MULTICRITERIA CONCEPTS AND APPLICATIONS IN DECISIONMAKING

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THE MULTICRITERIA HYPOTHESIS

Develop intervention  Authorise use  Prioritize/reimburse  Prescribe  Use

- Researchers
- Clinicians
- Industry
- Regulatory bodies (e.g., EMA, FDA)
- Healthcare systems (HTA, Ministries)
- Clinicians (community, hospitals)
- Patients

Evidence over time

Criteria?
Criteria?
Criteria?
Criteria?
Criteria?

Provide a common road map
Identify criteria that define value across the continuum
Align development with patient needs, systems efficiency, equity and sustainability
FEATURES OF MULTICRITERIA APPROACH

- Reflective (not an algorithm/formula)
- Transparent
- Systematic
- Pragmatic (sound mathematics but no mathematical complexity)
- Adaptable to context
- Holistic (comparisons across any type of intervention, covers continuum of decision)
- Participatory process

EVIDEM COLLABORATION
A NOT-FOR-PROFIT PLATFORM

OBJECT: promote public health by collaboratively developing efficient multicriteria-based solutions to healthcare decisionmaking and priority setting

STRUCTURE AND SUSTAINABILITY: not-for-profit organization run by an international board of directors with an open source philosophy relying on voluntary work, donations and institutional funding

FEATURES: Free membership (>25 countries), access to collaboratively developed multicriteria-based framework tools, multicriteria registry of interventions, working groups and discussion forum

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MEMBERS
(>150 from >25 countries)
Multicriteria practice community
- Physicians and healthcare professionals
- Policy Decisionmakers
- Patients
- Researchers
- Industry
- IT specialists

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EVIDEM: mechanism structuring the thinking process of linking decision criteria with evidence for each criterion

Building on ethical, MCDA and HTA principles

EVIDEM OPEN SOURCE FRAMEWORK V2.2

MCDA CORE MODEL

Disease impact
- Disease severity (D1)
- Size of population affected by disease (D2)

Context of intervention
- Clinical guidelines (C1)
- Comparative intervention limitations (unmet needs) (C2)

Intervention outcomes
- Improvement of efficacy/effectiveness (I1)
- Improvement of safety and tolerability (I2)
- Improvement of patient reported outcomes (I3)

Type of benefit
- Public health interest (e.g., prevention, risk reduction) (T1)
- Type of medical service (e.g., symptom relief, cure) (T2)

Economics
- Budget impact on health plan (cost of intervention only) (E1)
- Impact on other spending (e.g., hospitalization, disability) (E2)
- Cost-effectiveness (E3 - optional)*

Quality/uncertainty of evidence
- Completeness and consistency of reporting (Q2)
- Relevance and validity of evidence (Q3)

CONTEXTUALIZATION TOOL

FEASIBILITY & CONTEXTUAL NORMATIVE CRITERIA

Ethical framework**
- Utility - Goals of healthcare (Et1)
- Fairness - Population priority & access (Et2)
- Efficiency - Opportunity costs & affordability (Et3)

All context
- System capacity and appropriate use (e.g., infrastructure, skills) (O1)
- Stakeholder pressures (O2)
- Political/historical context (e.g., precedence) (O3)
- Environmental impact (O4)

E2 - Possible sub-criteria***
- Impact on primary care expenditures
- Impact on hospital care expenditures
- Impact on long-term care expenditures
- Impact on productivity
- Financial impact on patients
- Financial impact on caregivers

*Cost-effectiveness is a composite of some elements of other criteria and does not comply with the non-redundancy design requirement of MCDA. It might be included in the framework since many decisionmaking processes currently rely on this composite measure.

**Includes an ethical framework based on WHO ethical principles of resource allocation

***Guindo et al. CERA 2012; 10:9; Tanios et al. IJHTAC 2013
MCDA VALUE MODEL

**CORE MODEL CRITERIA**

Quantitative

Value \(= \sum \text{Weights} \times \text{Scores} \)

- Max value 1
- No value: 0

**CONTEXTUEL CRITERIA**

Qualitative

Impact of context

- High value: Invest
- Low value: disinvest

**Feasibility approach**

- Linear model for Value: 6 direct weights elicitation techniques available in EVIDEM v2.2;
- Scores: generic constructed scales for each criteria (holistic comparability)

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DESIGNING & IMPLEMENTING A MCDA APPROACH

- **Adapt to your context**
  - What is your mandate? What are the priorities in your context?
  - Challenge each criterion (evaluate implications of including or not including a criterion)

- **Make this a process**
  - Bring colleagues on board
  - Integrate with existing processes
  - One step at a time: from fully qualitative to quantitative
    - Criteria selection, by-criterion evidence synthesis
    - Weighting techniques, performance scales, value model
    - Qualitative impacts
    - Financial exercise
MCDA METHODOLOGICAL FOUNDATION

STEP 1: SELECTION OF CRITERIA

Ensure model measures what you wish to measure

- Rationale for selecting criteria
  - What is value?
  - What contributes to value?
- Principles for defining criteria
  - Non-redundant (avoid double counting),
  - Mutually independent (can be assessed independently),
  - Operationalizable (scales, data)
  - Completeness (all important criteria used for decisionmaking are included)
- Implications of including or not including a criterion
  - Complete value measurement (completeness)
- Clustering of criteria
  - Conceptually meaningful
  - Critical if using hierarchical method

STEP 2: DATA SYNTHESIS FOR EACH CRITERION

Ensure evidence-based decision making

- HTA principles
  - Systematic review of the literature
  - Synthesis of available data
  - Assessment of quality of evidence

- Adapation to MCDA model
  - Data synthesis for each criterion (matrix format rather than report format)
  - Data sufficient and necessary for scoring each criterion
MCDA METHODOLOGICAL FOUNDATION

STEP 3: SELECTION OF WEIGHT ELICITATION TECHNIQUE

- Capture perspective of evaluators (individual value system)

  ▪ Rationale for selecting technique
    ▪ Number of criteria
    ▪ Ease of use
    ▪ Mathematical complexity
    ▪ Examples: 10 points scale (Kepner Tregoe, ) Point allocation, Ranking, Swing weights, AHP, Best/worse, DCE

  ▪ Implications of selection of technique
    ▪ Weights vary depending on technique (no gold standard)
    ▪ These variations do not have a major impact on value calculation when number of criteria increases

11 Dolan. The Patient 2010; Van Tij (submitted)

MCDA METHODOLOGICAL FOUNDATION

STEP 4: SELECTION OF SCORING SCALE

- Measure the performance of an intervention for each criterion

  ▪ Rationale for selecting scale
    ▪ Ease of use
    ▪ Mathematical complexity
    ▪ Measured vs constructed scale

  ▪ Implications of selection of scale
    ▪ Comparability of interventions
    ▪ Strictly based on numbers (formula type) OR Capturing judgment on numbers (reflection support type)

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**IMPLICATIONS OF CRITERIA AND SCORING SCALE**

**EXAMPLE DISEASE SEVERITY (D1)**

- **Ethics**: alleviate suffering in individuals who are worst-off
- **Rationale for inclusion**: give more value to interventions targeting (regardless how: preventing, curing, or alleviating) severe diseases
- **Value range of the scale**:
  - Very severe (high)
  - Not severe (low)

**CASE STUDY: CANADIAN PANEL**

**EXAMPLE OF SCORING MATRIX**

- **Reflect on Data**: is data available meaningful, sufficient? Quality?
- **Comment**: Reflect on score: How currently decided?

Goetghebeur et al. CERA 2010.
EVIDEM collaborative Registry: www.evidem.org
CASE STUDY: CANADIAN PANEL
VALUE OF MEDICINES (NWEIGHTS X SCORES)

MCDA APPLICATIONS

<table>
<thead>
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- Go no-go decision
- Evidence generation planning
- Comprehensive study design
- Value estimation
- Positioning for most beneficial impact

*Sanofi

*Goetghelbeur et al. Medical Decision Making, 2011

Sanofi T. ISPOR Symposium, New Orleans, 2013
MCDA APPLICATIONS

Effect/data over time

- Develop intervention
- Authorise use
- Prioritize/reimburse
- Prescribe
- Use

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- Clinicians
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Quantitative risk benefit analyses

- EMA (PROTECT)

Visualization of risk/benefit


1 http://www.cadth.ca/products/environmental-scanning/health-technology-update/health-technology-update-9/selecting-topics
3 Tringali M, Dellagiovanna M. G Ital Diabetol Metab 2013;33:8-18.
MCDA APPLICATIONS

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Guidelines development

✓ International CPGs for rare disease Prader Willi Syndrome


Patient empowerment (transparency on data & institutional decisions)

✓ Enlightened individual decision
FUTURE: MCDA AS A PROCESS

- Identification of value
- Working across the decision continuum
- Criteria based evidence generation and planning
- Web power
- MCDA methodological development
- MCDA implementation processes

Thank you

Gracias