Cost-Benefit and Cost-Effectiveness Analysis

Kevin Frick, PhD
Johns Hopkins University
Section A

Where Does CBA/CEA Fit into Health Services Research?
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- Usually efficacy has already been done
- Generally look at effectiveness
  - Pharmaceutical
  - Treatment
  - Intervention program
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- Usually efficacy has already been done
- Generally look at effectiveness
  - Pharmaceutical
  - Treatment
  - Intervention program
- Effectiveness may already be established or effectiveness research may be simultaneous
- Fits in with multiple study designs
  - Modeling
  - Randomized controlled trial
Economic Reasoning, Public Health, and Medical Epidemiology: Cost-Effectiveness and Cost Benefit Results

Measurement of the Effectiveness of a Treatment, Program, or Intervention
Study Design
Epidemiology
Randomized Trials
Modeling
Statistical Analysis
Uncertainty

Valuation
Economic Theory
Personal and Societal Valuation
Instruments from Economics and Decision Sciences
Validity and Reliability

Time
Discounting
Inflation
Accounting for Possibilities
Offered by Technological Change

Cost
Theory of what to measure
Primary Data Collection Methods
Incorporating Secondary Data

Incremental Cost-Effectiveness Ratio or Net Benefit Calculation
Theory of how to calculate
Theory of how to use in decision making
Sensitivity (or “what if”) Analyses
Inference

Choosing which Program to Fund or Treatment to Recommend
Politics
Ethics

Problem and Potential Solution
Identification from Clinical Areas, Population Specific Interests, or the General Policy Process

Notes Available
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Problem and Potential Solution Identification from Clinical Areas, Population Specific Interests, or the General Policy Process

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Why Do a CBA or CEA?

- Information for resource allocation
- Use of these tools implies rationing
- Results fit into a decision-making process
- Values and ethics also impact on decisions
- Final results may be used less than the data used to do the calculations
Cost-Benefit Analysis

- Cost—dollars
- Consequences—dollars
- Net benefit is final product
  - Difference between valuation of benefits and costs
  - Unique feature that can indicate explicitly whether benefits outweigh costs
Cost-Benefit Analysis

- Cost—dollars
- Consequences—dollars
- Net benefit is final product
  - Difference between valuation of benefits and costs
  - Unique feature that can indicate explicitly whether benefits outweigh costs
- Ratio of net benefit to dollars spent (rather than benefit to dollars spent) is sometimes used to rank programs
Cost-Effectiveness Analysis

- Costs—dollars
- Consequences—non-monetary units
  - Mortality/morbidity
    - Only compare programs with similar outcomes
Cost-Effectiveness Analysis

- Costs—dollars
- Consequences—non-monetary units
  - Mortality/morbidity
    - Only compare programs with similar outcomes
- Standardized combinations of mortality and morbidity
  - Quality Adjusted Life Years
  - Implies a “cost-utility” analysis
Set of Types of Analyses

- Cost-benefit
- Cost-utility
- Cost-effectiveness
- Cost-consequence
Set of Types of Analyses

- Cost-benefit
- Cost-utility
- Cost-effectiveness
- **Cost-consequence**
- **Cost of illness**
Section B

Decision Maker Perspective
Decision Maker Perspective

- Different perspectives
  - Individual
  - Employer
  - Insurer/MCO
  - Government
  - Society

- Common perspective useful for making comparisons among alternatives
Cost Terminology

- Opportunity cost versus accounting costs
Direct Costs

- Providing medical care
- Transportation to medical care
- Administrative
- Research and development
Indirect Costs

- CBA only???
  - Lost productivity
  - Morbidity related costs
  - Time receiving medical care
  - Anything where money is not exchanged but time must be valued
Future Costs

- During time alive anyway
  - Medical costs associated with disease treated
  - Unrelated medical care cost
- During extra time alive
  - Medical costs associated with disease treated
  - Unrelated medical care cost
  - Other costs
Measuring Costs

- Incremental for analysis
  - Total may be useful for management decisions
Data

- Quantities
  - Micro-costing studies, billing/claims, procedure codes
Data

- Quantities
  - Micro-costing studies, billing/claims, procedure codes

- Prices
  - Market prices
    - Charges
    - Cost to charge ratios
  - Standard resource measures
    - DRG
    - RBRVS
Effects

- Health status measures
  - Increased life expectancy
  - Decreased morbidity
  - Reduced disability

- Other measures
  - Lower use of health care resources
  - Increased patient productivity

- Not a uniform valuation
Valuing Effects in Quality Adjusted Life Years

- Health states/functional status
  - Ranked from complete health to being dead
- Preferences
  - Those affected by program or entire community
- Measure of both increased length of life and improved quality of life
- Include lost productivity in quality of life
All three represent 0.5 QALYs
QALY Example Two

Quality of Life

Time

A

B
## QALY Numerical Example

<table>
<thead>
<tr>
<th>Program</th>
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Section C

Hot Topics for QALYs
Hot Issues for QALYs

- Special value for saving people near death?
- Should we consider people’s “potential health?”
- Is value of an effect for an individual proportional to length of effect?
- Is value of an effect for a population proportional to the number of individuals?
**Hot Issues for QALYs**

- Special value for saving people near death?
- Should we consider people’s “potential health?”
- Is value of an effect for an individual proportional to length of effect?
- Is value of an effect for a population proportional to the number of individuals?
- Does the distribution of QALYs matter?
- Should we ask individuals about how they would value hypothetical effects on their own health or the effects on groups of individuals?
- Adaptation and recall
Valuing Effects in Dollars

- Human capital model
- Willingness to pay
  - Measure maximum dollars consumer would give up to have effects of program
  - Better basis in economic theory
  - Related to wealth/income
- Consistency in treating items as benefits
Discounting

- A dollar today is worth more than a dollar tomorrow
- Net present value of costs of multiple year program depend on order of costs
Discounting

- A dollar today is worth more than a dollar tomorrow
- Net present value of costs of multiple year program depend on order of costs
- Commonly use real interest rate
  - What a dollar today is worth tomorrow
  - Appropriate rate is open to discussion
Uncertainty

- Range of prices/quantities
- Range of probability of certain events
- Sensitivity analyses
- Secondary data/expert opinion can fill in gaps
Reporting/Interpreting Results

- CBA—net benefit and ratio
- CEA—reference case
- Explicit assumptions
- Sources of any secondary data
- Intermediate results
- Sensitivity analyses