Question is Not *Whether* but *How* to use MCDA

Rob Baltussen, PhD, Associate Professor, Health Economics, Nijmegen International Center for Health Systems Research and Education (NICHE), Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands

KEY POINTS . . .

Multiple criteria related to efficiency, equity and feasibility should be systematically considered by decision-makers in making reimbursement decisions.

Multi-criteria decision making is one approach to facilitate the joint consideration of multiple criteria by decision makers, the question is no longer whether it should be used but rather how.

MCDA is not a mathematical solution for a political problem as it is not combining numbers, but really combining value judgments.

The following article is based on a presentation given during the Third Plenary Session, "Should Multi-Criteria Decision Analysis (MCDA) Replace Cost-effectiveness Analysis (CEA) For Evaluation of Health Care Coverage Decisions?" at the ISPOR 16th Annual European Congress, 2-6 November 2013, Dublin, Ireland

Introduction

Although cost-effectiveness analysis has long been used for health technology assessment in Europe, Asia, and Africa, these analyses are falling short in addressing the important questions and information requested by policy makers. Cost-effectiveness analysis is only looking at the maximization of health benefits, achieving as much health gains as possible, and ignoring the equity question of who is actually receiving the benefits. In a world with large health inequalities evident in many Asian, African, and European countries, this is not appropriate. There is a growing need to have techniques better than cost-effectiveness analysis available. Are there techniques to combine cost-effectiveness on the one hand, with more sensible techniques, such as equity analysis, on the other? Multi-criteria decision analysis (MCDA) is already popular in the agriculture and marketing domains. Can it be applied in health care? The question is not whether we should apply MCDA, but really the question is how we should apply it. In order to broadly apply MCDA some methodological steps need to be taken.

A decision maker, an important factor for MCDA, typically has to consider a whole cloud of criteria. But in the absence of structured guidance, this may result in ad hoc priority setting. MCDA, supported by a range of analysis, effectiveness, efficiency, equity, and feasibility analysis, can be used to give more structure, to identify criteria, and to systematically assess the performance on those criteria (Fig. 1).

MCDA and How to Approach It

A popular definition of MCDA is an aid to decision making, which makes the impact of multiple criteria on decisions more explicit and the relative importance attached to them. It aims to improve three things, first of which is the quality of decisions by addressing all relevant criteria. We are not only focusing on cost-effectiveness in MCDA, but also on who is actually receiving the benefits, thus reducing health inequalities. Secondly, MCDA aims to improve transparency and accountability of decisions for the population itself, including taxpayers. The last item MCDA aims to improve is the consistency of decisions both over time and across technologies. There are many different approaches to MCDA. On one hand, we have very highly qualitative approaches and on the other hand highly quantitative approaches. In addition there are MCDA methods representing anything and everything in between. The first steps in any MCDA are very similar. The problem must be identified, a consultation

Figure 1. Decision Maker Considerations.

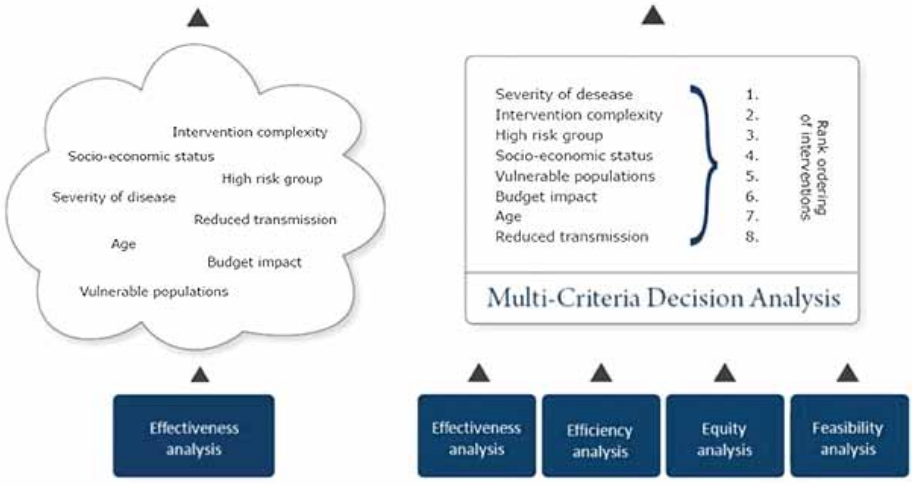

Figure 2. Simplified Performance Matrix.

Interventions	Health gain	Severity of disease	Vulnerable population	Composite score
Treatment of childhood pneumonia	●●●	●●●	●●●	✪✪✪
Inpatient care for schizophrenia	●	●●	●	✪✪
Plasturing for simple fracture	●●	●	●	✪✪
Weights	30%	40%	30%	

panel established (including all relevant stakeholders), relevant criteria must be defined, and interventions in terms of the performance on those criteria must be assessed. The differences arise in how this evidence is interpreted and henceforth summarized.

In a highly simplified example of a performance matrix there are a number of interventions and corresponding criteria, seen in the first row (Fig. 2). This matrix shows how well an intervention performs on criteria.

Looking at treatment of childhood pneumonia, it performs well on health gains, severity of disease, and vulnerable population. Thus, in a qualitative interpretation, the consultation panel looks at this matrix and makes a decision. But in a more quantitative analysis, a highly quantitative analysis, weights are attached to the different criteria. As a principle, let us say health gains count for 30%, severity of disease for 40%, and vulnerable population for 30%. From here you can go one step further and calculate a composite score index. In this example, the treatment of childhood pneumonia would rank first. When looking at a performance matrix the process of deliberation is very important because not everything can be caught in the performance matrix. There will most likely be criteria that cannot be quantified and the members of the consultation panel may wish to discuss their personal interpretation of the matrix.

The Uses of MCDA

The ways in which MCDA can be used is abundant. At the individual level, MCDA has been used for shared decision making between a medical doctor and a patient. At the local level, for the past 10 or 15 years, there has been success in applying MCDA to re-allocation decisions within an organization or program. At a national level, this technique has been used to set priorities in HIV/AIDS control in Indonesia and Thailand, to set general health priorities in Ghana, and similar broad disease control priorities in other countries. There are also many MCDA applications within tools. Some examples include Evidence and Value: Impact on Decision Making (EVIDEM) and 1000Minds software to elicit weights. But the question today is can MCDA also be used for setting specific health care coverage decisions (decisions at the margin)?

Let us draw a general picture on the usefulness of MCDA in western countries (Fig. 3). If you look at the policy framework in those countries, we see that they mention the use of various criteria. These are all kinds of criteria that are being mentioned in policy guidelines in the different countries. It can be seen that cost-effectiveness is mentioned often, like severity of disease and accessibility. But when looked at in detail, it appeared that many of those criteria are rather vaguely defined, which does not allow for the deduction of good decisions on priorities.

So the question is then, can MCDA improve on these policy frameworks? Can it guide those decisions? The current process is very much based on cost-effectiveness analysis while other criteria are taken into account during the process of deliberation. There are two challenges associated with using MCDA to guide decisions. The first challenge is the lack of consensus on accepted criteria. There is a broad consensus on cost-effectiveness analysis and health maximization. Additionally, there is some consensus in countries such as the UK and The Netherlands on the use of severity of disease as criteria. However, for the other criteria there is no certainty. For example, responsibility for one's own health is often mentioned as important for the decision-making process. However, if somebody goes off-piste skiing has an accident and needs a treatment, should that be publically reimbursed? People tend to have differing opinions when questions such as these are posed. Because there is no consensus building a matrix in which they are the backbone becomes quite difficult. The second challenge stems from the fact that even if there is a common consensus on the criteria they remain almost impossible to define. For instance, is the criteria "severity of disease" about present health losses or future health losses? In The Netherlands, this has been a topic of debate for 5 to 10 years on how best to operationalize severity of disease. These challenges make it problematic to develop a performance matrix complete with weights and with composite index scores.

Although there are challenges associated with MCDA, there are already good examples in which elements of MCDA are being utilized. A few countries have made important steps and incorporated important >

Figure 3. Representation of Usefulness of MCDA in Western Countries.

Criteria	Australia	Canada	Denmark	France	Netherlands	UK
Cost-effectiveness	V		V		V	V
Budgetary impact		Vague				
Severity			Vague	Vague	V	V
Availability of alternative		Vague		Vague		
Accessibility	Vague	Vague	Vague			
Affordability to individual					Vague	
Other...	...	...	...	...	...	...

Source: Adapted from Golan et al. Health Policy 2011

Figure 4. MCDA for Coverage Decisions – A Framework.

Has the technology special value because	Relevance	Assessment	
	Yes / no	Quantitative	Qualitative
Severity (.....)			
End of life (.....)			
Lack of alternative treatment			
Vulnerable group (.....)			
Rare disease (.....)			
Intervention complexity (.....)			
Other			

elements of MCDA in their decision making. One example can be found within the National Institute for Clinical Excellence (NICE) in the UK. As many of you know, there is a threshold of £20,000 by quality-adjusted life-year (QALY) gained for public reimbursement of an intervention. There are six special cases identified by NICE, including whether an intervention targets a severe disease or whether it targets an end of life condition. If an intervention meets any of those cases, the threshold may go up to £30,000 pounds. With a strong case this threshold has the possibility of increasing further. In The Netherlands, the use of a scaled threshold has been proposed, between €10,000 and €80,000 by QALY gained by severity of disease. If

MCDA holds the potential to guide coverage decisions leading to improved decisions with increased transparency and consistency.

an intervention treats a mild disease, then the Dutch are only willing to pay €10,000 per QALY. If the intervention treats a very severe disease, the threshold goes up to €80,000 per QALY. With the process of deliberation other criteria are also defined. By being explicit about what criteria counts these are examples associated with elements of MCDA.

In addition to performing a cost-effectiveness analysis, the use of a checklist would be very convenient as a framework for the application of MCDA for coverage decisions (Fig. 4).

This checklist should include tightly defined criteria based on country consensus. Of course the first step is to derive consensus; what do we find important in the public reimbursement of interventions? This can be severity of disease, end of life, and so forth. Within the application of the checklist, the first question is, is this criteria relevant to a certain technology? If yes, the assessment follows, quantitatively if possible, qualitatively if the quantitative analysis is not possible. The key issue is then of course how to come to a decision with all this qualitative and quantitative information readily available. One option would be to use, as in the UK and in The Netherlands, a special cost-effectiveness threshold for different criteria. Of course, there are problems associated with this proposed method if there have several criteria and interactions between thresholds. However, this option may work and has the potential to provide a step forward for many countries.

Conclusions

In conclusion, MCDA holds the potential to guide coverage decisions leading to improved decisions with increased transparency and consistency. MCDA is not a mathematical solution for a political problem as it is not combining numbers, but really combining value judgments. Any application of MCDA for specific coverage decisions is unlikely to be a full quantitative approach because of three reasons. These reasons are the lack of consensus is all criteria, the inability to quantify all criteria, and the necessity of discussion and deliberation. Finally, there is a large need to further develop MCDA. Cost-effectiveness analysis has been around for 40 years, and according to health economists is now mature. MCDA, on the other hand, has only existed for between 5-10 years. Because of this MCDA needs time to grow before an accurate assessment of its relevance can be made. Finally, let's revisit the main question. Should MCDA replace cost-effectiveness analysis? Yes, it is already happening. MCDA is already beginning to be taken into account, but it is doing so in an evolving process. ■