Introduction to QALYs and Preference Measurement in CEA

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HSR&D HEALTH SERVICES RESEARCH & DEVELOPMENT

Overview

- Brief review CEA and Outcomes
- Estimating QALYs in CEA
- Preference/utility measurement in CEA
- Most frequently used preference measurement systems
- Guidelines on selecting measures

The Challenge in CEA

- Costs
- Outcomes
- Policy Questions
  - Limited resources
  - Which program to choose

CEA/CUA review

- CEA compares the effectiveness and costs o two (or more) interventions

$$\frac{(Cost_{study} - Cost_{usualcare})}{(Effectiveness_{study} - Effectiveness_{usualcare})}$$

- Societal perspective

CEA/CUA review

- CEA compares the effectiveness and costs of two (or more) interventions;
  - The *effectiveness* is defined by the health benefit or outcome achieved with the intervention.

CEA/CUA review

- CEA and CUA require all outcomes be quantified in a single scale;
  - A day in hospital or an infection avoided vs.
  - A day “free of angina pain”
  - A day of “improved quality of life”.

Poll1

- What outcomes can be used in CEA
  - Costs or Cost-savings
  - Hospital days
  - VR-36
  - QALYs
  - Infections avoided

CEA/CUA review

- Effectiveness can be measured in natural units,
  - Cost per avoided infection or hospitalization
  - Cost per day “free of anginal pain”
  - Cost per gain in Life Year (LY).

CEA/CUA review

- Effectiveness as a summary measure
  - Quality of life,
  - Quantity of life,
  - Weighted by the societal *preference* for that quality of life*

The Quality Adjusted Life Year (QALY)

- QALYs describe years of survival, adjusted for quality of life or preference

QALYs

- You have 1 year in perfect health = 1 QALY
- I have 1 year in “good” health (.80 QALY)

- Difference = .20 QALYs

QALY Example

- New cancer treatment vs. standard of care
- Weights range from 0-1

	6 mo.	6 mo.	6 mo.	6 mo.	Total QALYs
New Txt.	.90 (.90 x .50)	.30 (.30 x .50)	.50 (.70 x .50)	.25 (.25 x .50)	(.45+.15+.35+.13) =.5375/2 years = *.268/year*
UC	.90 (.90 x .50)	.50 (.50 x .50)	.25 (.25 x .50)	-	(.45+.25+.25+0) =.4125/2 years = *.2065/year*

Calculating cost/QALY

- ICER – New txt vs. standard care
  - *(hypothetical all other costs are equal)*

$$(\$10{,}000 - \$0 / (.268 - .2065) = \$162{,}602 / QALY$$

Estimating QALYs

- Requires:
  - Description of the health states experienced by patients
  - Estimation of the duration of each health state
  - Comparison to or assessment of individual or community *preferences* for each health state

Individual or community preferences

- CEA and societal perspective
  - Considers costs incurred by all parties
  - Allows comparisons across programs and conditions
    - For resource allocation/policy purposes

Deriving preferences or utilities for health states

- Basic methodology:
  - Individuals provide a personal reflection on the relative value (preference weight) of different health states experienced or described.
    - Patients
    - Providers
    - Community Sample

Deriving preferences or utilities

- Two methods to derive preferences:
  - Direct:
  - Indirect:

Methods to assess preferences

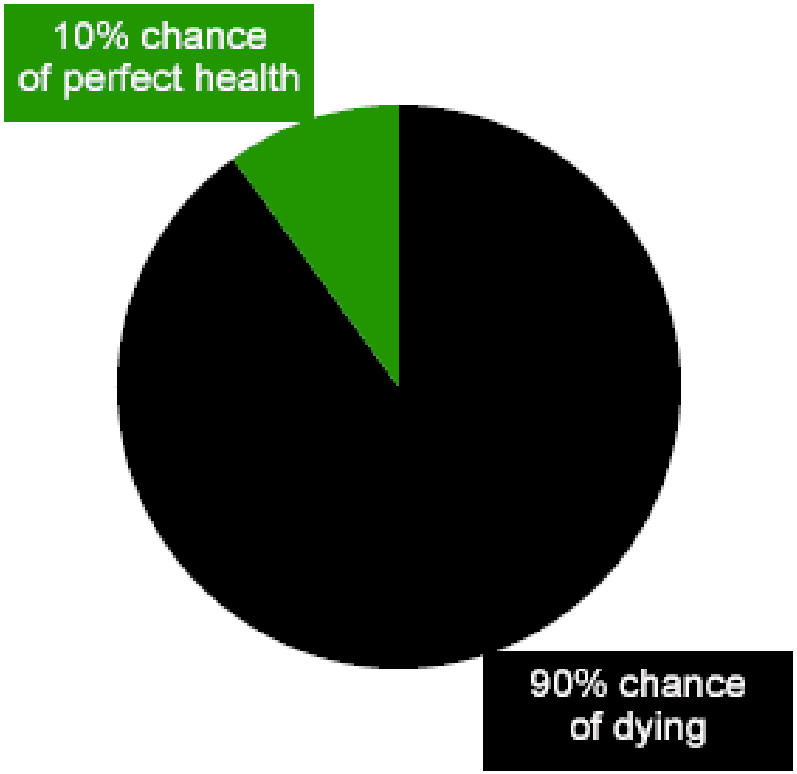
- Direct method
  - Individuals asked to choose (declare *preferences*) between their current health state and alternative health status scenarios
  - Individuals make these choices based on their own comprehensive health state (or the composite described to them).

Sample health state description (composite)

- You are able to see, hear and speak normally
- You require the help of another person to walk or get around; and require mechanical equipment as well.
- You are occasionally angry, irritable, anxious and depressed.
- You are able to learn and remember normally.
- You are able to eat, bathe, dress and use the toilet normally.
- You are free of pain and discomfort.

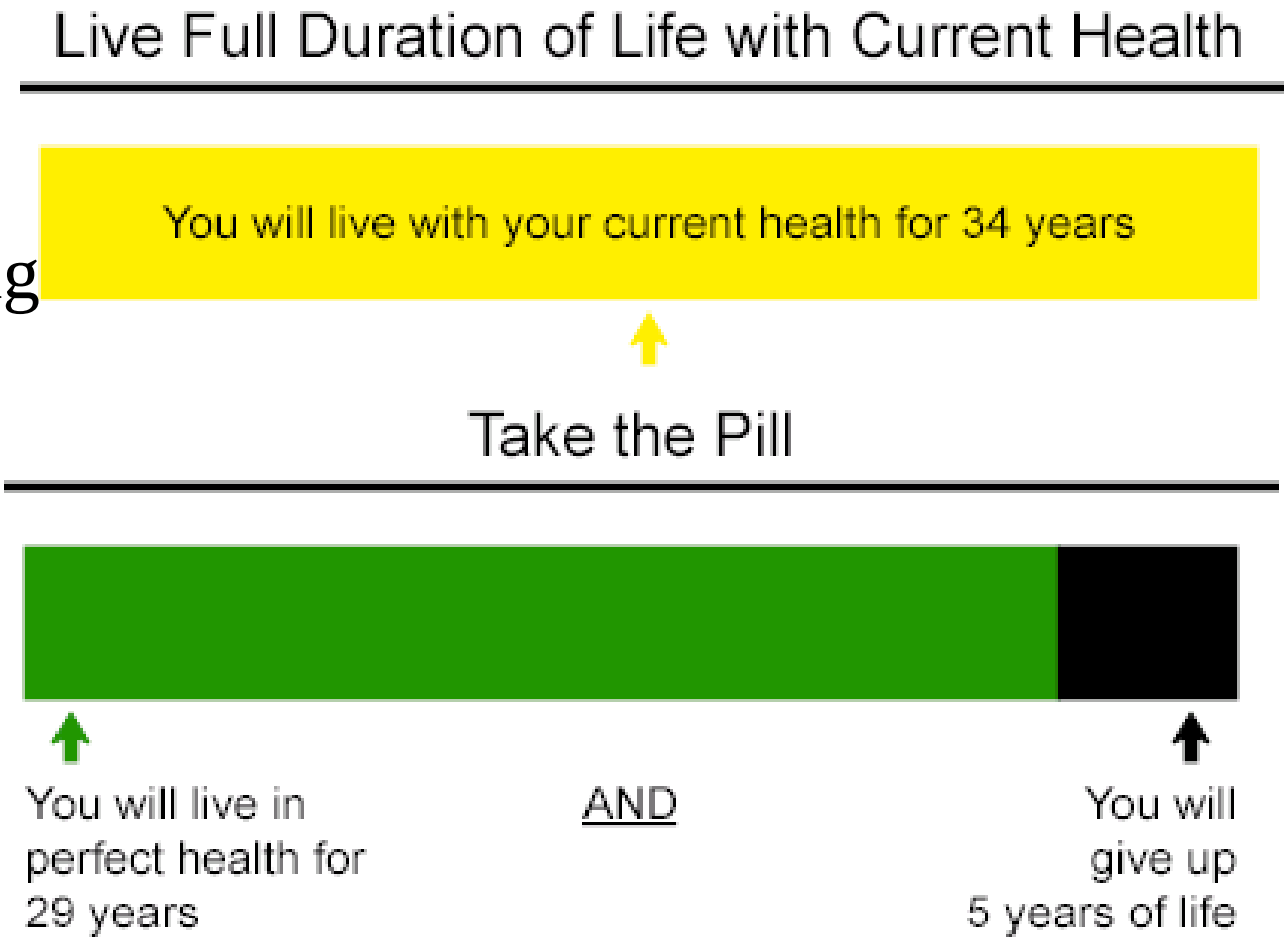
Direct: Standard Gamble (SG)

- Live rest of life in current health state; or
- “take a pill (with risks) to be restored to perfect health”
- Scale represents risk of death respondent is willing to bear in order to be restored to full health.



Direct: Time Tradeoff (TTO)

- How much reduction in total life willing to give up in order to live in perfect health



Methods to assess preferences

- Indirect method
  - Individuals asked to rate preferences for separate domains of health states
    - Physical function
    - Social functioning
    - Mental health etc.
  - Scores are aggregated to create preference or utility weight for the composite health state

Poll 2 (from the EQ-5D)

- Which statements best describes you today
  - Mobility: (answer choices)No problems, some problems, extreme problems
  - Pain (same answer choices)
  - Anxiety/depression
  - Self-care
  - Usual activity

Indirect preference measurement systems

Health utility measures vary in:

- Dimensions or attributes included;
- The size and nationality of the sample population used to establish the weights;
- Health states defined by the survey; and
- How the summary score is calculated, etc.

Which method to use?

- Trade-off between sensitivity and burden
- Start with a literature search re the condition of interest

Hierarchy of methods

- Going from least burdensome to most:
  - Off-the-shelf utility values
  - Indirect Measures
    - (HUI, EQ-5D, QWB, SF-6D)
  - Use disease-specific survey during trial and transform later to *preferences*
  - Direct measure (SG, TTO)

Off-the-shelf values

- Use preference weight determined in another study for health state of interest
  - Not all health states have been characterized
- Useful in decision modeling

Indirect measures (HUI, EQ-5D, QWB, SF-6D)

- Standard surveys that are widely used
- Review published studies on psychometric properties *in the population of interest*
- May lack “responsiveness ”

Using disease-specific surveys

- Use disease specific quality of life instrument if consequences of the treatment or disease are not captured with a generic measure
- Have community respondents value health states with a direct measure at a later time

Using disease-specific surveys

- Key methods issues:
  - Difficult to describe health state to community respondent
  - Difficult to establish values when there are a large number of possible health states
- Expensive, but potentially sensitive to variations in quality of life for this disease
- Often used in addition to generic measure

Direct Methods (SG, TTO)

- May be necessary if effects of intervention are complex:
  - Multiple domains
  - Effects not captured in indirect or disease-specific instruments

Direct Method (SG, TTO)

- High variance in estimates from patients in a trial
  - Reflect risk aversion, feeling about disability
  - High variance = large sample size
- Not the “community value” specified by Gold et al

Methods to assess preferences for health states

- Indirect Measures
  - Health Utility Index (HUI)
  - EuroQol (EQ-5D)
  - Quality of Well-Being Scale (QWB)
  - SF-6D

Indirect measures: Health Utility Index (HUI)

- 41 questions (many items can be skipped)
  - can derive both HUI Mark 2 and HUI Mark 3 health utility scores.
- 8 domains of health and 972,000 health states
  - vision, hearing, speech, ambulation, dexterity, emotion, cognition, and pain
- Basis of domain weights:
  - Canadian community sample rated hypothetical health states
  - Utility theory

Indirect measures: EuroQol EQ-5D

- 5 questions in 5 domains of health
  - Mobility, self-care, usual activity, pain/discomfort, or anxiety/depression
  - 245 health states.
- Basis of domain weights:
  - Past studies based on British community sample
  - New US weights recently published

Indirect measures: the QWB Quality of Well-Being Scale

- Two versions
  - Interviewer or self-administered (QWB-SA)
- QWB-SA is more feasible, but still takes time
  - 76 questions; 1215 health states defined;
  - Includes symptoms, mobility, physical activity, & social activity
- Basis of domain weights:
  - Primary care patients in San Diego, CA

Indirect measures: SF-6D

- Converts SF-36 or SF-12 scores to utilities
  - When based on SF-36, uses 10 items
  - When based on SF-12, uses 7 items
- 6 health domains
  - physical functioning, role limitations, social functioning, pain, mental health, and vitality
- Defines 18,000 health states
- Basis of domain weights
  - British community sample

Important Resources

- Harvard Center for Risk Assessment
  - http://www.hcra.harvard.edu/
- Brazier J, Deverill M, Green C, Harper R, Booth A. A Review of the use of health status measures in economic evaluation. Health Technol Assess 1999;3(9).
  - http://www.hta.ac.uk/932

Important Resources

- Table of published utility weights (preferences) for different health states
  - http://www.tufts-nemc.org/cearegistry/

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- PL Sinnott, Joyce, JR, Barnett, PG. Preference Measurement in Economic Analysis. *Guidebook*. Menlo Park, CA. VA Palo Alto Health Economics Resource Center. 2007 (see HERC website)

QUESTIONS and COMMENTS