The burden of ADHD

Leona Hakkaart
Outline

• Introduction in Economic Evaluations
• Concepts and design
• Costing and measurement outcomes
• Instruments for measuring Costs and QALYs
• Burden of ADHD
Relevance of economic evaluation

• Tool for deciding on the introduction of new technologies in health care
• Compulsory for deciding on reimbursement of new innovative medicines and treatments in many countries
• Since long used for introduction (public) health care programs
Improving population health

- Cost-effectiveness is not the same as clinical effectiveness
  - RCT is about health effects
  - CEA additionally asks whether effects are worth the costs
- But there are similarities
  - RCT concentrates on finding which treatment improves health most
  - CEA followed in that tradition, but from a different perspective
- Clinical evaluations optimize resource use within a patient group, economic evaluations across groups
Definition of research areas

• **Health Technology Assessment (HTA)**
  assessment of health technologies from various perspectives (economic, organisational, ethical) to inform health policy

• **Economic Evaluation (cost-effectiveness analysis)**
  evaluation of health technologies in terms of their outcomes (costs and benefits); is generally the core of an HTA

• **Pharmaco-economics**
  economic evaluation of treatment with medicines
Question:
Does the improved health status justify the additional resources required for the new intervention as compared to the old intervention?
Not every technology must be analysed

<table>
<thead>
<tr>
<th>EFFECTIVENESS</th>
<th>better</th>
<th>worse</th>
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<tbody>
<tr>
<td>+</td>
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<tr>
<th>COSTS</th>
<th>higher</th>
<th>CER</th>
<th>Reject</th>
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Phases in an economic evaluation

Phase 1: design of the study
Phase 2: measuring and valuing costs
Phase 3: measuring and valuing benefits
Phase 4: discounting
Phase 5: sensitivity analysis
Phase 6: applying a decision rule
The design determines the extent of generalisability

Controlled design
Subject homogeneity
Double blind
Selected standard
Forced compliance
Fixed procedures

Naturalistic design
Representativeness
Open treatment
Usual care
Real compliance
Flexible procedures
Phase 2: principles of costing

• Resource use by all parties concerned (societal perspective)

• Actual use of resources, which can not be deployed elsewhere

• Financing system is irrelevant
Categories of costs (1)

Direct costs

• within health care
  * manpower
  * equipment and material
  * medication
  * housing (depreciation and interest)
  * overhead
Categories of costs (2)

**Direct costs**

- outside health care
  - travel and waiting time (patient)
  - supporting network (welfare, family)
Categories of costs (3)

Indirect costs

- within health care
  * health care during prolonged survival
  * health care costs due to long–term consequences
- outside health care
  * loss in production due to morbidity or mortality
  * costs in other domains (crimes of psychiatric patients)
Instrument measuring resource use: TiC-P Questionnaire

- Measuring health care consumption within mental health sector
- Measuring health care consumption other health care suppliers
- Measuring productivity losses at paid work
- Measuring impediments at paid and unpaid work
Productivity losses

- Absence from work
- Reduced efficiency at work
- Impediments at paid and unpaid work
Valuation of resource use

• Based on real unit prices
• No charges!
Valuation of productivity losses

• Human capital method

• Friction costs method (realistic estimate)
Phase 3: outcome measures (survival, QoL etc)

• dependent on relevant outcomes

• measurement (health status) and valuation (utility associated with health status)

• monetary valuation of outcomes?
Outcomes in health economics

- Comparison across conditions requires a common standard
- Disease specific measures are not comparable
  - blood pressure, clinical success or failure (# depression free days)
- Generic outcomes are comparable
  - Life years
  - Quality of life
  - Most generic outcome: Quality adjusted life year (QALY)
Common standard: the QALY

- Main outcomes of health care
  - Saving lives
  - Improving Quality of Life
- QALYs combine these two
  - by weighing life years for the quality of life during those years
  - QALY = V(Q) * Y
QALY

- Quality of life index
  - 1.0 = normal health
  - 0.0 = death
  - negative values also occur (but debate about the scale)

- Examples of QoL weights
  - Erectile dysfunction: 0.80
  - Severe COPD: 0.60
  - Moderate to severe depression: 0.52

- Collections of QoL weights
  - WHO Burden of disease study (Australian version!)
  - CEA registry Tufts University Boston
What is Quality of Life (QoL)?

‘…. refers to the physical, psychological and social domains of health that are influenced by a person’s experiences, beliefs, expectations and perceptions…..’

→ subjective and multidimensional

Testa and Simonson NEJM 1996
Descriptive measures

Generic

Short Form-36 (SF 36)
EuroQoL (EQ-5D)

Disease specific
Generic quality of life measures in cost-effectiveness analysis

• Although they make results comparable
  – still multi-dimensional
  – no interval scales

• Valuation: translation to utilities (unique summary measure for QoL)
QALY Analysis

- **Value (V) of quality of life (Q)**
  - \( V(Q) = [0….1] \) (utility concept)
    - 1 = healthy
    - 0 = dead

- **Adjust life years (Y) for quality of life**
  - QALY’s = \( Y \times V(Q) \)
    - Y: numbers of life years
    - Q: health state during life years
    - V(Q): the value of health state Q
EQ-5D

• **Strong points**
  – Very sensitive in poor health states
  – It is the only instrument with negative values
  – Low administrative burden, Many translations, Cheap
  – Many national value sets

• **Weak points**
  – Only three levels per dimensions
  – Not very sensitive in relatively good health states
SF-6D

• Strong puns
  – Probably sensitive in the high regions
  – Often already include in trials (SF-36)
  – Many translations

• Weak points
  – Expensive
  – Insensitive in the low regions
  – Only one validation study
  – Upwards shift of values
Conclusions about indirect measures

• More states not always implies better sensitivity
• Two leading questionnaires have different strong and weak points
Phase 6: Which health care program is the most cost-effective?

- A new wheelchair for elderly (iBOT)
  - Increases quality of life = 0.1
  - 10 years benefit
  - QALY = Y x V(Q) = 10 x 0.1 = 1 QALY
  - Extra costs: $3,000 per life year
  - Costs are 10 x $3,000 = $30,000
  - Cost/QALY = 30,000/QALY

- Special post natal care
  - Quality of life = 0.8
  - 35 year
  - QALY = 35 x 0.8 = 28 QALY
  - Costs are $250,000
  - Cost/QALY = 8,929/QALY
I : C+ E+ \rightarrow evaluate
II : C- E+ \rightarrow accept
III: C- E- \rightarrow evaluate
IV: C+ E- \rightarrow reject
## QALY league table

<table>
<thead>
<tr>
<th>Intervention</th>
<th>$ / QALY</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM-CSF in elderly with leukemia</td>
<td>235,958</td>
</tr>
<tr>
<td>EPO in dialysis patients</td>
<td>139,623</td>
</tr>
<tr>
<td>Lung transplantation</td>
<td>100,957</td>
</tr>
<tr>
<td>End stage renal disease management</td>
<td>53,513</td>
</tr>
<tr>
<td>Heart transplantation</td>
<td>46,775</td>
</tr>
<tr>
<td>Didronel in osteoporosis</td>
<td>32,047</td>
</tr>
<tr>
<td>PTA with Stent</td>
<td>17,889</td>
</tr>
<tr>
<td>Breast cancer screening</td>
<td>5,147</td>
</tr>
<tr>
<td>Viagra</td>
<td>5,097</td>
</tr>
<tr>
<td>Treatment of congenital anorectal malformations</td>
<td>2,778</td>
</tr>
</tbody>
</table>
• Examples of inconsistencies
  – Viagra: cost-effective not reimbursed
  – Lung transplants: reimbursed but not cost-effective
• This can be explained in terms of fairness
  – Setting a cost-effectiveness threshold assumes that health maximization is the only goal
  – But people also want to distribute health fairly
  – A fair distribution is not necessarily also efficient
Validity and responsiveness of the EQ-5D and the KIDSCREEN-10 in children with ADHD

CAM Bouwmans, A van der Kolk, M Oppe, S Schawo, EA Stolk, M van Agthoven, RJ van der Gaag, JK Buitelaar, L Hakkaart-van Roijen
Health related Quality of Life

- General HRQoL instruments
- Required in reimbursement dossiers
- Developed for adults
- Application in children and adolescents
Burden of illness study ADHD

- Respondents recruited via ‘Balans’
- Parents with a child, aged 6 to 18 years diagnosed with ADHD
- Data collection on costs and QoL
- Cross sectional
- Kidscreen and EQ-5D
- Proxy
- Co-morbidity
Kidscreen

- Generic HRQoL instrument
- Children and adolescents 8 and 18 years
- Kidscreen -10
- Physical Well-being, Psychological Well-being, Autonomy and Parent Relation, Social support & Peers and School Environment
- Single score
EQ-5D

- HRQoL in adults
- EQ-5D proxy for children aged
- Mobility, self-care, usual activities, pain/discomfort and anxiety/depression
- Single summary index (utility)
Analyses

• Construct validiteit
• Responsiveness
### Characteristics of the study population (n= 738)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age mean (SD)</td>
<td>12 (3)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Boy</td>
<td>82.1</td>
</tr>
<tr>
<td>ADHD diagnosed by:</td>
<td></td>
</tr>
<tr>
<td>Pediatrician</td>
<td>16.3</td>
</tr>
<tr>
<td>Child psychiatrist</td>
<td>69</td>
</tr>
<tr>
<td>General practitioner</td>
<td>0.4</td>
</tr>
<tr>
<td>Other (not specified)</td>
<td>14.4</td>
</tr>
<tr>
<td>State intake of stimulant medication</td>
<td></td>
</tr>
<tr>
<td>Compliant</td>
<td>59.2</td>
</tr>
<tr>
<td>Non compliant</td>
<td>25.2</td>
</tr>
<tr>
<td>Stopped medication</td>
<td>12.8</td>
</tr>
<tr>
<td>Never used medication</td>
<td>2.8</td>
</tr>
<tr>
<td>Co morbidity</td>
<td>74.0</td>
</tr>
</tbody>
</table>
Components derived from the items of the KIDSCREEN-10 and EQ-5D

<table>
<thead>
<tr>
<th>Component</th>
<th>KIDSCREEN items</th>
<th>EQ-5D domains</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Felt fit and well</td>
<td>Pain/discomfort</td>
</tr>
<tr>
<td></td>
<td>Felt full of energy</td>
<td>Mobility</td>
</tr>
<tr>
<td>2</td>
<td>Felt sad</td>
<td>Anxiety/depression</td>
</tr>
<tr>
<td></td>
<td>Felt lonely</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Had fun with friends</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Felt treated fairly by parents</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Got on well at school</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Been able to pay attention</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Had enough time for himself</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Able to do things he/she wants in free time</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Self-care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Usual activities</td>
</tr>
</tbody>
</table>
Comparison of instruments’ responsiveness

<table>
<thead>
<tr>
<th>(n)</th>
<th>EQ-5D (SD)</th>
<th>Cohen’s effect size</th>
<th>KIDSCREEN (SD)</th>
<th>Cohen’s effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study population</td>
<td>0.81</td>
<td></td>
<td>45.5</td>
<td></td>
</tr>
<tr>
<td>Non-compliant (177)</td>
<td>0.75 (0.18)</td>
<td></td>
<td>42.7 (7.7)</td>
<td></td>
</tr>
<tr>
<td>Compliant (417)</td>
<td>0.84 (0.15)</td>
<td>0.51</td>
<td>47.5 (9.1)</td>
<td>0.58</td>
</tr>
<tr>
<td>No co morbidity (192)</td>
<td>0.86 (0.15)</td>
<td></td>
<td>48.4 (9.5)</td>
<td></td>
</tr>
<tr>
<td>1 co morbid condition (295)</td>
<td>0.84 (0.37)</td>
<td>0.18</td>
<td>46.6 (8.7)</td>
<td>0.20</td>
</tr>
<tr>
<td>2 co morbid conditions (167)</td>
<td>0.77 (0.17)</td>
<td>0.42</td>
<td>43.3 (7.3)</td>
<td>0.41</td>
</tr>
<tr>
<td>3 co morbid conditions (60)</td>
<td>0.70 (0.17)</td>
<td>0.43</td>
<td>40.2 (6.2)</td>
<td>0.46</td>
</tr>
</tbody>
</table>
Conclusion

• Different constructs of HRQoL
• Comparable responsiveness
• Complementary instruments
• Both instruments were able to discriminate
Limitations

- Population
- Proxy
- Relative small variation EQ-5D dimensions
Hartelijk dank voor uw aandacht!