Patient preferences and HIV drugs: what about uncertainty?

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Objectives
Quantitative patient preferences are increasingly considered for healthcare policy decisions. The objective of this study is to develop a methodology to combine patient preferences with clinical evidence in a multi-criteria framework that takes into account uncertainty in both preferences and clinical evidence. The methodology is illustrated with a case on antiretroviral treatments.

Case on treatments for HIV

Part-worth utility

Performance estimate of drug, e.g., probability of cure

Preference estimate, e.g., the added utility of 1% more probability of cure

Part-worth utility that is yielded by the performance in (1) for a patient with the preference in (2)

Probability distribution of the performance of the drug

A performance sample from the performance distribution

Probability distribution of the preferences of the patient (population)

A sampled preference representing an individual patient

Part-worth utility that corresponds to the samples in steps (5) and (7)

Repeating this process a large number of times in a Monte Carlo simulation yields a distribution of the part-worth utility of a drug

Steps (1) through (9) are repeated per treatment for each attribute and the results are summed to obtain the probability distribution of each treatment's utility.

Description
Treatments under consideration are eight highly active antiretroviral therapies (HAART) recommended for treatment-naïve patients by the National Institute of Health [1]. The treatments are compared on the probabilities of virologic failure, hyperosmolarity reaction, bone damage, and kidney damage; and on the treatability of bone/kidney damage.

Preference data
Preferences were with a discrete choice method in an earlier study [2]. The study population were 147 treatment-naïve African Americans who were HIV-positive. Preferences were assumed to be distributed with a multivariate normal distribution.

Data on clinical performance of treatments
Clinical evidence was derived from clinical trials cited by the NIH guideline. Clinical performance on the probability of events was modelled with beta distributions. The ω parameter was set to the number of events in clinical trials, and the θ parameter was set to n − ω, where n is the total sample size in the study. Bone damage was assumed to be treatable, while renal events (renal failure) was assumed to be not treatable. For Tenofovir/Etravirine, bone mineral density loss >5% was used as surrogate for bone damage. Elvitegravir was used as surrogate measure of allergic reaction for Elvitegravir/Cobicistat.

Source data tables

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Virologic failure</th>
<th>Hyperosmolarity reaction</th>
<th>Bone damage</th>
<th>Kidney damage</th>
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Results tables

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Conclusion
A probabilistic multi-criteria methodology was developed that explicitly combines patient preferences and clinical evidence. The impact of uncertainty in one or both of these on the treatments’ patient-weighted utilities can be assessed. Although limited by the small number of attributes and preference sample, the illustrative case suggests the choice of HAART is highly sensitive to patient preferences.


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