropriate, community-based estimates more accessible to cost-effectiveness researchers.* ***Objective***. *To provide nationally representative EQ-5D index scores for chronic ICD-9 codes.* ***Methods***. *The nationally representative Medical Expenditure Panel Survey (MEPS) was pooled (2000–2002) to create a data set of 38,678 adults. Ordinary least squares (OLS), Tobit, and censored least absolute deviations (CLAD) regression methods were used to estimate the marginal disutility of each condition, controlling for age, comorbidity, gender, race, ethnicity, income, and education.* ***Results***. *Most chronic conditions, age, comorbidity, income, and education were highly statistically significant predictors of EQ-5D index scores. Homoskedasticity and normality assumptions were rejected, suggesting only CLAD estimates are theoretically unbiased. The magnitude and statistical significance of coefficients varied by analytic method. OLS and Tobit coefficients were on average 60% and 143% greater than CLAD, respectively. The marginal disutility of 95 chronic ICD-9 codes as well as unadjusted mean, median, and 25th and 75th percentiles are reported.* ***Conclusion***. *This research provides nationally representative, community-based EQ-5D index scores associated with a wide variety of chronic ICD-9 codes that can be used to estimate quality-adjusted life-years in cost-effectiveness analyses.*
Key words: *health-related quality of life; cost-utility analysis; cost-effectiveness analysis; utility; chronic disease; ICD-9; econometric methods.* ***(Med Decis Making 2006; 26:410–420)***

Quality of life weights by ICD 9 codes

ICD-9 Classification	*n*	Mean Age	NCC[b] 25%	NCC[b] 50%	NCC[b] 75%	Unadjusted				Regression Results[a]		
						Mean EQ-5D	EQ-5D 25%	EQ-5D 50%	EQ-5D 75%	Disutility of Condition[a]	Condition[a] Standard Error	Statistical Significance (Condition)
ICD-9 410 Acute Myocardial Infarct	244	62	3	5	7	0.704	0.575	0.778	0.843	–0.0409	0.0002	*
ICD-9 413 Angina Pectoris	228	69	4	6	9	0.695	0.517	0.768	0.827	–0.0412	0.0002	*
ICD-9 414 Oth Chr Ischemic Hrt Dis	183	66	4	6	8	0.738	0.708	0.794	0.827	–0.0336	0.0002	*
ICD-9 424 Oth Endocardial Disease	214	56	2	4	6	0.789	0.708	0.816	1.000	–0.0059	0.0002	*
ICD-9 427 Cardiac Dysrhythmias	649	67	3	5	7	0.774	0.708	0.810	0.843	–0.0190	0.0001	*
ICD-9 428 Heart Failure	284	71	5	6	9	0.636	0.437	0.708	0.810	–0.0635	0.0002	*
ICD-9 429 Ill-Defined Heart Dis	1204	69	3	5	7	0.716	0.619	0.778	0.827	–0.0492	0.0001	*
ICD-9 436 CVA	340	68	3	5	7	0.650	0.463	0.768	0.816	–0.0524	0.0001	*

Summary

- Data collection alongside primary studies key source of evidence
  - Direct use of generic preference-based measure
  - Mapping from disease-specific measure
- HRQoL may take place outside effectiveness study
  - Mapped to clinical measures
- Secondary sources of HRQoL weights increasingly available