Multiple Criteria Decision Analysis for Health Care Decision Making—Emerging Good Practices: Report 2 of the ISPOR MCDA Emerging Good Practices Task Force

Most health care decisions are complex and require consideration of multiple, often conflicting objectives. Decision makers, whether they are individuals or committees, often have difficulty processing and systematically evaluating potential treatment options and the numerous disparate factors impacting them.

Multiple criteria decision analysis (MCDA) is a means to improve decision making through use of structured, explicit approaches to decisions. Decision making that occurs in the absence of objective evaluation criteria and processes can result in variability in the factors considered, discrepancies in how the importance of criteria are weighed, and inconsistent choices. Employing structured, explicit approaches that require evaluation of multiple criteria can significantly improve decision making quality.

ISPOR MCDA Emerging Good Practices Task Force

In 2014, ISPOR established an MCDA Emerging Good Practices Task Force to establish a common definition for MCDA and develop good practice guidelines for conducting MCDA to aid health care decision making. The initial MCDA task force report defined MCDA, provided examples of its use in health care, described the key steps, and provided an overview of the principal methods of MCDA.

This second task force report builds on the first, providing emerging good-practice guidance on the implementation of MCDA to support health care decisions, including the eight-step ISPOR MCDA Good Practice Guidelines Checklist, considerations regarding checklist implementation, the resources and skills required to implement MCDA, and future research directions. Consistent with the first report, this guidance is intended to cover a wide range of decisions, including regulatory authorization, health technology assessment (HTA), commissioning decisions/priority setting frameworks, (e.g., patients' access to treatment), hospital decision making, and disease classification, among others.

The ISPOR MCDA Good Practice Guidelines Checklist

The eight-step checklist starts with defining the decision problem and concludes with reporting and examining the findings (Table 1). There are specific recommendations to follow for each step. The full task force report provides detailed guidance on each of the primary recommendations, as well as general guidance regarding the validation process.

Other Considerations When Designing an MCDA

In what order should the steps in an MCDA be undertaken? While

Table 1. The ISPOR MCDA Good Practice Guidelines Checklist.

MCDA Step	Recommendation	Implementation Brief Summary
1. Defining the decision problem	a. Develop a clear description of the decision problem b. Validate and report the decision problem	Determine whether the objective is to rank or value alternatives; whether the decision is one-off or whether a reusable model is required; consider alternatives; stakeholders; and decision constraints, such as budgets.
2. Selecting and structuring criteria	a. Report and justify the methods used to identify criteria b. Report and justify the criteria definitions c. Validate and report the criteria and the value tree	Criteria can be identified in documents describing previous decisions; evaluations to support related decisions; studies of stakeholders' priorities; and treatment guidelines. Effective criteria are marked by completeness, nonredundancy, nonoverlap, and preference independence. Individual criteria should be unambiguous, comprehensive, direct, operational, and understandable.
3. Measuring performance	a. Report and justify the sources used to measure performance b. Validate and report the performance matrix	The method for measuring performance should conform to the broad principles of evidence-based medicine and to local methods guidelines. Often such guidelines will recommend analysis of trial data or network meta-analysis to generate evidence on performance. When such data are not available, expert opinion should be used to fill the data gap.
4. Scoring alternatives	a. Report and justify the methods used for scoring b. Validate and report scores	The objective of scoring is to capture stakeholders' strength of preferences for changes in the performance within a criterion. The selection of the scoring method will depend on a number of characteristics of the decision problem. The full report includes a typology of scoring and weighting methods.
5. Weighting criteria	a. Report and justify the methods used for weighting b. Validate and report weights	The objective of weighting is to capture stakeholders' preferences between criteria. The selection of weighting methods should be made with consideration for the cognitive burden on stakeholders, level of precision required, theoretical foundations, and stakeholder heterogeneity.
6. Calculating aggregate scores	a. Report and justify the aggregation function used b. Validate and report results of the aggregation	The objective of aggregation is to combine scores and weights in a way that is consistent with stakeholders' preferences. The most commonly applied aggregation formula in health care MCDAs is the additive model.
7. Dealing with uncertainty	a. Report sources of uncertainty b. Report and justify the uncertainty analysis	The types of uncertainty that may impact the results of an MCDA should be reported, including imprecise or incomplete model inputs, variability in model inputs, quality of evidence, and structural uncertainty. Two broad approaches to considering the impact on uncertainty are available (ie, including uncertainty as a criterion in the MCDA and sensitivity analysis).
8. Reporting and examining the findings	a. Report the MCDA method and findings b. Examine the MCDA findings	The inputs/outputs of an MCDA can be communicated by the use of several tabular and graphical formats. In the end, MCDA is intended to serve as a tool to help decision makers reach a decision—their decision, not the tool's decision. This can be facilitated by presenting the MCDA model to decision makers and allowing them to explore the results and their sensitivity to inputs.

the checklist could be interpreted as implying a linear process to implementing MCDA, this is rarely, if ever the case. Designing an MCDA is an iterative problem. The authors outline circumstances when it makes sense to diverge from the order of the steps as they are outlined in the checklist.

Another consideration when designing an MCDA is that many health care decisions are subject to budget constraints (including HTA and commissioning) and some shared decision making requires consideration of patient out-of-pocket costs. Accordingly, the report elaborates the implications for undertaking MCDA in the presence of a budget constraint.

Resources, Skills, and Software

The successful implementation of MCDA requires four key participants: (1) *Decision makers* make the choice between alternatives; (2) *Stakeholders* provide the source of scores and weights; (3) *Analysts* are responsible for the design and implementation; and (4) *Experts* provide advice to the other participants. These roles are not mutually exclusive.

Many steps outlined in the MCDA checklist can be supported by specialized software. The software is especially useful for: (1) weighting and scoring, (2) problems that involve relatively large numbers of alternatives and criteria, and (3) the generation of graphical and tabular outputs. Some software packages also support survey development and collection of criteria weights.

Future Research Directions

This report identified several areas for further research, including: (1) the level of precision required of an MCDA; (2) the cognitive challenges facing different types of stakeholders and the support that can overcome these challenges; (3) decision makers' preferences for the theoretical foundations of MCDA methods; (4) which value functions best describe stakeholders preferences; and (5) the best methods for incorporating uncertainty and budget constraints into an MCDA. Finally, the report focuses on value measurement approaches and recommends that further work also be undertaken to ensure that the conditions under which value measurement approaches are appropriate for health care decisions. ■

Additional information:
To view the initial MCDA task force report, go to: http://www.ispor.org/Multi-Criteria-Decision-Analysis-guideline.asp

Spotlight on *Value in Health*

From Volume 19, Issue 2 (March/April 2016):

COMPARATIVE EFFECTIVENESS RESEARCH / HTA

The Use of Economic Evidence to Inform Drug Pricing Decisions in Jordan (pp. 233-238)

This study describes the role of economic evidence in drug pricing decisions in Jordan, an example of a high-priority setting in a developing country where policies laid in place requesting cost-effectiveness evidence in certain situations.

Barriers to the use of economic information and the extent to which the results of economic evaluations in used were investigated. Economic evidence found partially influential in drug pricing decisions but due to poor quality it is unlikely to be the sole driver of decisions. Limited local data and health economic experience were the main barriers for the use of economic evidence in drug pricing decisions. Additionally, there are no official rules describing the elements and process by which the evidence should inform drug pricing decisions.

Accumulated observations for the use of economic evaluations and evidence-based decision making in Jordan were summarized. Recommendations have been proposed to enhance the role of economic evidence in influencing health policies and evidence-based decision making. An Official guideline for conducting pharmacoeconomic evaluations and their use in high priority settings such drug pricing must be developed in Jordan.

For the highlighted articles in *Value in Health* Volume 19, Issue 2, please see page 27.