

Three Questions to Ask when Examining MCDA

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KEY POINTS . . .

Criteria are attributes that make an independent contribution to a composite measure of benefit.

Cost-effectiveness is not an attribute of benefit so should not be used as a criterion in MCDA.

The attributes of benefit expected to be lost due to additional costs must be assessed.



The final and most important question is how to account for the attributes lost as a consequence of additional costs.

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

Multi-Criteria Decision Analysis (MCDA) is already being done. In fact, all measures of health-related quality-of-life are a very specific form of MCDA. For example, the EQ-5D is a form of MCDA with six criteria, including length of life and five different attributes of quality in which it might be lived with three performance scores for each. So what is the argument about? Why do we have a problem? In some instances the point of conflict is centered on how some have used MCDA as a mechanism for advocacy around how innovation should to be taken into account within reimbursement decisions. This was certainly true in the Kennedy Review of Innovation for the National Institute of Clinical Excellence (NICE). In examining MCDA, let us try and answer three questions. The first important question is what the criteria are and what ought to be included as attributes in any MCDA? The second question is how might we start to assign weights to performance on those attributes? The third question is very important and is which attributes and aspects of benefit foregone, lost, or displaced as a consequence of additional cost?

Three Questions to Ask When Examining MCDA

Q1: What Criteria to Use as Attributes in MCDA?

Criteria can be defined as attributes of benefit or aspects of social value that we value alongside health gain. It is widely accepted that our current measures of health-related quality-of-life do not capture all socially valuable aspects of health or other effects that are socially valuable. MCDA is an attempt to capture these other items to generate a composite multi-attribute measure of benefit. This might seem obvious, but it tells us what cannot be considered attributes of benefit or criteria. Costs, the additional costs required

to achieve an improvement in composite benefit, cannot be a criteria because they are not an attribute of benefit. Costs are important because they tell us something about the scale and attribute of benefit we will have to sacrifice. In addition, uncertainty, or the quality of evidence, is not a criteria or an attribute of benefit. Uncertainty measures how doubtful we might be achieving the "expected" net improvements of the item in question. This uncertainty needs to be assessed in order to determine whether or not more evidence is needed to support the decision and whether approval should or shouldn't be held until that evidence is acquired.

Questions to ask when examining MCDA:

1. Which criteria might be included and how could performance be measured and scored?
2. How can weights be assigned to performance on each of the criteria?
3. What attributes of benefit are lost due to additional costs?

Criteria or attributes should be clearly defined and based on generally accepted principles. Each criteria or attribute should make an independent contribution to benefit. Any substantial overlap runs the risk of double counting the same aspects of benefit. The means of measuring performance against each attribute should be pre-specified, including what evidence would support particular performance scores. It should be made very clear that performance scores are not equivalent to weights. No matter how much effort is put into identifying attributes and defining how performance should be measured, a complete description of all aspects of social value will not be possible. Which criteria are important and how they should be measured is disputed so accountable deliberation will still be necessary.

Q2: How Can Weights Be Assigned To Performance For Each Criteria?

If these are criteria and attributes, what

about the weights that we might assign? How should we assign them? Some have suggested that they might emerge during the decision-making process. Unfortunately, that method will prove to be quite difficult in terms of achieving any kind of predictability, consistency, and accountability. Relying on weights to emerge during the decision-making process also provides a danger of strategic behavior in which scientific and social value judgments can become mixed. The same is true when looking at sensitivity and threshold analysis. Should we simply add our performance scores, as some have suggested? This tends to confuse scientific questions of performance with those of relative social value. It would imply an equal and additive relative weight, which would seem inappropriate in most cases. To achieve some level of predictability, consistency, and accountability the weights associated with criteria performance should be pre-specified and based on other sources of information and data. In other words, choice-based expressed preference. How much are you willing to give up of one attribute to achieve an improvement on another? This same issue is posed in health-related quality-of-life (HRQoL) measures.

Who should provide the weights? Because they will most likely be disputed the “who” and the “how” is quite important. It should be an inclusive deliberative process. Perhaps it should be a process decided upon by the general public or patients. General public involvement may result in the same issues encountered when trying to establish a tariff for HRQoL measures. What about the economic effects outside the health care system, things that impact on private consumption? The relative weight attached to these external effects

is not a directly expressed preference, but rather is implied by the answer to the question, “what is the equivalent health care system resource of a change in private consumption?” In the UK, the ratio might be about 3 to 1. In other words, one National Health Service (NHS) pound is worth about three private consumption pounds. Why? We know something about the cost-effectiveness threshold for the NHS, and we know something about how much people are willing to pay for their health out of private consumption. The threshold seems to be substantially lower than individual’s willingness to pay to improve their own health, reflecting the relative scarcity of resources available for public expenditure.

So how these weights should be used? Simply put, the linear aggregation or the sum of weighted scores is likely to be inappropriate. It assumes additive separability and is not acceptable in other contexts, such as in measures of health-related quality-of-life. It poses a particular problem when those attributes slightly overlap, causing problems of double counting. Let us attempt to illustrate this by thinking about the EQ-5D. We have five dimensions with three levels of performance. We do not assign a weight to 5 dimensions and then add them up, nor do we assign a weight to the 15 combinations of performance across the 5 dimensions and use that as the tariff to create a quality-adjusted life-year (QALY). What we have done is to estimate a tariff for all the possible combinations that define each health state, quite a considerable task. Even so assumptions about constant proportional time trade-off, independence, and constancy of risk attitude are still required when we try and create a QALY or a profile. Therefore, the task is considerable

and if we do not do this properly instead of making decisions that improve our composite measure of benefit, which better represents society’s preferences, we may actually reduce it.

Q3: What Attributes Of Benefit Are Lost Due To Additional Costs?

The final and most important question is how to account for the attributes lost as a consequence of additional costs. Can we account for these attributes of benefit forgone by including the ICER in MCDA as criteria? No, we cannot. Cost-effectiveness and cost are not attributes of benefit. To account for the additional cost required to improve the composite measurement benefit requires an assessment of the attributes of the benefit given up as a consequence of these costs. Including cost-effectiveness as a criteria cannot do this and is likely to lead to decisions that reduce both health overall and the other attributes of benefit that originally motivated the use of MCDA.

How should weights be established?

- Emerge during decision-making process
- Sensitivity/threshold analysis
- Summation of performance scores
- Pre-specified based on other studies

What happens if we cannot estimate how much of an attribute will be displaced as a consequence of additional costs? It can be argued that if you cannot estimate this loss, then you cannot use it as an attribute on the benefit side as it will not be fully defined. Including it as a benefit but not reflecting it in assessment of opportunity costs runs the risk of reducing rather than increasing these aspects of benefit. An exception might be if it is believed that an attribute is particularly ‘rare’ so is unlikely to be displaced or lost as a consequence of imposing additional costs. If we can account for opportunity cost on all attributes then it is possible to compare the attributes of a proposed investment with the attributes of the expected disinvestment required, then we can represent decisions in terms of net composite benefit. One example of evaluating the attributes of investment and disinvestment is based on the appraisal of ranibizumab for diabetic macular oedema in 2011, for the subgroup >

Figure 1. Example Evaluating Attributes of Investment and Disinvestment

Appraisal Information					
Deaths	LYs	QALYs	Burden (QALYs pp)	Wider social benefits (Consumption) (QALYs)	
0	0	3,200 (6,005)	?	?	?
Expected Attributes lost					
Deaths	LYs	QALYs (QALYs pp)	Burden	Wider social benefits (Consumption) (QALYs)	
295	1,337	4,367	2.07	£49,783,800	830

of patients with the thicker retinas (Fig. 1). The attributes of benefit for the eligible population for this subgroup per year in the NHS is 3200 QALYs based on the NICE assessment of the ICER or just over 6000 based on the manufacturers. This appraisal has no associated deaths or life-year effects and the burden as well as the impact on wider social benefits such as care cost and productivity was not reported. Approval at the price without the patient access scheme would cost the NHS £80 million each year.

Attributes of Investment and Distribution

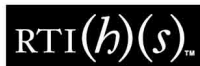
What would we expect to see in terms of attributes that will be foregone? Based on the threshold work and the other work that has been done for value-based pricing in the UK, we would expect 295 deaths, 1337 life years to be lost and 4367 QALYs. On average, each patient giving up their health will face a burden per patient of about two QALYs. The impact of the wider social benefits is about £50 million when valued in consumption or about 830 QALYs when expressed in health equivalent. As this example suggests, if we are going to add things on the benefit side, such as burden of disease and wider social benefits, we need to make sure they can be included on the opportunity cost side. Keeping this in mind will allow accountable, predictable, and coherent decisions to be made. ■

WEB CONNECTIONS

How often do you connect to the internet to conduct a literature search? Whether your question is simple or complex, there are many sources that one can use for searches. One suggestion is to use the National Cancer Institute’s Division of Cancer Control and Population Sciences, **Cancer Genomics and Epidemiology Navigator (CGEN)** (<http://epi.grants.cancer.gov/cgen/>). CGEN is a searchable database that has linked information on the NCI-funded active and inactive grants by the Epidemiology and Genomics Research Program, peer-reviewed publications that are linked to EGRP grants, and evidence-based cancer genomic tests resulting from NCI’s Division of Cancer Epidemiology & Genetics (DCEG) and Cancer Human Genome Epidemiology (HuGE) Literature Finder. CGEN is a wonderful and easy to use oncology resource.

Do you know of any websites that you would like to share with the ISPOR community? If so, contact Bonnie M. Korenblat Donato, PhD, at: bonnie.donato@bms.com.

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