VALUE IN HEALTH ▮ (2017) ▮▮▮–▮▮▮

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/jval

The Use of MCDA in HTA: Great Potential, but More Effort Needed

Kevin Marsh, PhD[1,*], *Mark Sculpher, PhD*[2], *J. Jaime Caro, MDCM, FRCPC, FACP*[3], *Tommi Tervonen, PhD*[1]

[1]*Evidera, London, UK;* [2]*Centre for Health Economics, University of York, UK;* [3]*Evidera, Waltham, MA, USA; McGill University, Montreal, PQ, Canada*

ABSTRACT

The potential for multi-criteria decision analysis (MCDA) to support health technology assessment (HTA) has been much discussed, and various HTA agencies are piloting or applying MCDA. Alongside these developments, good practice guidelines for the application of MCDA in health care have been developed. An assessment of current applications of MCDA to HTA in light of good practice guidelines reveals, however, that many have methodologic flaws that undermine their usefulness. Three challenges are considered: the use of additive models, a lack of connection between criteria scales and weights, and the use of MCDA in economic evaluation. More attention needs to be paid to MCDA good practice by researchers, journal editors, and decision makers and further methodologic developments are required if MCDA is to achieve its potential to support HTA.

Keywords: multi-criteria decision analysis, health technology assessment, reimbursement, good practice.

Multi-criteria decision analysis (MCDA) is proposed as part of health technology assessment (HTA) because it offers the means to consider a more comprehensive set of benefits compared with conventional HTA methods while still summarizing these benefits in a single number. MCDA has been adopted or piloted by various HTA agencies, including those in Germany [1], Italy [2], Hungary [3], Colombia [2], and Thailand [4]. Although MCDA has the potential to make a significant contribution to HTA, we are concerned that it is failing to do so because applications are ignoring some key principles. We focus on three challenges: the use of additive models, a lack of connection between criteria scales and weights, and the use of MCDA in economic evaluation. Many of the concerns raised are already recognized in the literature [5,6]. This commentary highlights and illustrates the implications of these concerns through a discussion of a recent application of a well-known MCDA for HTA,* the EVIDEM framework [7] (from here on referred to as "the illustration"; see Table 1 for more detail), but the concerns are applicable to many examples of MCDA in HTA.

The Use of Additive Value Models

By far the most prevalent model adopted for HTA MCDAs is the additive one [6]. This involves a simple weighted sum of the criteria scores. An additive model is analytically simple, facilitating implementation and transparency, but it requires that the criteria do not overlap (otherwise there will be inappropriate double-counting of value) and are preferentially independent (the weight attached to one criterion should not depend on the performance on other criteria).

Unfortunately, many applications of the additive model in HTA violate these requirements. For instance, in the illustration (see Table 1) overlap results from the inclusion of cost-effectiveness alongside other cost and effectiveness criteria. Over 40% of MCDAs designed to support "coverage or reimbursement" decisions include this overlap [8]. The overlap between these two criteria would be avoided by removing one of them from the MCDA. However, here, we advocate removing both of them.

Another source of overlap in the illustration is the inclusion of both "improvement in patient-reported outcomes (PROs)" and "improvement in efficacy or effectiveness." Although PROs may provide extra information on outcomes of importance to patients, combining this additively with efficacy or effectiveness requires that the weights attached acknowledge the overlap. The weight attached to "improvement in PROs" must reflect only the extra value associated with this criterion, over and above that already captured in "improvement in efficacy or effectiveness." Eliciting such complex weights would put significant additional cognitive burden on stakeholders. In the presence of such overlap, good practice guidelines recommend restructuring the criteria set, which can involve redefining or removing criteria [6]. If the overlap cannot be completely avoided, the MCDA can be run more than once, each time just including one of the overlapping criteria, to test whether the different designs generate the same result [6].

Conflicts of interest: The authors have indicated that they have no conflicts of interest with regard to the content of this article.

* Address correspondence to: Kevin Marsh, Metro Building, 6th Floor, 1 Butterwick, London, W6 8DL, UK. Tel: +44 (0)208 576 5025.
E-mail: kevin.marsh@evidera.com

1098-3015$36.00 – see front matter

http://dx.doi.org/10.1016/j.jval.2017.10.001

Table 1 – Example of the EVIDEM framework.

Criterion	Definition	Scale	Normalized weight*
Relevance and validity of evidence	Extent to which evidence on the proposed intervention is relevant to the decision-making body (in terms of population, disease stage, comparator interventions, outcomes, etc.) and valid with respect to scientific standards (i.e., study design, etc.) and conclusions (agreement of results between studies).	Low (0) – High (+3) relevance /validity	0.076
Completeness and consistency of reporting	Extent to which reporting of evidence on the proposed intervention is complete (i.e., meeting scientific standards on reporting) and consistent with the sources cited.	Many gaps/inconsistent (0) – Complete and consistent (+3)	0.072
Impact on other spending	Impact of providing coverage for the proposed intervention on other expenditures (excluding intervention cost), such as hospitalization, specialist consultations, adverse events, long-term care, disability costs, lost productivity, caregiver time, etc.	Substantial additional other spending (0) – Substantial reduced spending (+3)	0.061
Cost-effectiveness of intervention	Ratio of the incremental cost of the proposed intervention to its incremental benefit compared with alternatives.	Not cost-effective (0) – Highly cost-effective (+3)	0.068
Budget impact on health plan	Net impact of covering the intervention on the budget of the target health plan (excluding other spending). Limited to cost of intervention (e.g. acquisition cost, implementation and maintenance cost).	Substantial budget impact (0) – Substantial budget reduction (+3)	0.057
Type of medical service	Nature of the clinical benefit provided by the proposed intervention at the patient level (e.g., symptom relief, prolonging life, cure).	Minor service (0) – Major service (+3)	0.067
Public health interest	Risk reduction provided by the proposed intervention at the population level (e.g., prevention, reduction in disease transmission, reduction in the prevalence of risk factors).	No risk reduction (0) – Major risk reduction (+3)	0.072
Improvement of patient reported outcomes	Capacity of the proposed intervention to produce beneficial changes in patient-reported outcomes (PROs) (e.g., quality of life) compared with alternative interventions.	Worse PRO (–3) – Major improvement (+3)	0.082
Improvement of safety and tolerability	Capacity of the proposed intervention to produce a reduction in intervention-related harmful or undesired health effects compared with alternative interventions.	Lower safety/tolerability than comparators presented (–3) – Major improvement in safety/tolerability (+3)	0.070
Improvement of efficacy/ effectiveness	Capacity of the proposed intervention to produce a desired (beneficial) change in signs, symptoms or course of the targeted condition compared with alternative interventions	Lower efficacy/effectiveness (–3) – Major improvement in efficacy/ effectiveness (+3)	0.086
Comparative interventions limitations	Shortcomings of comparative interventions in their ability to prevent, cure, or ameliorate the condition targeted	No or very minor limitations (0) – Major limitations (+3)	0.074
Clinical guidelines	Concurrence of the proposed intervention with the current consensus of experts on what constitutes state-of-the-art practices	No recommendation (0) - Strong recommendation (+3)	0.067
Size of the population affected by the disease	Number of people affected by the condition (treated or prevented by the proposed intervention) among a specified population at a specified time	Very rare disease (0) - Common disease (+3)	0.063
Disease severity	Severity of the health condition with respect to mortality, disability, impact on quality of life, clinical course (i.e., acuteness, clinical stages).	Not severe (0) - Very severe (+3)	0.080

Adapted from Wahlster P, Goetghebeur M, Schaller S, et al. Exploring the perspectives and preferences for HTA across German healthcare stakeholders using a multi-criteria assessment of a pulmonary heart sensor as a case study. Health Res Policy Syst 2015;13:24; https://www.evidem.org/evidem-framework/.

* A five-point weight elicitation technique was used (1 = low importance; 5 = high importance). The average of stakeholder weights was used in the MCDA.