COMPARING PATIENT PREFERENCES FOR MEDICAL TREATMENTS WITH PROMETHEE II: A PILOT STUDY

HENK BROEKHUIZEN, MARJAN HUMMEL, KARIN GROOTHUIS, MAARTEN IJZERMAN
OVERVIEW

- Our decision context and requirements
- Choice of MCDA method
- Pilot study with PROMETHEE II
  - Methods
  - Main results
  - Sensitivity analysis (esp. relevant!)
- Discussion
- Future work
Decisions before drugs can be used:
Market Access → Reimbursement → Prescribe

MCDA a structured and transparent method to guide process
  - Growing interest in health field (Diaby 2013, Marsh 2014, ISPOR taskforce)

Patient perspective important, can be measured with stated preference methods → This yields probabilistic preference data

How can we transparently integrate these (probabilistic) preferences in a structured MCDA process?
OUR DECISION CONTEXT AND REQUIREMENTS
WHAT MCDA METHOD TO USE IN CONJUNCTION WITH PROBABILISTIC DATA?

- Broekhuizen 2015 review approaches to deal with uncertainty in MCDA (569 studies identified)
REVIEW OF APPROACHES TO DEAL WITH UNCERTAINTY

RESULTS: UNCERTAINTY APPROACHES

Bayesian framework
Deterministic framework
Fuzzy set theory
Grey theory
Probabilistic framework
OUR DECISION CONTEXT AND REQUIREMENTS
WHAT MCDA METHOD TO USE IN CONJUNCTION WITH PROBABILISTIC DATA?

Top 3 MCDA methods used with probabilistic approach

- AHP
- PROMETHEE
- SMAA

UNIVERSITY OF TWENTE.
THE PILOT STUDY
DESCRIPTION

- **Goal:** choose an antidepressant
- **Alternatives:** Venlafaxine, Bupropion, Duloxetine
- **Criteria:**
  1) Response to treatment
  2) Achieve remission
  3) Minor side effects
  4) Major side effects
- **Weights** AHP panel session with 12 patients
  But method would readily extend to larger sample sizes
- **Performance scores** derived from clinical trials that compared the drugs with placebo.
- Modeled in *Visual PROMETHEE (academic edition)* and *R*

UNIVERSITY OF TWENTE.
## THE PILOT STUDY
### SOURCE DATA

<table>
<thead>
<tr>
<th></th>
<th>Benefits</th>
<th></th>
<th></th>
<th>Risks</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Response</td>
<td>Remission</td>
<td>Adverse events</td>
<td>Severe adverse</td>
<td>adverse events</td>
</tr>
<tr>
<td>Median weight</td>
<td>0.62 (0.36 to 0.78)</td>
<td>0.16 (0.07 to 0.34)</td>
<td>0.04 (0.01 to 0.23)</td>
<td>0.19 (0.02 to 0.25)</td>
<td></td>
</tr>
<tr>
<td>(range)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odds ratio (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dul vs Plc</td>
<td>1.95 (1.61 to 2.36)</td>
<td>1.91 (1.56 to 2.34)</td>
<td>1.91 (1.50 to 2.43)</td>
<td>0.96 (0.39 to 2.35)</td>
<td></td>
</tr>
<tr>
<td>Ven vs Plc</td>
<td>2.04 (1.74 to 2.39)</td>
<td>1.97 (1.64 to 2.36)</td>
<td>1.80 (1.28 to 2.53)‡‡</td>
<td>1.27 (0.81 to 2.00)</td>
<td></td>
</tr>
<tr>
<td>Bup vs Plc</td>
<td>1.48 (1.20 to 1.82)</td>
<td>1.46 (1.17 to 1.81)</td>
<td>1.55 (1.10 to 2.18)‡‡</td>
<td>0.39 (0.16 to 0.95)</td>
<td></td>
</tr>
</tbody>
</table>

**UNIVERSITY OF TWENTE.**
PREFERENCE FUNCTION USED

Your current selection

P - Preference threshold: 0.25

V-shape

If the selected preference function is correct and you wish to use it, please press the "Apply" button.
If you wish to review your selection, press "< Previous". Otherwise, press "Cancel".

< Previous  Cancel  Apply
MAIN RESULTS
GLOBAL FLOWS AT AGGREGATE (GROUP) LEVEL AND FOR 9 PATIENTS
SENSITIVITY TO VARIATION IN WEIGHTS
RANK STABILITY INTERVALS

- Response: [22%;100%], median = 62%, range 36% to 78%
- Remission: [0%;100%], median = 16%, range 7% to 34%
- Side effects: [0%;23%], median = 4%, range 1% to 23%
- Severe side effects: [0%;46%], median = 19%, range 2% to 25%
SENSITIVITY TO VARIATION WEIGHTS
PROBABILISTIC ANALYSIS

- Bootstrapping weights, repeat 1000 times
SENSITIVITY TO VARIATION WEIGHTS AND SCORES
PROBABILISTIC ANALYSIS

- Sample odds ratios from lognormal distribution 1000 times
COMPARISON WITH AHP RESULTS
DISCUSSION

- It is possible to compare the preferences of a large group of patients with PROMETHEE
  - Group preferences and individual preferences can be contrasted
  - Results similar to AHP results
  - Problem: Visual PROMETHEE limited to 9 scenarios
- The meaning of weights?
  - Can AHP weights really be used for PROMETHEE?
FUTURE WORK

- Supporting decision in early stages of health technology
  - Case: novel imaging modalities for non-small cell lung cancer
  - Klaske Siegersma (MSc student) will elicit from group of clinical experts:
    - Relevant criteria
    - Criteria weights
    - Performance scores / preference functions
- Piloting weights elicitation for PROMETHEE among patients
  - Problem: low numerical & health literacy
  - Incomparability? Veto?
THANK YOU!

- More information:
  - H.broekhuizen@utwente.nl
  - http://www.utwente.nl/bms/htsr/Staff/broekhuizen/

- Some references:

UNIVERSITY OF TWENTE.