New Methods for Valuing Benefits of Low Vision Interventions

Thomas Butt

UCL Institute of Ophthalmology, London, UK

Economic Evaluation of the Impact of Visual Impairment and Interventions for Low Vision – ARVO Low Vision Group Minisymposium

May 4th 2014

Conflict of Interest

UCB Pharma (E), Notal Vision (C)

Work conducted at and funded by University College London

Presentation represents own views

Background: QALY maximization

- Opportunity cost: When introducing a new technology into the (publically funded) health care system, methods are needed to account for what is displaced

- Many health care systems explicitly use quality-adjusted life years (QALYs) in cost-utility analysis to set priorities and allocate resources in order to **maximise health with the available budget**

- QALYs are a measure of benefit accounting for *length of life adjusted for people's preferences different levels of health (on a utility scale anchored by 0=dead and 1=full health)*

$$ICER = \frac{Cost_{new} - Cost_{old}}{QALY_{new} - QALY_{old}} \leq \$50{,}000/QALY$$

Background: “Is it time to move beyond the QALY in vision research?” Kymes (2014)

- Benefits of interventions: The production of health (length of and quality of life) remains central to the health care system

- Two issues for low vision research
  - Measurement of benefit (do questionnaires such as EQ-5D capture HRQoL?)
    - Sensitivity
  - **Valuation of benefit (does HRQoL capture benefit?)**
    - **Should the health system take account of something more than health maximisation? (multi-criteria decision analysis)**
      - **Aims and outcomes of visual rehabilitation**

Kymes et al. (2014) Is it time to move beyond the QALY in vision research? Ophthalmic Epidemiology 21(2): 63–65

Background: Adding to the benefit equation

- The aim of low vision rehabilitation are broader than health gain

- There is political desire (and empirical evidence) that criteria beyond QALYs should be considered in healthcare decision making
  - Cancer drugs fund provided by the UK Department of Health
  - Deliberative process of health technology assessment (HTA)

Background: Deriving QALY-weights using DCEs

- Budget constraint remains fixed, therefore introducing additional items on the benefit side requires a method to weight benefits (i.e. QALYs) to account for the opportunities forgone

- Discrete choice experiments (DCEs) have been used to weight QALYs by non-health attributes

  – Lancsar et al. demonstrated that a DCE could be used to elicit preferences for weighting QALYs due to other characteristics (age at onset, age at death if untreated and QoL if untreated)

Lancsar et al. (2011) Deriving distributional weights for QALYs through discrete choice experiments. Journal of Health Economics 30:466-478

Aim

- To elicit preferences for weighting QALYs by other characteristics using a DCE
  - Characteristics defined ‘top-down’ from UK value-based pricing consultation and ‘bottom-up’ from clinical features of anti-VEGF treatment for nAMD
    - Health gain, severity, unmet need, process of care
- Utility function:

$$V = f(HG)$$ *“Health maximisation”*

$$V = f(HG, S, UN, P_{\text{hom}enurse}, P_{\text{hom}eself}, P_{onehospital})$$ *“Health maximisation +”*

where Health gain (HG), Severity (S), Unmet need (UN), Process (P)

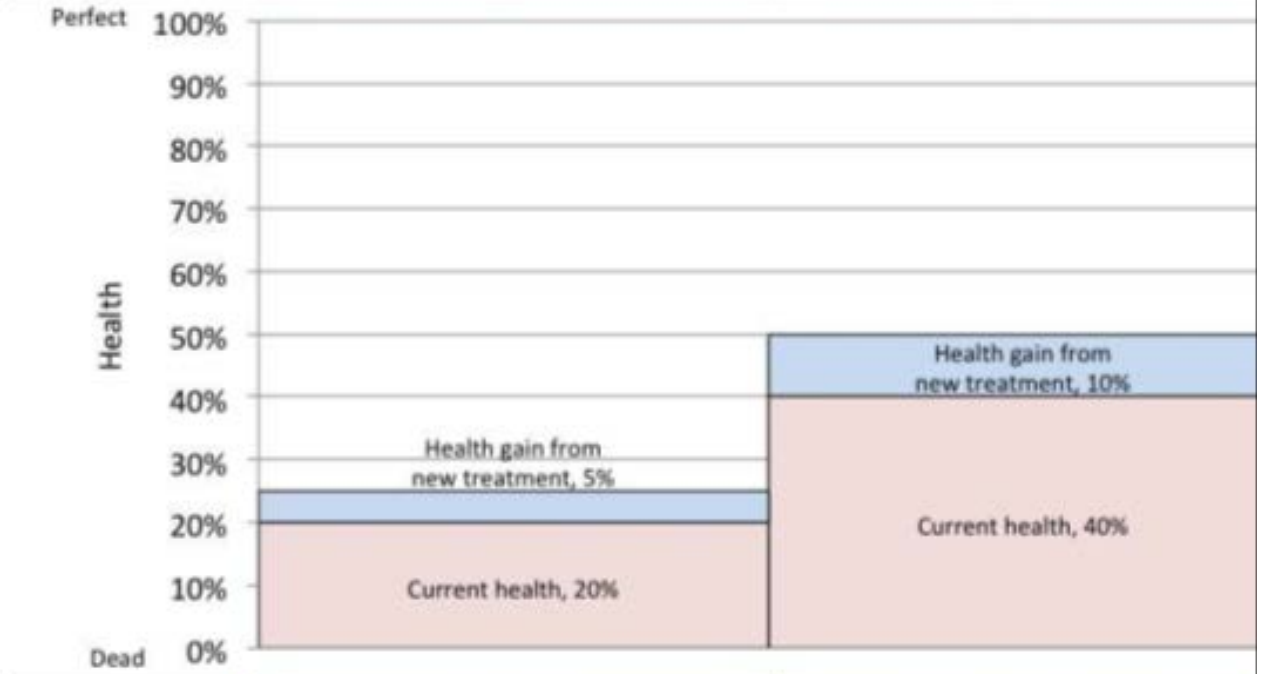
DCE design

Attribute	Level
Health gain	+5%, +10%, +15%, +20%
Current health	20%, 40%, 60%, 80%
Unmet need	No adequate treatment, Adequate treatment
Process of care	Monthly at hospital, One-off at hospital, Monthly nurse administered at home, Monthly self-administered at home

Example choice

Now please consider the choice to treat these two groups of patients with two new treatments

	Group A	Group B
What do patients currently receive?	Patients currently receive an existing adequate treatment, but new treatment is an improvement	Patients currently receive basic NHS comfort care, but no adequate treatment currently exists



How does the new treatment work?	Monthly home-based self-administered injection	Monthly home visit by nurse for injection

***12. Which group of patients do you think the NHS should treat?**

◯ Group A ◯ Group B

DCE design

- Survey structure:
  - Socio-demographic characteristics, introduction and practice task
  - 17 choice tasks in random order (16+1)
    - Binary forced choice to treat A or treat B (no neither to reflect NHS priority setting – budget will be spent on any treatment with an incremental benefit)
  - Likert scale rating importance of 12 attributes
    - Information for choice of attributes in future research
- 200 UK general public (18+) via online survey panel (UK population preferences)
  - Quotas set for age and gender to reflect UK population
  - Pilot in convenience sample

DCE results (conditional logit model)

	Coef.	SE
Health gain	**0.878****	0.108
Severity	**-6.334****	0.444
Unmet need (adequate=1)	0.048	0.037
Process (Monthly home nurse)	**0.151****	0.062
Process (Monthly home self)	**0.147****	0.064
Process (One-off hospital)	**0.158****	0.073

* significant at p<0.1 **significant at p<0.05

Analysis: Coefficients

Attribute	Coefficient ($p<0.05$)	Interpretation
Health gain	Positive	Respondents preferred treatments that provided a greater health gain
Severity	Negative	Respondents preferred treatments that were for patients with a lower starting level of health
Unmet need *cf. adequate*	Not significant	-
Process *cf. monthly hospital*	Positive	Respondents preferred home treatments or less frequent hospital-based treatments over monthly hospital treatments

Compensating variation and QALY weights

	CV	Weight
Severity		
0.8	0.23	**0.77**
0.6	0.00	**1.00**
0.4	-0.56	**1.56**
0.2	-1.55	**2.55**
Unmet need		
Adaquate treatment	-0.03	1.03
No adaquate treatment	0.00	1.00
Process		
Monthly_hospital	0.00	**1.00**
Monthly_home_nurse	-0.05	**1.05**
Monthly home_self	-0.09	**1.09**
One_off hospital	-0.16	**1.16**

- Reference case
  - Health gain = 10% (1 QALY over 10 years)
  - Severity = 60%
  - Unmet need = no adequate treatment available
  - Process = monthly hospital

CV = compensating variation to move from reference case

Importance of long list of attributes

Rating	Attribute
Important	Current health
	Terminal illness
	Health improvement from treatment
	Other adequate treatment available
Maybe	Cause of disease (e.g. genetic)
	Method of administration (e.g. tablet)
	Frequency of dose
	Location of care (e.g. hospital)
Not important	Age
	Gender
	Socioeconomic group
	Ethnic group

- Information on future attributes for which to elicit preferences

Conclusions

- Respondents were willing to forego health gain for other attributes
  - Preferences for QALYs may be weighted by
    - Severity
    - Process

- **Low vision rehabilitation**: defining what matters to patients…
- …within the remit of the health care system

- *Not everything that counts can be counted and not everything that can be counted counts*

Acknowledgements

- Prof Gary Rubin, Dr Shepley Orr and Dr Louise Longworth for advice
- SurveyMonkey Audience Panel for recruitment and hosting
- University College London and Moorfields Eye Hospital for funding

Questions and Discussion

BACKUP

DCE design: Survey

- 4^4 main effects design selected from experimental plan catalogue
  - 16 runs
  - Plus one ‘logically dominant’ choice to test understanding of task (excluded from analysis)
  - Not necessary to constrain the design as the choice of attributes and levels meant there were no implausible scenarios
- Fold-over to systematically vary levels of second choice
- Randomised order of choice tasks

Sample characteristics

Age	18 to 24	3%
	25 to 34	12%
	35 to 44	16%
	45 to 54	25%
	55 to 64	26%
	65 to 74	15%
	75 or older	3%
Gender	Female	53%
Employment status	Unemployed, retired, student	43%
	Manual worker (with no qualifications)	6%
	Manual worker (with industry qualifications)	8%
	Supervisor, clerical; junior managerial, administrative or professional	23%
	Intermediate managerial, administrative or professional	14%
	Senior manager or professional	6%
Health status (where 0 = dead and 100 = perfect), Mean (SD)		71 (24)
Disability	Yes	26%
	No	73%
	Prefer not to say	1%

DCE analysis

- Utility function

$$V = f(HG, S, UN, P_{\text{hom}enurse}, P_{\text{hom}eself}, P_{onehospital})$$

- Conditional logit model (additive)

$$\Delta\log(V) = \beta_1(\Delta\log(HG)) + \beta_2(\Delta\log(S)) + \beta_3(\Delta\log(UN)) + \beta_4(\Delta\log(P_{\text{hom}enurse})) + \beta_5(\Delta\log(P_{\text{hom}eself})) + \beta_6(\Delta\log(P_{onehospital}))$$

- Utility weights derived using Hicksian compensating variation

$$CV = \frac{1}{\lambda}\left[\ln\sum_{j=1}^{J} e^{V_j^0} - \ln\sum_{j=1}^{J} e^{V_j^1}\right]$$

$$Weight = \frac{1 - CV}{Utility_{base}}$$

where Health gain (HG), Severity (S), Unmet need (UN), Process (P)

DCE design

Attribute	Level	Rationale
Health gain	+5%, +10%, +15%, +20%	• Health is currently maximised in cost utility analysis. Its inclusion allows health gain to be traded against other characteristics and distributional weights calculated • Levels: health gain as % of health between 0% (dead) and 100% (perfect). • Analogous to health state utility scale
Current health	20%, 40%, 60%, 80%	• Severity is frequently mentioned as important to patients when prioritising treatment. Not accounted for in cost-utility analysis (a QALY is a QALY). • Levels: starting health between 0% (dead) and 100% (perfect). • Analogous to health state utility scale
Unmet need	No adequate treatment, Adequate treatment	• Preferences for a new product may differ between one that generates a health gain for patients with a disease with no treatment compared with one that generates an equivalent health gain for patients with a disease with an available treatment
Process of care	Monthly at hospital, One-off at hospital, Monthly nurse administered at home, Monthly self-administered at home	• Convenience may be valued by patients in the absence of any health gain. The UK NHS is pursuing policies of improved process such as ‘care closer to home’: are the public willing to forgo some health gain by diverting resources to improved process?