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**Choice-based Conjoint
Analysis – pilot project to
identify, weight, and prioritize
multiple attributes in the
indication “hepatitis C”¹**

Executive Summary

¹ Translation of the executive summary of the working paper *Wahlbasierte Conjoint-Analyse – Pilotprojekt zur Identifikation, Gewichtung und Priorisierung multipler Attribute in der Indikation Hepatitis C* (Version 1.1; Status: 23 July 2014). Please note: This translation is provided as a service by IQWiG to English-language readers. However, solely the German original text is absolutely authoritative and legally binding.

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This report was prepared in collaboration with external experts. According to § 139b (3) No. 2 of Social Code Book (SGB) V, Statutory Health Insurance, external experts who are involved in the Institute's research commissions must disclose "all connections to interest groups and contract organizations, particularly in the pharmaceutical and medical devices industries, including details on the type and amount of any remuneration received." The Institute received the completed form "Disclosure of conflicts of interest" from each external expert. The information provided was reviewed by a Committee of the Institute specifically established to assess conflicts of interests. The information on potential conflicts of interest provided by the external experts is presented in Appendix F of the full working paper. No conflicts of interest were detected that could endanger professional independence with regard to the work on the present commission.

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Background: Health economic evaluation, efficiency frontier, and consideration of patient preferences

The *General Methods for the Assessment of the Relation of Benefits to Costs* pursuant to § 35b Social Code Book (SGB) V were prepared by IQWiG in collaboration with an international expert panel and published in the autumn of 2009. The efficiency frontier method is presented in this document. To generate an efficiency frontier, benefits and costs of preferably all alternative health technologies in a therapeutic indication are recorded. The most efficient technologies according to benefits and costs then form the so-called efficiency frontier. Pursuant to IQWiG's methods, the efficiency frontiers are initially generated specifically for each outcome. To enable aggregation of the results of the outcome-specific efficiency frontiers (i.e. to determine a measure of overall benefit) the results can be weighted and aggregated based on patient preferences.

On the benefit side, the requirements for the generation of an efficiency frontier are study results assessed following the criteria of evidence-based medicine (EbM). In this context, results of patient-relevant outcomes are considered. In accordance with §35 SGB V, patient-relevant outcomes are primarily outcomes that represent an effect on mortality, morbidity, and health-related quality of life of patients.

As patients are the “end-consumers” of health technologies and services, the consideration of patient preferences within health technology assessments (HTAs) themselves, as well as within HTA-based decision processes (e.g. reimbursement decisions), is of great importance. In many countries HTA institutions therefore regularly involve patients in HTA processes, but often still in a purely qualitative manner. Quantitative approaches for measuring patient preferences, such as the Conjoint Analysis (CA), have so far not been used on a regular basis. In the described application of the efficiency frontier concept at IQWiG, there is the possibility of aggregating outcome-specific results by means of weights based on patient preferences. These preferences can be elicited with different methods of multi-criteria decision analysis (MCDA) such as the CA.

Furthermore, the following condition applies for the efficiency frontier concept: the benefit values³ on the ordinate must be measured (approximately) on a cardinal scale. However, no transformation method has been described so far, in particular for transforming metrical effect measures into cardinally scaled benefit values.

The present pilot project on the treatment of hepatitis C uses attributes (partly also named outcomes) that do not necessarily correspond to patient-relevant outcomes pursuant to SGB V (i.e., outcomes describing morbidity, mortality, and health-related quality of life). As the aim of the pilot project was to test a method to identify, weight, and prioritize outcomes, it cannot

³ Benefit value: Value which, on the basis of choices, arises as the weight for individual attributes and consequently for individual alternatives.

be concluded from the language used that IQWiG would regard the attributes applied to represent (patient-relevant) outcomes in the event of a benefit assessment.

Research objective

In this pilot project it was examined to what extent the (choice-based) CA can be applied in health economic evaluations in Germany in the identification, weighting, and prioritization of multiple patient-relevant outcomes. The possibilities of application were examined using the example of chronic hepatitis C and its forms of treatment (antiviral therapy).

Methods

In a discrete choice experiment (DCE), the choice-based variation of CA, patients and healthcare professionals involved in their treatment were questioned. In this context, in questionnaires participants in each case had to choose between 2 (fictitious) treatment alternatives that were composed of various treatment characteristics (attributes, e.g. outcomes) and that differed according to the levels of the characteristics. These fictitious differences between the characteristics of the treatment alternatives are based on real treatment effects; however, they are presented as scenarios of choices combined theoretically.

The participants then decided on one of the two alternatives. The preferences for treatment attributes can be elicited and weightings determined on the basis of these choices.

The results of all of these choices were analysed using logistic regression models. The relative importance (weighting) of the individual treatment attributes can be derived with this procedure. Furthermore, in the regression analysis the approximate cardinality of the weights determined for each level of an attribute was tested (testing of the linearity assumption) for presentation in the efficiency frontier, and the influence of heterogeneous patient preferences (impact of subgroup effects) was examined.

Results

Weighting of patient preferences

Seven attributes were considered in the present DCE on the treatment of chronic hepatitis C. The coefficients (weights) were determined and converted into odds ratios (ORs); the ORs express the odds that a choice is based on a certain attribute in relation to a choice based on all other attributes. The analysis produced weightings in the following sequence for the attributes “sustained virological response 6 months after end of treatment” (coefficient: 0.804, 95% confidence interval [CI] [0.753; 0.855], OR: 2.235, 95% CI [2.123; 2.351]), “frequency of administration of medication” (coefficient: 0.297, 95% CI [0.251; 0.342], OR: 1.345, 95% CI [1.285; 1.408]), “duration of antiviral therapy” (coefficient: 0.250, 95% CI [0.204; 0.296], OR: 1.284, 95% CI [1.226; 1.344]), “probability of mental adverse effects” (coefficient: 0.186, 95% CI [0.140; 0.232], OR: 1.204, 95% CI [1.150; 1.261]), “probability of gastrointestinal complaints” (coefficient: 0.123, 95% CI [0.078; 0.169], OR: 1.131, 95% CI [1.081; 1.184]), “probability of skin problems and/or hair loss” (coefficient: 0.105, 95% CI [0.060;

0.151], OR: 1.111, 95% CI [1.062; 1.163]), and “persistence of flu-like symptoms after the injection” (coefficient: 0.105, 95% CI [0.060; 0.151], OR: 1.111, 95% CI [1.062; 1.163]).

Approximate cardinality of patient preferences

A linear increase in the difference in value across the attributes used can be demonstrated for the attributes “sustained virological response 6 months after end of treatment”, “persistence of flu-like symptoms after the injection”, “probability of gastro-intestinal complaints”, and “probability of mental adverse effects”. A linear course cannot be assumed for the attribute “probability of skin problems and/or hair loss”.

Heterogeneity of patient preferences

Subgroup effects could be found in the evaluation of heterogeneity of patient preferences, especially in the 3 most highly rated attributes: “sustained virological response 6 months after end of treatment”, “duration of antiviral therapy”, and “frequency of administration of medication”. These effects were demonstrated for the model variables sex, age, marital status, school-leaving qualification, occupational position, net income, fibrosis stage, genotype, year of first diagnosis, and status after antiviral therapy.

Patient preferences versus opinions of healthcare professionals

As healthcare professionals are often consulted in the assessment of treatment alternatives, it was recorded in parallel whether the importance of attributes was evaluated differently by patients and healthcare professionals.

Overall it can be concluded for the pilot project that the sequence of weighting is highly congruent, whereas the magnitude of weighting differs between attributes. There are also differences in the sequence of weighting for the attributes “duration of antiviral therapy”, “probability of mental adverse effects”, and “frequency of administration of medication”.

Conclusion

The questions to be investigated with the CA method could be answered by means of the present pilot project:

- For patients it was shown that it was feasible to weight patient-relevant outcomes via a DCE. It is thus basically possible to use this method of preference measurement. It can especially be used to determine weights for patient-relevant outcomes that are to be considered in the efficiency frontier concept.
- In addition, it could be shown that the linearity assumption can be tested with this method. The approximate cardinality can thus be examined for the calculation of benefit-value-based efficiency frontiers on the basis of clinical effect measures.
- Statistically significant differences in the weighting of attributes could be determined for 5% of the variables examined. However, it remains unclear whether this is a random finding. In addition, the interpretation of these results within the pilot project is insofar unclear, as the impact of actual choices in the event of treatment alternatives was not examined.
- In the comparison of patient preferences and opinions of healthcare professionals, the sequence was the same for 4 of the 7 attributes; however, the magnitude of the weighting deviated for further attributes. But how this would actually affect treatment decisions was not the subject of the present pilot project and can thus not be answered.

Apart from these specific findings and the resulting possibilities of application, the CA method can also be applied to other questions, for example, which outcomes should primarily be considered in future clinical studies, which ones should be considered to a lesser degree, and which ones should possibly not be considered at all. However, some methodological issues still need to be solved, but this was not the subject of the present pilot project, which initially was to examine the general applicability of the method in patients and healthcare professionals in the context of the German healthcare system.

Keywords: Conjoint Analysis, decision support techniques, hepatitis C, patient preference, pilot projects