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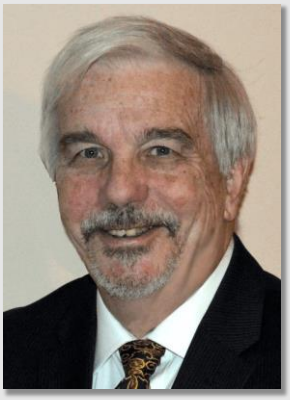
Novel Approaches to Value Assessment, Beyond Cost-Effectiveness Framework



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NOVEL APROACHES TO VALUE: BEYOND COST EFFECTIVENESS

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BUILDING TOWARDS MCDA

- Policy makers and clinicians dislike monetizing value of life (reject CBA)
  - Shift to CEA with benefits expressed in "natural units"
- Baby Steps: "lives saved," "infant life equivalents," then "life years saved"
- Refinements: QALYs and DALYs ➔ Cost Effectiveness Analysis
- Next: decision making with a maximum Willingness to Pay (WTP)
  - Garber and Phelps, 1997 derived cutoff from ***single person utility maximization***
- CEA is incomplete: "CERA recognizes that cost and cost-effectiveness analysis alone may not provide sufficient information to decision makers to guide their choices on the allocation of resources, …." [Editorial statement, 2009, *Cost Effectiveness and Resource Allocation]*

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AUGMENTED COST-EFFECTIVENESS ANALYSIS

- QALYs (a "must")
- Productivity
- Adherence Improvement
- Reduction in uncertainty
- Fear of Contagion
- Antibiotic resistance
- Equity (several dimensions)
- Insurance Value
- Severity of Disease
- Value of Hope
- Real option value
- Scientific Spillovers

- Problem remains: Combining these into a single metric

Lakdawalla D, Doshi J, Garrison LP, Phelps CE, Basu A, Danzon PM , "Defining Elements of Value in Health Care—A Health Economics Approach: An ISPOR Special Task Force Report [3]", *Value in Health* 2018; 21:131-139.

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NEEDED: A WAY TO COMBINE ALL OF THESE ATTRIBUTES INTO A SINGLE VALUE MEASURE

- The economist's utility function

$$U = U(X_1, X_2, \ldots. X_n)$$

- MCDA attempts to *approximate* that concept

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THE CORE IDEA OF MCDA

- 1) ***DETERMINE*** dimensions of value ("attributes")
  - Health gains
  - Distributional gains
  - Etc. (see list in "Augmented CEA" slide)
- 2) ***ELICIT*** preference structure from decision makers
  - Relative values, relative importance,….
- 3) ***MEASURE*** performance of "candidates" on all dimensions of value
  - Requires conversion to a common "measuring stick" – difficult and important
- 4) ***COMBINE*** into a weighted sum of performances

$$U = \sum_i w_i * u_i(x_i)$$

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VIRTUES OF MCDA

- Transparency
- Helps make things systematic
- Focuses data collection
- Avoids human cognitive errors (behavioral economics)
- "Test drive" variants to improve design (flight simulator)
- May assist in decision convergence

Phelps CE, Madhavan C, "Using Multicriteria Approaches to Assess the Value of Health Care," *Value in Health* 2017; 20:151-155.

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YOU CAN USE MCDA AT VARIOUS "LEVELS"

- Societal level
  - What services to offer to citizens
- Health plan level
  - What services to offer to enrollees
  - Could differ from plan to plan – heterogeneity can have value
- Individual level
  - Among covered services, which is best for me?

- **EACH APPROACH HAS DIFFERENT VALUE STRUCTURE AND WEIGHTS!**

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EXAMPLES AT THE INDIVIDUAL LEVEL

- Available cancer therapies
- Nursing home options
- Diabetes or hypertension options
- Different health insurance plans
- Which health care system to choose?
- Who should I choose for my primary care doctor?

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MCDA: SOME ISSUES TO BE RESOLVED

- Best way to elicit preferences
  - Each model has specific method to elicit weights
  - Need head to head testing to determine which is best
- Scaling of incommensurate dimensions of value
  - Like decathlon in track – running, jumping, throwing…..
  - Weighting method interacts with scaling

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MANY VARIANTS TO ELICIT PREFERENCES

- MAUT ("Swing" weights, Rank order centroid)
- AHP (Pairwise comparisons throughout)
- MACBETH (Categorical comparisons of incremental value)
- PROMETHEE (Compares value of each to average value)
- PAPRIKA (Combines weight setting and scaling)
- Many, many more
- SOFTWARE: two dozen offerings
  - http://www.mcdmsociety.org/content/software-related-mcdm

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MCDA: SOME ISSUES TO BE RESOLVED

- Best way to elicit preferences
- Scaling of incommensurate dimensions of value
- Data complexity
  - It's the problem that's complex – the model structures it!
- Computational complexity – "black box" to many users
- Decision making in a budget-constrained world

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THREE WAYS TO DEAL WITH BUDGETS USING MCDA

- If predetermined budget, rank projects on value/cost using MDCA scores
  - Budget can be set administratively
  - Or by "popular vote"
- Extrapolate from acceptable values of cutoffs for Cost/QALYs
- Vote on a direct cutoff of cost/value (using MCDA value metric)

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METHOD 1: EXTERNAL BUDGET

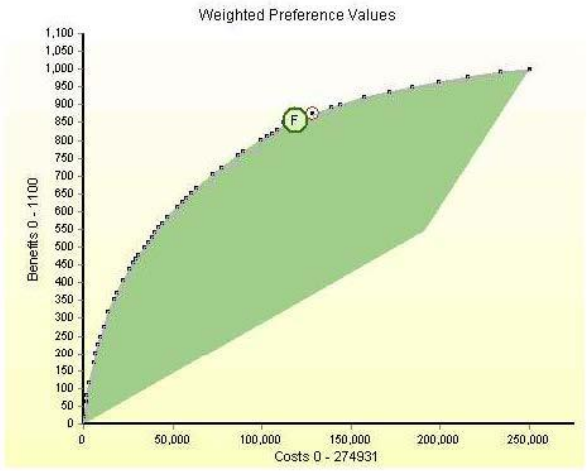

Figure 3: An efficient frontier created from an MCDA model. The graph displays cumulative benefits versus cumulative costs. Each point represents another project, with the F position defining the affordable portfolio: all projects down and to the left of F are within the available

Transparent prioritisation, budgeting and resource allocation with multicriteria decision analysis and decision conferencing. *Annals of Operations Research*, October, 2007, 154(1):51-68. L Phillips and C Bana e Costa

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METHOD 2: BEGIN WITH WTP for QALYs

- Start with $U = \sum_i w_i*(u_i(x_i))$ (simplest form)
- Of these elements, **one is QALYs**, **all the rest are "X"**
- This gives us the MULTI-ATTRIBUTE UTILITY INDEX (MAUI)

$$MAUI = w*QALY + (1-w)*X$$

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THEN YOU EXTRAPOLATE

- If the cutoff for QALYs alone is K
  then the MAUI cutoff is K/w
- Issue: Who pays for the extra value (e.g., if it's equity or scientific spillover or …..)?
- CAUTION: If w is small, extrapolation magnifies errors in K.

Phelps and Madhavan, "Resource Allocation in Decision Support Frameworks, *Cost Effectiveness and Resource Allocation (CERA), 2018.*

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EXAMPLES OF EXTRAPOLATION OF VALUE

	Weight on QALYs	Weight on Other Attributes	Cost-Effectiveness (Cost per QALYs) Cutoff	Multi-Criteria Cutoff
Decision Maker A	0.5	0.5	$80K	$160K
Decision Maker B	0.666	0.333	$100K	$150K

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IF YOU TAKE A VOTE….

- If the "vote" is a specific value of the cutoff
  - (like $100,000/QALY or some other value)
- Then the median voter's preferences will determine the outcome
- Has little meaning unless voters also know the distribution of costs

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AND SPEAKING OF VOTING…..

- Implementing MCDA models with group decision makers
  - Most MCDA models presume a single decision maker
  - Many approaches involve a facilitator to help navigate the model ("decision conferences")
- When votes are employed, considerable attention needed on voting rules and methods
- In models with many decisions, voting may be impractical
- In models with potential "inconsistency," voting may be intractable.

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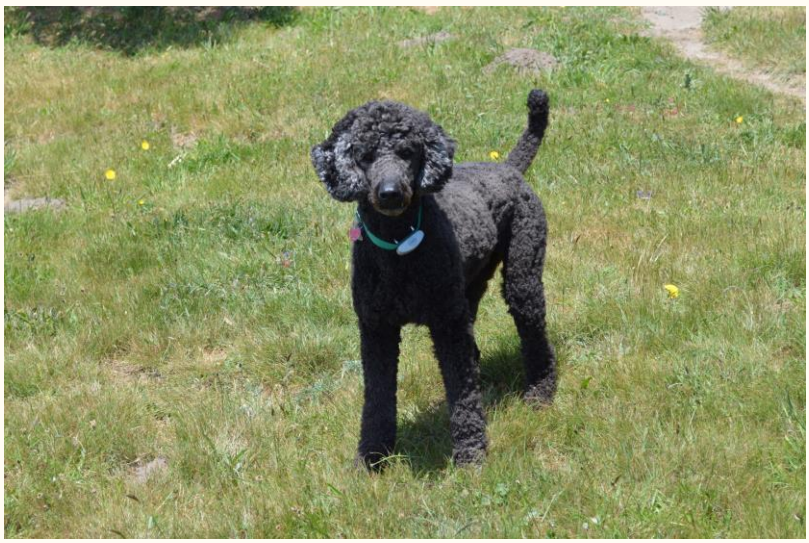
THANKS FOR YOUR ATTENTION



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