The cost-effectiveness of the Adherence Improving self-Management Strategy (AIMS) in HIV-care: a Markov Model

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Background: HIV & Medication

- If not treated, infection with HIV leads to AIDS and death

- Effective Combination AntiRetroviral Treatment (cART):
  - Suppresses HIV to undetectable levels
  - Restores/maintains immune system (CD4 cells)
  - Better health and quality of life
  - Reduces HIV transmission risk

- Adherence important, but proportion patients non-adherent

- No robust evidence on (cost)effectiveness interventions

1- Nieuwlaat, Cochrane 2014, 11:CD00001; 2- Oberje, de Bruin et al, 2013
Adherence Improving self-Management Strategy

- Develop an intervention that can be delivered by nurses during routine clinical care

- Intervention content based on: $1,2,3$
  - Comprehensive literature review
  - Integration behavior (change) theory
  - Input professionals & patients
  - Use of MEMS-data

- Nurses deliver the intervention after 2.5-day training

Trials

- **Pilot-study (within-subject)**, n= 26
  - Feasible, acceptable, effects on adherence

- **Single centre RCT**, n= 133
  - Effective adherence

- **Multi-centre RCT**, n= 233
  - Viral loads 1.26 times [1.1-1.5] higher in controls
  - Odds treatment failure 3.20 [1.3-7.9] times higher controls

1- de Bruin, Aids Pat Care STDs, 2005;19:384; 2- de Bruin, Health Psychology, 2010;29:421. 3-de Bruin, in revision
Policy makers – implementation of AIMS?

Effects  

Value for money
Criteria used to assess medicinal products

Health Technology Assessment, European Parliament, 2015
Economic evaluation

Societal perspective

Cost A → Intervention A → Outcome A

Cost B → Intervention B → Outcome B

Differences in costs?

Differences in outcomes?

Relationship?
Cost-effectiveness plane

ICER = ΔC / Δ QALY
If ICER < λ => cost-effective
Aim of this study

- To assess the cost-effectiveness of AIMS compared to TAU

⇒ Lifetime societal costs and outcome (QALY) for TAU and AIMS

⇒ Modelling to capture long-term benefits of prevention worsening health status
**Methods: Markov model**

- Patients move through health states, 6-month probabilities

- Per health state:
  - Health care costs
  - Productivity losses
  - Transmission risk
  - Quality of life
  - Transition probabilities

<table>
<thead>
<tr>
<th>Health states</th>
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</thead>
<tbody>
<tr>
<td>CD4 &gt;500; viral load 0-50</td>
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<td>CD4 &gt;500; viral load 51-200</td>
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<td>CD4 &gt;500; viral load 201-1000</td>
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<td>Dead</td>
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Treatment as usual (TAU)
- Longitudinal dataset patients Netherlands (n=7347)
  - Transition probabilities health states (matrix 12X12)
  - Excess mortality
  - Total cost per health state (healthcare + productivity losses + transmission cost)

AIMS:
- Duration: 18 months
- Relative risks of AIMS compared with TAU (trial data)
- Effect after stopping intervention
- Intervention cost (€41.5 per 6 month)
**Scenario’s**

- **Effect during intervention:**
  - Scenario 1 (base case): At least 5 transitions per RR
  - Scenario 2: all available relative risks
  - Scenario 3: at least 10 transitions per RR

<table>
<thead>
<tr>
<th>Health state</th>
<th>1</th>
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<tbody>
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<td>0,923**</td>
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* Used for all scenarios. ** Only used for scenario 1 and 2. *** Only used for scenario 2
Scenario’s and sensitivity analyses

- Effect after intervention (offset):
  - S1 (base): linear decrease to zero in next 18 months
  - S2: no effect after intervention cessation
  - S3: full effect in the next 18 months

⇒ 3 × 3 scenarios (9)

- Sensitivity analyses
  - Univariate: perspective, etc.
  - Probabilistic
## Results

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<table>
<thead>
<tr>
<th>Offset: linear decrease over 18m</th>
<th>Lifetime costs</th>
<th>Lifetime QALYs</th>
<th>ICERs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1 (base case)</td>
<td>€-592</td>
<td>0.034</td>
<td>AIMS dominant</td>
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<td>Scenario 2</td>
<td>€-843</td>
<td>0.036</td>
<td>AIMS dominant</td>
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<tr>
<td>Scenario 3</td>
<td>€-412</td>
<td>0.025</td>
<td>AIMS dominant</td>
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</table>

<table>
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<tr>
<th>Offset: full effect over 18 m</th>
<th>Lifetime costs</th>
<th>Lifetime QALYs</th>
<th>ICERs</th>
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</thead>
<tbody>
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<td>€-793</td>
<td>0.046</td>
<td>AIMS dominant</td>
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<td>Scenario 2</td>
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<td>0.049</td>
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<tr>
<td>Scenario 3</td>
<td>€-599</td>
<td>0.035</td>
<td>AIMS dominant</td>
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</table>

<table>
<thead>
<tr>
<th>Offset: no effect after stopping AIMS</th>
<th>Lifetime costs</th>
<th>Lifetime QALYs</th>
<th>ICERs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>€-375</td>
<td>0.023</td>
<td>AIMS dominant</td>
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<td>Scenario 2</td>
<td>€-546</td>
<td>0.024</td>
<td>AIMS dominant</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>€-221</td>
<td>0.016</td>
<td>AIMS dominant</td>
</tr>
</tbody>
</table>
Dominant in all univariate SA

- Healthcare
- 10 year time horizon
- Different ages
- Cost -25%
- Utility -25%

Maximum cost to be cost-saving

- €251 per 6 month
Probabilistic sensitivity analysis
Conclusion

- AIMS is cost-saving & should be implemented in routine clinical care for HIV
  - 10,000 patients: save 5.3 million and gain 340 QALYs
Conclusion

➢ Strengths:
  – Objective clinical data from trial with substantial sample
  – TAU from large cohort representative of population
  – Robust economic results

=> Increasing importance of economic considerations to inform decision makers
Thank you for your attention

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