Abstract

Objectives: Multiple-criteria decision analysis (MCDA) comprises a set of methods that explicitly considers multiple criteria in decision-making environments. Formally structuring complex problems appropriately and considering multiple criteria explicitly is expected to lead to more informed and transparent decisions. MCDA methods are increasing in popularity however existing instruments do not reflect local decision making needs. ZRx MCDM was developed as a highly flexible tool to support the local adaptation of MCDA methods. For this example seven decision-makers applied inter-criteria weights using visual analogue scale (VAS). Results: Applying the Simple Linear Adaptive Model (SLAM) method, the decision-making criteria as ranked in order of importance were safety, budget impact, cost-effectiveness and unmet medical need (equal third), patient preferences and strategic considerations. Global scores calculated for Aranesp were marginally higher than for the biosimilar (0.52 vs 0.51), whereas Procrut (0.46) scored lower. When the Multi Attribut Value Theory (MAVT) method was used, total score differentiation became more pronounced: Aranesp, Biosimilar and Procrut (0.57, 0.50 and 0.46). Conclusions: ZRx MCDM tool has been successfully applied in a local decision-making context not relying on, or promoting, predefined criteria, level definitions and weighting/aggregation methods, the tool is fully flexible and adaptive to high precision local decision making needs and preferences.

RESULTS: SLAM (Simple Linear Adaptive Model) is the most commonly applied value-based model in HTA and was the first of the aggregation methods implemented by the ZRx MCDM tool. Its application essentially involves three key steps. The first is to construct a partial value function for each criterion. This value function measures decision makers’ intensity of preference between levels on the scale used to measure performance. The second step is to assess the relative importance of each of the criteria. In applying the SLAM method criteria weights are recalculated to coefficients with sum=1. The third step is to combine the partial values and weights by following an additive aggregation mechanism.

The need to fine tune weights and performance values according to the specific needs of the decision is the reasoning behind the next method applied by the ZRx MCDM tool – MAVT, or Multi Attribut Value Theory. MAVT and SLAM both share the same aggregation model. However, MAVT allows for taking into account the impact of uncertainty on the decision. In MAVT a swing related approach is used to capture both the scale and relative importance of the criteria. In terms of definition an attribute weight indicates the importance a particular criteria relative to the total multi-attribute value function. Swing weights capture how important the attributes swing in values (from worst to best) is related to the swings in values for other attributes under consideration. Where as with the initial SLAM analysis weights are recalculated to coefficients with sum=1 in MAVT many numbers are used as swing weights and the software recalculates coefficients automatically.

When Multi Attribut Value Theory (MAVT) method was applied in the case example, total score differentiation among the three alternative treatments became more pronounced (Table 2): Aranesp, Biosimilar and Procrut (0.57, 0.50 and 0.46).

Thus, based on the above analyses the decision makers in this particular local context would likely choose Aranesp as the most attractive first line treatment for the management of anemia associated with chronic kidney disease.

CONCLUSIONS: ZRx MCDM tool has been successfully applied in a local decision making context. By not relying on, or promoting, pre-defined criteria, level definitions and weighting/aggregation methods, the tool is fully flexible and adaptive to high precision local decision making needs and preferences.

INTRODUCTION: In certain complex decision-making environments, such as with formulary listing or portfolio optimization decisions, there is likely to be significant benefit in formally structuring the decision problem and explicitly defining and evaluating the multiple criteria (sometimes conflicting) that need to be weighted in making a particular decision. Formally structuring complex problems appropriately and considering multiple criteria explicitly is expected to result in more informed, transparent and consistent decisions.

Multiple-criteria decision analysis (MCDA) comprises a set of methods (or techniques or approaches) that explicitly consider multiple criteria (or attributes) in decision making and allows them to be combined in a single appraisal1. The aim in applying MCDA is to help decision-makers explore the problem with which they are faced and eventually to decide on a preferred course of action. It is important to recognize that the application of MCDA helps decision-makers to structure their exercise of judgement but the methods do not remove the need for judgement itself2.

The use of MCDA in healthcare is steadily increasing and there are already software programs available to support its application3. However existing instruments are rigid and do not reflect local decision making needs and preferences. In order to address this issue ZRx Outcomes Research Inc. has developed a highly flexible user-friendly decision support tool called ZRx MCDM4. The tool has been designed to support the local application of MCDA in health care in an efficient and effective manner and has been developed based on published and established MCDA methods.

In order to conduct an analysis using the ZRx MCDM tool key information relevant to the decision problem needs to be added by the registered user. Once this has been done the various MCDA methods can then be applied as provided. These generate a global aggregated or overall estimate of value (net value or pay-off) (or rank) for each alternative being compared.

The objective of this analysis is to illustrate the core features of the ZRx MCDM tool through the evaluation of three alternatives for the management of anemia associated with chronic kidney disease: Procrut, Aranesp and a Biosimilar (Epogen Zeta).

METHODS: In applying MCDA methods users are initially required to define the decision problem, including the objectives of the analysis and the alternatives being compared. In this case example a seven-member local formulary committee wanted to understand which of the three alternative treatments for chronic kidney disease offered the greatest value and thus could be recommended as first line therapy.

Next, the performance criteria on which to compare the alternatives needs to be defined. Typically criteria should be as comprehensive as possible and each criterion as defined should be independent. Those criteria specified by the committee as most relevant to the decision were safety, budget impact, cost-effectiveness, unmet medical need, patient preferences and strategic considerations. These six criteria were ranked and subsequently weighted by the committee according to their relative importance to the overall decision.

Third, how to measure the performance of each of the criteria was defined. Direct rating methods using a visual analogue scale (VAS) were chosen. For the purpose of informing the performance measurement, decision-makers were provided with key information from the scientific literature, which they could combine with local experience. The ratings were collected via an online survey.

The above information was entered into the ZRx MCDM tool and the analyses conducted - as per the different MCDA calculation methods applied by the tool – first of all to generate an overall estimate of value for each alternative and secondly, to generate relative performances between the alternatives and these values, and their interpretation. The findings were subsequently validated against stakeholder expectations.

References: