Use of Economic Evidence in Clinical Decision Making: a Discrete Choice Experiment

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A way through..

- Conceptual framework
- Literature review
- Study Objectives
- Methods: DCE
- Results
- Discussion

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Conceptual framework

- Evidence based decision making (EBDM): a broader field, explored in different disciplines and perspectives (i.e. knowledge utilization, sociological, political science, organizational science, innovation diffusion, program evaluation, cognitive science…)
- EBDM evokes a concept "problem solving model" of research utilization (Weiss, 1979) or "rational comprehensive model" :
  - Empirical and analytical research evidence is applied directly to policy problem and leads to improved rationalization of decisions made
  - Evidence generated by research primarily influence decision making
  - At the heart of normative approach to economic evaluation analysis

Conceptual framework

- Focus: use of economic evidence (i.e. cost effectiveness analysis) in healthcare decision making
  - DM is complex intellectual process, depends on roles and responsibilities
  - Literature distinguishes between three different levels of DM:
    - Macro-policy level
    - Meso – organizational level
    - Micro- professional/clinical level
- The degree to which evidence is used varies in relation to different level of decision making

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Literature review

- A recent review identified 36 empirical studies that investigated the impact of economic evaluation on clinical decision making (van Velden et al, *Pharmacoeconomics* 2005) : USA (50%), UK (25%), Canada (20%)

- 8 studies (23%) focused on clinical decision making
- Evidence from Italy very limited (Fattore and Torbica, Value in Health 2006)

- Methods employed:
  - Questionnaires, surveys, interviews
- General results:
  - Limited to moderate influence of economic evaluation
  - "Enlightenment use" of economic evidence

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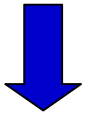
Clinical decision making

- A fact: clinicians make decisions on the basis of limited, and sometimes contrasting evidence
- Choices involve trade-offs between different type of evidence provided (i.e different decision criteria)
- Very few studies provide a measure of "relative importance" clinicians attach to cost effectiveness criteria



A different methodological approach:

Discrete choice experiment (DCE)

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Discrete choice experiments

- Grounded in Random utility theory (McFadden, 1973) and Lancaster's economic theory of value (Lancaster, 1966) :
  - individuals make choices that maximize their utility
  - Utility is derived from the attributes and associate attribute levels of goods/services
  - In making choices respondents make trade-offs between different attributes and attribute levels
- Technique involves presenting individuals with choices of scenarios described in terms of characteristics and associated levels
- Response data are modeled within a utility function which provides information on :
  - whether or not the given dimensions are important;
  - the relative importance of dimensions;
  - the rate at which individuals are willing to trade between dimensions
  - overall benefit scores for alternative scenarios.

DCE in Health Economics

- DCE has been used to investigate the variety of issues in HE literature:
  - Patients and clinicians preferences for health outcomes
  - Patients preferences for characteristics of healthcare services
  - Provider preferences for job characteristics
  - Reimbursement schemes

- Two studies used DCE to investigate the importance of CE information in DM:
  1. Baltussen, R. et al. *Towards a multicriteria approach for priority setting: an application to Ghana*. Health Economics 2006
  2. Johnson F.R. and Backhouse M. *Eliciting Stated Preferences for Health-technology Adoption Criteria using Paired Comparisons and Recommendation Judgements.* Value in Health 2006

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Study objectives

1. To evaluate the relative importance Italian cardiologists attach to cost effectiveness criteria in evaluating innovative treatments

2. To illustrate how discrete-choice experiments may be applied for eliciting clinician's preferences for new treatment in cardiology

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Methods

Phases of DCE:

1. Hypothetical scenario design
2. Identifying the relevant dimensions (attributes) and assigning levels
3. Generating the questionnaire
4. Establishing preferences
5. Model estimation to value total and marginal utilities

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1. Hypothetical scenario design

- A crucial element: setting up the context in which the respondents should imagine themselves when choosing between options
- Our objectives : appealing and realistic scenario
- Designed with consultation of 3 senior cardiologists
- Clinicians were asked to imagine themselves in a situation in which they had to decide whether to adopt an innovative treatment for a patient with a specific characteristics

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2. Identifying the relevant dimensions and assigning levels

- Initially identified on the basis of theoretical arguments and literature
- Validated in two focus group interviews with clinicians
- Balance between cognitive burden and validity of an instrument
- Three dimensions identified:
  1. Quality/solidity of clinical evidence
  2. Size of health gain demonstrated
  3. Economic impact (i.e. cost effectiveness ratio)

- Levels must be plausible and actionable (possible trade-offs), thus encouraging respondents to take the exercise seriously
- Levels reflected the format in which evidence about the new treatments is usually conveyed to clinicians

Attributes and levels used in DCE

Attributes	*Variable**	*Levels definition*
Quality of clinical evidence	Quality_high	Evidence obtained from 3 RCTs, all three favourable for the treatment (n=30,000)
	Quality_mod	Evidence obtained from one big RCT (n=10,000)
		Evidence obtained from one small RCT (n=3,000)
Size of health gain	Gain_high	Relative Risk Reduction 20% (Absolute Risk Reduction 2%)
		Relative Risk Reduction 5% (Absolute Risk Reduction 0.5%)
Economic impact	ICER_very	Very cost-effective (ICER= 5,000 € per life years gained)
	ICER_mod	Cost-effective (ICER=50,000 € per life years gained)
		Not cost effective (ICER= 200,000 € per life years gained)

**Attribute levels are dummy coded with the "worst" level being the reference (omitted) category*

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3. Generating the questionnaire

- Full factorial design: 18 different scenarios
- Choices sets defined using *a cyclical foldover approach* (Carlsson, 2003)
- Choices randomly allocated to 2 blocks of 9 questions
- Criteria: orthogonality, minimal overlap and level balance
- In addition:
  - Socio demographic characteristics
  - Self assessed level of knowledge of EE techniques
  - Number of EE studies read in the last year
  - Level of agreement on 3 statements:
    - *Economic evaluation analysis is currently used by Italian cardiologists.*
    - *Economic evaluation analysis should exercise more impact on decisions in cardiology*
    - *The only economic variable considered by Italian cardiologists is the cost of a drug.*

Figure 1. Example of a choice presented to clinicians

The context

Imagine the following situation: a female patient, 65 years old, with family history of cardiovascular diseases, one mild acute myocardial infarction experienced at the age of 60, comes to see you for a specialist visit in the hospital. The blood exams show total cholesterol 230mg/dl and blood pressure is 150/95 mm Hg. The baseline risk of cardiac mortality is 10%.
You must decide whether to prescribe an innovative treatment in order to reduce the cardiac mortality risk. Your decision must be based exclusively on the basis of evidence presented to you in different scenarios. The scenarios differ according to the quality of clinical evidence available, size of health gain estimated in target population and cost-effectiveness profile of the new drug.
For each question below you are asked to choose in which situation you would be more favourable of adopting the new treatment (Situation A or Situation B).

1. Which scenario you would prefer? (please tick box below)

Scenario A ☐ Scenario B ☐

Scenario A	Scenario B
Evidence obtained from 3 RCTs, all three favourable for the treatment (n=30,000)	Evidence obtained from one small RCT (n=3,000)
Relative Risk Reduction 5% (Absolute Risk Reduction 0.5%)	Relative Risk Reduction 20% (Absolute Risk Reduction 2%)
Not cost effective (ICER= 200,000 € per life years gained)	Very cost-effective (ICER= 5,000 € per life years gained)

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4. Establishing preferences

- Pilot study (25 respondents)
- Main sample: attendees of the 2007 National Congress of Cardiologist (ANMCO) in Florence, Italy
- Consistency
  - Each block of questions included 2 "dominant" choices
  - Individuals who failed the consistency test were excluded from the sample
- Dominant preferences
  - Compensatory decision making vs. lexographic ordering
  - No consensus in the literature
  - "Dominant" individuals identified and the model was estimated with and without

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5. Model estimation

- Clinicians are assumed to choose the preferred scenario based on their preferences for different attribute levels

  $U(X_B, Z_j) > U(X_A, Z_j)$

  Where:

  X_B and X_A = utility bearing attributes

  Z_j = j^{th} individual characteristics (tastes)

- Introducing random utility component:

  $\text{Prob}\,[U(X_B, Z_j) > U(X_A, Z_j)] =$

  $\text{Prob}\,[(\varepsilon_A - \varepsilon_B) < (V(X_B, Z_j) - V(X_A, Z_j)]$

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6. Model estimation

- Baseline empirical model: Random Effects Probit:

$$\Delta U = (\beta_0 B - \beta_0 A) +$$
$$\beta 1 * \Delta \text{ Quality\_high} + \beta 2 * \Delta \text{ Quality\_mod} +$$
$$\beta 3 * \Delta \text{ Gain\_high} +$$
$$\beta 4 * \Delta \text{ICER\_very} + \beta 5 * \Delta \text{ ICER\_mod} + \varepsilon + \mu$$

- Heterogeneity of preferences: interaction terms between clinicians' characteristics and economic dimension

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Results

Sample characteristics

	N.	%
Sex		
Female	23	18.1
Male	104	81.2
Region		
North	69	54.8
Centre	31	24.6
South	27	20.6
Age		
<45 years	23	18.1
45 - 65 years	96	75.6
>65 years	6	4.3
Self assessed extent of knowledge of economic evaluation techniques		
1 (poor)	12	9.5
2	27	21.3
3	53	42.1
4	33	26.2
5 (very good)	1	0.8
Number of economic evaluation studies read in the last year		
none	20	15.9
1 to 3	70	55.1
more than 3	37	29.0

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Results

Level of agreement of respondents with the proposed statements

Statement	*Mean*	*Median*	*1 (strongly disagree)*	*2*	*3*	*4*	*5 (strongly agree)*
Economic evaluation analysis is currently used generally by Italian cardiologists	2.5	3	11.8%	36.2%	41.7%	10.2%	0.0%
Economic evaluation analysis should be used more by Italian cardiologists	3.9	4	3.9%	3.9%	19.7%	41.7%	30.7%
Italian cardiologist use the cost of a drug as the only economic criteria in treatment decisions	2.5	2	2.4%	30.7%	18.1%	22.8%	3.9%

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Results

Random effects probit model (baseline estimates)

Dimensions	Full set Coefficients (se)	W/o dominant ind. Coefficients (se)
Quality_high	0.949 (0.079)***	1.116 (0.099)***
Quality_mod	0.585 (0.071)***	0.723 (0.087)***
Gain_high	0.874 (0.060)***	0.887 (0.071)***
ICER_very	1.133 (0.084)***	1.345 (0.109)***
ICER_mod	0.811 (0.074)***	1.029 (0.096)***
Constant	0.111 (0.0620)	0.146 (0.071)
N of observations	1143	873
N of respodents	127	97
Log likelihood	-479.31	-339.02
Prob (Chi2)	< 0.0001	<0.001
Rho	0.394	0.437
ρ (95% confidence interval)	0.161 (0.086-0.282)	0.145 (0.063-0.299)
Proportion 1s correctly predicted	82.9%	82.9%
Proportion 0s correctly predicted	79.4%	79.4%

Dominant individ.:
- 14 Health gain
- 9 Cost effectiv
- 7 Quality clin.

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Results

Random effects probit model with interactions

Dimensions	Full Coefficients (se)	Reduced Coefficients (se)
Quality_high	0.974 (0.082)***	0.965 (0.081)***
Quality_mod	0.603 (0.073)***	0.596 (0.072)***
Gain_high	0.894 (0.062)***	0.887 (0.061)***
ICER_very	1.033 (0.098)***	1.077 (0.089)***
ICER_mod	0.610 (0.093)***	0.631 (0.091)***
Good_knowledge* ICER_very	0.178 (0.175)	
Good_knowledge* ICER_mod	0.357 (0.152)*	0.272 (0.126)*
Age_45*ICER_very	0.445 (0.221)*	0.449 (0.223)*
Age_45*ICER_mod	0.516 (0.183)**	0.517 (0.184)**
Age 45_65* ICER_very	0.620 (0.347)	
Age 45_65* ICER_mod	0.276 (0.317)	
North * ICER_very	0.058 (0.156)	
North * ICER_mod	0.062 (0.142)	
Constant	0.089 (0.063)	0.0935 (0.139)
N	1143	1143
Log likelihood	-470.817	-473.107
Prob (Chi2)	<0.0001	<0.0001
Rho	0.404	0.401
LR test with no interactions - Chi2 (p -value)	16.99 (0.030)	12.41 (0.006)
LR test with full set of interactions - Chi2 (p value)	-	4.58 (0.4693)

*** p < 0.0001
**p<0.01
* p< 0.05

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Discussion

- The first study to investigate the importance of cost effectiveness information to clinicians in DCE framework

- Study limitations
  - Sample size and representativeness
  - Methods:
    - Dominant preferences
    - Heterogeneity of preferences (latent class models)

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Discussion

- Study contributions

1. From policy point of view
   - Adds new evidence on the importance of cost effectiveness information in Italy: clinicians value economic evidence in their decision making
   - Clinical level as the "starting point" for greater use of cost effectiveness studies at meso (organizational) and macro (policy) level
   - Suggests the existence of "threshold" among more knowledgeable clinicians
   - Generational differences in attitudes towards economic evaluation analysis

Discussion

2. From methodological point of view

- DCE is feasible, and preferable methodological framework to elicit clinicians' preferences
- Similar study design in other clinical areas to guide allocation of resources for conducting research
- Feasible approach to elicit decision making criteria in different populations (eg. healthcare or public managers)

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