



Principles of MCDA applied to HTA: development and applications of the EVIDEM framework

4 April 2011

CADTH Symposium, Vancouver

EVIDEM Collaboration - Board of Directors

Rob Baltussen PhD, Radboud University, Netherlands (formerly WHO)

Renaldo Battista MD, University of Montreal, CHU Ste Justine, Canada

Mireille M Goetghebeur PhD, BioMedCom Consultants inc, CHU Ste Justine, Canada

Paul Kind PhD, University of York, UK

Sharon Kletchko MD, Nelson Marlborough District Health Board, New Zealand

Mark Legault MA, Pfizer Canada

Jacqui Miot PhD, University of Pretoria, South Africa

Donna Rindress PhD, BioMedCom Consultants inc, Canada

Outline

- ❖ Overview
- ❖ MCDA
 - ❖ Decision Criteria
 - ❖ Weighting techniques
 - ❖ Scoring scales
 - ❖ Mathematical model & qualitative considerations
- ❖ Applications
- ❖ Advantages & challenges
- ❖ Future developments

Overview

❖ EVIDEM Collaboration

- ❖ **Not-for profit** independent legal entity
- ❖ **Object:** promote health and efficient decisionmaking via systematic assessment of evidence and value of healthcare interventions
 - ❖ **Decision making framework tools*** freely available under Creative Commons license
 - ❖ **All rights released** - framework evolved out of a decisionmaking study performed by BioMedCom with a grant from Pfizer Canada
 - ❖ **Collaborative development:**
 - ❖ Tools **regularly updated** based on academic research and pragmatic applications
 - ❖ **Web registry**
 - ❖ **Funding & support:** Canadian Institutes of health Research (CIHR), Pfizer Canada (start up), BioMedCom (in kind)

❖ On-going collaborations

- ❖ Canada, Italy, Netherlands, New Zealand, South Africa, UK, USA
- ❖ Tools used and tested by **government agencies** and **academic centers**



Structuring the natural thinking process

→ **MCDA**

Develop MCDA model Decision criteria?

Defining criteria

❖ **MCDA principles:** criteria should be complete, with minimum overlap, mutually independent, and operationalizable*

→ Elicit from users

→ Use an existing set of criteria & adapt - EVIDEM**

❖ MCDA Core Model

❖ Contextual Tool

*National Economic Research Associated. Multi-criteria analysis manual 2005.
www.communities.gov.uk/pub/252/MulticriteriaanalysismanualPDF1380Kb_id1142252.pdf

5 **Criteria identified from extensive analysis of literature and decisionmaking processes, feedback from users and selected to fulfill MCDA principles**

Defining decision criteria

What should we do for sustainable healthcare systems?

EVIDEM MCDA Core model - 15 universally normative criteria

- ➔ Highest rank or priority should be given to interventions
- ❖ For severe disease (D1)
- ❖ For common disease (D2)
- ❖ For disease with many unmet needs (C2)
- ❖ Recommended in consensus guidelines by experts (C1)
- ❖ Conferring major improvement in efficacy/effectiveness over standard of care (I1)
- ❖ Conferring major improvement in safety & tolerability over standard of care (I2)
- ❖ Conferring major improvement of patient perceived health over standard of care (I3)
- ❖ Either conferring major risk reduction (T1) or major alleviation of suffering (T2)
- ❖ That results in savings in treatment expenditures (E1) as well as other medical and non medical expenditures (E3); *cost-effective (E2)**
- ❖ For which there is sufficient data (Q1), that is fully reported (Q2) and valid and relevant (Q3)

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

Defining decision criteria

What is our context and what can be done?

EVIDEM Contextual tool - 6 criteria

→ Define objectives & priorities - contextual normative criteria

- ❖ Alignment with scope and mission of health care system/plan (Et1)
- ❖ Defining country/institutional priorities for populations & access (Et2)

→ Feasibility criteria

- ❖ Exploring opportunity costs (forgone interventions) and affordability (Et3)
- ❖ Verifying system capacity (e.g., infrastructure, skills) and appropriate use of intervention (O1)
- ❖ Assessing political/historical context (e.g. cultural acceptability, precedence) (O2)
- ❖ Realizing pressures/barriers from healthcare stakeholders (O3)

Clustering decision criteria

EVIDEM framework structure

MCDAs core model

Universally normative criteria

Disease impact (quantitative)

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

Context of intervention

- Clinical guidelines (C1)
- Comparative intervention limitations (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 of intervention (E3)

Quality/uncertainty of evidence

- Adherence to requirements of decisionmaking body (Q1)
- Completeness and consistency of reporting (Q2)
- Relevance and validity of evidence (Q3)

Contextual tool

Context & feasibility criteria (qualitative)

Ethical framework*

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

Other system-related criteria

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

8 *Based on three principles; since often conflicting, clearly identify trade-offs and legitimize decision by engaging a broad range of stakeholders & explaining decision; legitimizing decision is key to provide accountability for reasonableness (A4R)

Decision criteria

Adapting structure

- **Include priorities** defined using the contextual tool as additional criteria of the MCDA Core Model (e.g., vulnerable populations)
- **Transfer** other contextual criteria in the MCDA core model
- **Expand** criteria into subcriteria*

Criteria	Possible sub criteria
E3 Impact on other spending	<ul style="list-style-type: none">•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

- **Remove** criteria

Develop MCDA model

Weight elicitation technique*?

- ❖ Capture individual perspective on relative importance of criteria independently of healthcare interventions
- ❖ No gold standard

→ Simple techniques

❖ EVIDEM

Criteria	Weights				
	Low	←————→			High
Example Disease severity		□1	□2	□3	□4 □5

- ❖ Kepner -Tregoe Analysis (KTA)
 - ❖ Direct point allocation
- More complex
- ❖ Analytical hierarchy process (AHP)
 - ❖ Best/worst scaling
 - ❖ Conjoint analysis
- Adapt to user preference/context

Develop MCDA model

Scoring scale?

- ❖ Measure performance of intervention
- ❖ Need to define:
 - ❖ Type of scale/number of options
 - ❖ Scale anchors for each criteria
- ➔ Simple approach
 - ❖ EVIDEM

Criteria	Scoring scale
Example Disease severity	<input type="checkbox"/> 0 - not severe <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 - very severe

- ➔ More complex (e.g., more scale options, boolean operators for each option)
- ➔ Adapt to user preference/context

Develop MCDA model

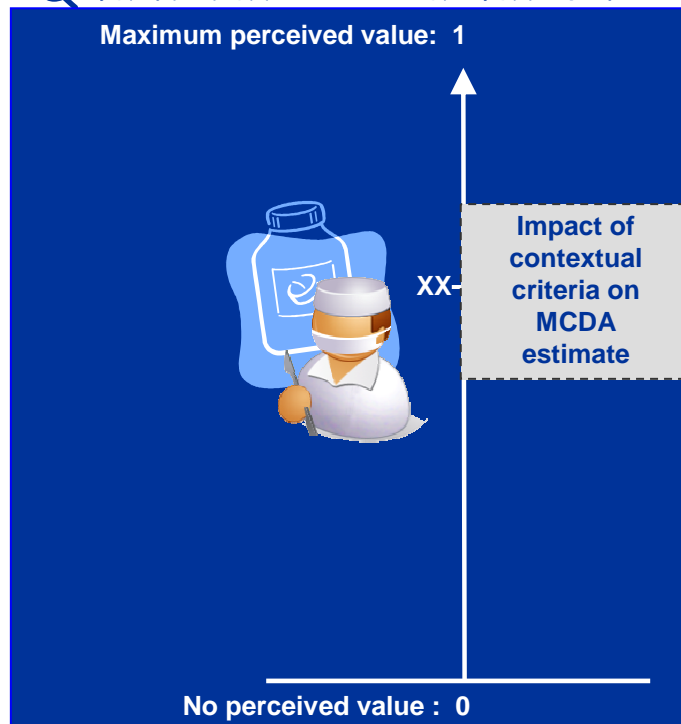
Mathematics & qualitative considerations

Type of mathematical model

- ❖ Simple linear model (combine normalized weights and scores) to calculate perceived value of intervention

Ranking of healthcare interventions

- ❖ Quantitative evaluation



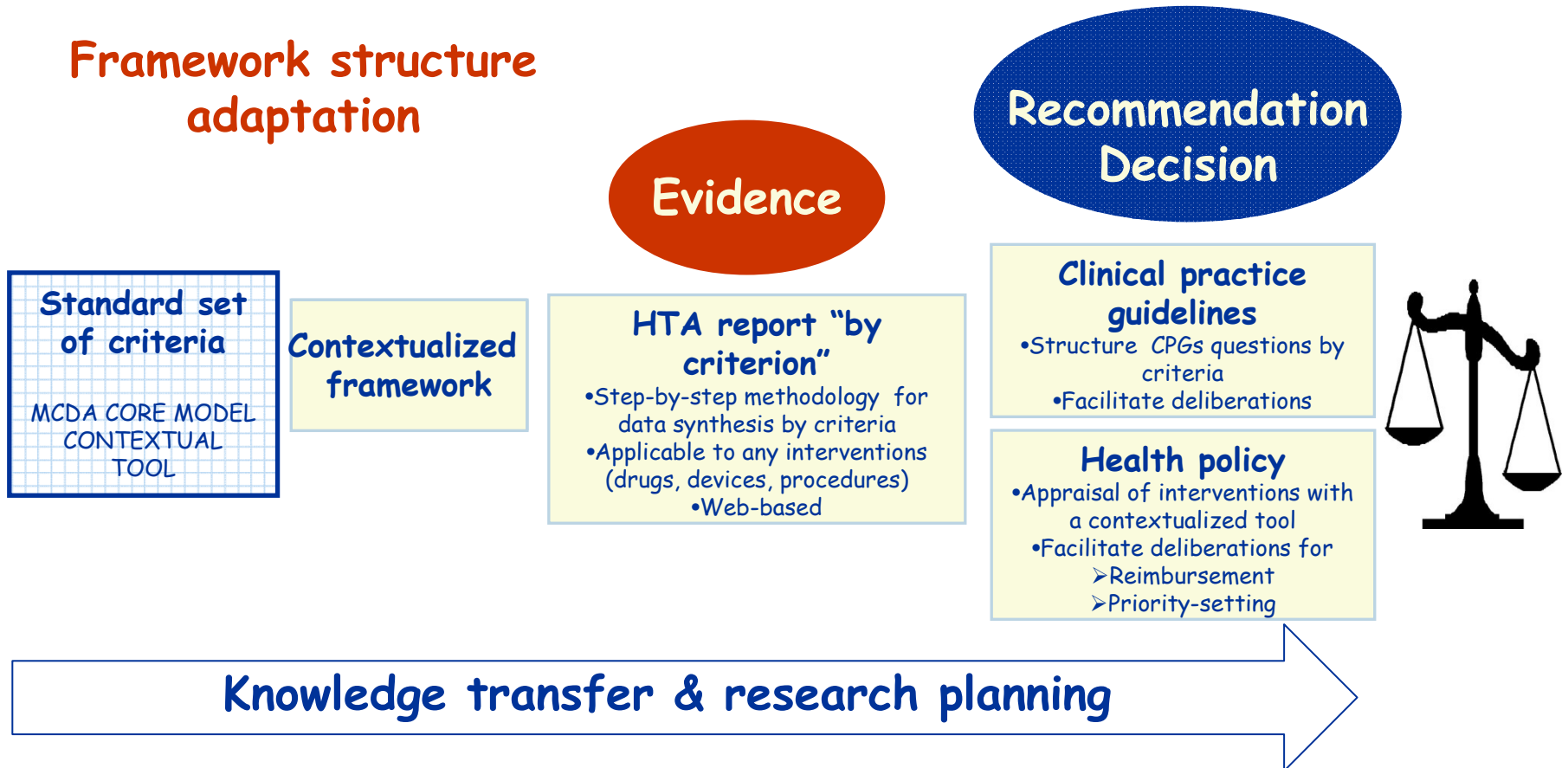
- ❖ Combined with qualitative impact of context

Contextual criteria	Qualitative impact on appraisal/ranking
Example Political/ historical context	<input type="checkbox"/> Negative <input type="checkbox"/> Neutral <input type="checkbox"/> Positive

EVIDEM framework - overview

Applications

Framework structure adaptation



Advantages

- ❖ Identify criteria at play in healthcare decisionmaking
- ❖ Allow simultaneous consideration of a wide range of criteria
- ❖ Stimulate reflection on perspectives, values and priorities
- ❖ Systematize judgment
- ❖ Transparent multidisciplinary evidence in a by-criterion HTA report

Challenges

- ❖ Perception of complexity
- ❖ Integration in existing processes
- ❖ MCDA estimate may be used as a formula
- ❖ Perceived difficulty of breakdown of evidence by criteria

Future developments

- ❖ **Collaborative studies/applications**

 - ⇒ Field testing & implementation

 - ⇒ Methodological development

- ❖ **Web registry**

 - ❖ Interactive open access web resources

 - ➔ Optimize resources, decisions, priority-setting and health

Acknowledgments: Active members for their contribution to the EVIDEM Collaboration

Thank you

www.evidem.org