Broader Costs and Outcomes in Health Economics

Health Economics in the Low Lands: Roots & Trends

Presented by: Kimberley Hubens, MSc (EUR); Luca Janssen, MSc (UM), Irina Pokhilenko, MSc (UM), Ayesha Sajjad, MD PhD (EUR), Inge van der Putten PhD (UM)
Agenda

• The PECUNIA Project (Kimberley)
• Identification of factors of productivity costs of paid and unpaid work (Kimberley)
• Identification & Prioritization of Intersectoral Costs and Benefits: The case of Education & Criminal Justice (Luca)
• Development of a Generic Multi-Sectoral Resource Use Measurement Instrument for the Measurement of Broader Resource Use (Irina)
• In search of a ‘pan-European’ value set – Application for the EQ-5D-3L (Ayesha)
• Usefulness of Broader Outcomes for Decision-Making in the Field of Vaccinations (Inge)
• Discussion statements (Inge)
The PECUNIA Project

ProgrammE in Costing, resource use measurement and outcome valuation for Use in multi-sectoral National and International health economic evaluations

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 779292
Introduction

- Ever-growing and rapidly ageing population
- Developing new standardized, harmonized, and validated methods and tools
- Assessment of costs and outcomes in European healthcare systems
Consortium
Objectives

PECUNIA will:

• address the unnecessary variations in the input cost and (health) outcome data of economic evaluations

• address the scarcity of internationally standardised, generic tools for the assessment of both costs and outcomes
  ◦ resource use measurement (RUM) instrument
  ◦ unit cost information
  ◦ outcome assessment tools
Identification of factors of productivity costs of paid and unpaid work

VGE Conference, 6 March 2020, Utrecht

Kimberley Hubens, Leona Hakkaart-van Rijen

Confidential
Productivity costs

‘The costs associated with paid and unpaid production loss and replacement due to illness, disability or the death of productive persons’ (Krol et al. 2013)
Why include productivity costs?

• In economic evaluations from a societal perspective, include all relevant costs

• Excluding productivity costs could lead to a misrepresentation of costs

• Shifting ICER to above or below threshold
Challenges

Identification of productivity costs:
• All relevant factors should be included
• Only absence from work is included
• Instruments measure more factors

Which factors are relevant and which are recommended to be included in economic evaluations?
Study aims and methods

1. To identify factors of productivity costs
   Systematic meta-review

2. To assess the relevance, comprehensiveness and redundancy of these factors
   Expert consortium

3. To review recommendations on the inclusion of these factors
   Review of country-specific pharmacoeconomic guidelines
Methods meta-review

• Identified all previous systematic reviews on measurement instruments of productivity costs from Embase

• All factors of productivity costs were extracted from the included full-text papers
Methods expert consortium

• Invited experts in the field of productivity costs in economic evaluations
• Discussed the identified factors in multiple consortium meetings
Methods review on guidelines

- Assessed country-specific pharmacoeconomic guidelines from the ISPOR website
- Extracted recommendations on the inclusion of productivity costs and its factors
Results meta-review

Records from Embase (n=154)

Full texts assessed (n=16)

Title/abstracts excluded (n=138)

Full texts excluded (n=7)

Studies included (n=9)
Factors from meta-review

paid

- absenteeism
- presenteeism
- multiplier
- compensation

unpaid
Expert consortium

• Relevance of absenteeism, presenteeism and unpaid work
• Not yet include multiplier effects and compensation mechanisms
Relevant factors from expert consortium

paid

absenteeism

presenteeism

unpaid
Results guidelines

- From 16 guidelines, 69% recommended the inclusion of productivity costs
- Only one recommended to include all factors
Conclusion

• Relevant factors of productivity costs:
  
  ![icons](absenteeism, presenteeism, paid, unpaid)

• Only one guideline recommended the inclusion of all of these factors in economic evaluations
Future research

• Identifying instruments that cover all of these factors
• Enable comprehensive measurement
• Enhance comparability between studies and countries
Identification & Prioritization of Intersectoral Costs and Benefits

The case of Education & Criminal Justice

Presented by: Luca Janssen
Background
Methods

Identification of items

Testing with sector specific experts

Finalizing and operationalizing list

BWS

- Drost et al. (2013)
- Scientific literature
- Grey literature

- Security & Justice ministry
- Educational researchers
- Relevant & Complete?

- Mutually exclusive
- 20 ED attributes
- 20 CJ attributes

- 12 choice sets
- 5 attributes / choice set
- Health economists
Methods

**Best-worst scaling survey: Criminal justice sector**

Please identify which cost and benefit in the criminal justice sector you believe is the **MOST important** and which is the **LEAST important** to include in economic evaluations conducted in the disease area of mental and behavioral disorders.

**Trade-off scenario 1**

<table>
<thead>
<tr>
<th>Most important</th>
<th>Least important</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>Jail and prison expenditures</td>
</tr>
<tr>
<td></td>
<td>Short-term pain and suffering of others</td>
</tr>
<tr>
<td></td>
<td>Property loss of offender</td>
</tr>
<tr>
<td></td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Probation/Parole (including electronic monitoring)</td>
</tr>
<tr>
<td></td>
<td>Forensic services</td>
</tr>
</tbody>
</table>

*Figure: Example of a choice set*
Results – Education (n=32)

- **Special education school attendance**
- **Absenteeism from school**
- **Reduced school attainment**
- **Additional education services provided at a regular school outside operating hours**
- **Reduced school performance**
- **School-based health promotion intervention**
- **Counselling services offered in school**
- **Reduced school competence**
- **Additional education services provided at a regular school during operating hours**
- **Presenteeism at school**
- **School completion programs for adults**
- **Reduced school readiness**
- **Grade retention**
- **Negative school experiences**
- **Problems with school entry**
- **Home education/Homeschooling**
- **Attendance officer**
- **Reduced school adaption**
- **Reduced school engagement**
- **Student transport to school**

Values:
- 0
- 2
- 4
- 6
- 8
- 10
- 12

- Special education school attendance: 11.21
- Absenteeism from school: 10.08
- Reduced school attainment: 9.43
- Additional education services provided at a regular school outside operating hours: 7.49
- Reduced school performance: 7.44
- School-based health promotion intervention: 6.2
- Counselling services offered in school: 6.01
- Reduced school competence: 5.89
- Additional education services provided at a regular school during operating hours: 4.86
- Presenteeism at school: 4.46
- School completion programs for adults: 4.39
- Reduced school readiness: 4.04
- Grade retention: 3.69
- Negative school experiences: 3.17
- Problems with school entry: 3.0
- Home education/Homeschooling: 2.8
- Attendance officer: 2.54
- Reduced school adaption: 1.6
- Reduced school engagement: 0.91
- Student transport to school: 0.81
Results – Criminal Justice (n=38)

- Illegal untaxed income of the offender
- Property loss of the offender
- Lost freedom of the offender
- Fire and rescue services
- Forensic services
- Property loss of others
- Probation/Parole (including electronic monitoring)
- Police contact
- Court appearance
- Property loss of victims
- Victim compensation
- Property loss of others
- Victim/witness protection
- Short-term pain and suffering of others
- Jail and prison expenditures
- Lost freedom of the offender
- Illegal untaxed income of the offender

Decreased chance of committing a crime as a consequence/effect of…
Discussion

- Methods are lacking
- Focus facilitates inclusion
- Relevance does not equal inclusion
- Importance per attribute differs
  - Per study per sector
  - Per stakeholder?
- Further steps...
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Presented by: I. Pokhilenko, MSc (Maastricht University)

06.03.2020
Background

• Resource Use Measurement (RUM)
  ◦ *Number of GP contacts* $\times$ *cost per visit*
  ◦ *Out-of-pocket expenses*
  ◦ *Unpaid help from family members*
  ◦ *Loss of productivity at work*
  ◦ ...

• Using self-reported data is currently the most feasible method of generating valid resource use estimates for the measurement of broader resource use
Background

• The majority of self-reported RUM instruments focus on narrower resource use

• Lack of transparency of the development process
  ◦ Framing, phrasing, and order of questions can affect the responses

• Aims
  ◦ To develop a **generic** RUM instrument to measure **broader resource use** in multiple sectors
  ◦ To transparently report the instrument development process
Process

STEP 1: Definition of instrument attributes

STEP 2: Identification and definition of main cost driving elements

STEP 3a: Scoping review to identify methodological recommendations

STEP 3b: Development of a harmonized methodological approach

STEP 4: Development of questionnaire modules
Process

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MILESTONE 1: 1st DRAFT INSTRUMENT

STEP 4: Development of questionnaire modules

STEP 5: Harmonization of questionnaire modules
Process

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MILESTONE 1: 1st DRAFT INSTRUMENT

MILESTONE 2: 2nd DRAFT INSTRUMENT

STEP 6: Validation
Process

STEP 1: Definition of instrument attributes

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STEP 3a: Scoping review to identify methodological recommendations

STEP 3b: Development of a harmonized methodological approach

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MILESTONE 1: 1st DRAFT INSTRUMENT

STEP 6: Validation

MILESTONE 2: 2nd DRAFT INSTRUMENT

Further steps: Validity, reliability and pilot testing in a follow-up project
PECUNIA RUM Instrument

- Generic, self-reported RUM instrument
- 9 sections (1-11 questions per section)

<table>
<thead>
<tr>
<th>Section</th>
<th>Types of resource use measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential care</td>
<td>Usual living situation selecting from a range of residential, health, social, educational and correctional facilities</td>
</tr>
<tr>
<td>Health and social care</td>
<td>Use of health and social services including outpatient, daycare, helplines, and vocational services</td>
</tr>
<tr>
<td>Medication</td>
<td>Use of medications</td>
</tr>
<tr>
<td>Personal expenses</td>
<td>Out-of-pocket expenses including expenses for the household help, childcare, purchase of goods (e.g. wheelchair) among other</td>
</tr>
<tr>
<td>Unpaid help</td>
<td>Informal care provided by the respondent’s friends, relatives, neighbors or volunteers</td>
</tr>
<tr>
<td>Education</td>
<td>Highest level of education, current educational status, absenteeism and presenteeism at school and the use of education services (e.g. tutoring, counselling)</td>
</tr>
<tr>
<td>Productivity</td>
<td>Current employment status, absenteeism and presenteeism at paid and unpaid work</td>
</tr>
<tr>
<td>Criminal justice</td>
<td>Contacts with police, fire-and-rescue and legal services, material damage caused by the respondent (e.g. theft, vandalism), and incarceration</td>
</tr>
</tbody>
</table>
PECUNIA RUM Instrument

• Instructions
  ◦ “Please tick the applicable box below”
  ◦ “Please fill in the applicable number of contacts in the list below”

• Use of examples
  ◦ Medical specialists (e.g. psychiatrist, neurologist, etc.)

• Additional explanations/clarifications
  ◦ “‘Other education-related services’ refer to additional support in relation to your learning in- or outside of your school/college such as tutoring, educational counselling/therapy among other services”
PECUNIA RUM Instrument

1. In the past 3 months did you use any medication?

   Please tick the applicable box below:

   ■ Yes  Please go to question 2
   ■ No  Please go to the next section
   ■ I don’t remember/I would rather not say  Please go to the next section

2. Please list below use of any medication taken over the past 3 months.

<table>
<thead>
<tr>
<th>Medication name</th>
<th>Dose</th>
<th>Unit</th>
<th>Frequency</th>
<th>Start date (Enter only if started during the past three months) (dd/mm/yyyy)</th>
<th>Stop date (Enter only if stopped during the past three months) (dd/mm/yyyy)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Using the PECUNIA RUM Instrument

• Trial-based economic evaluations in the adult population
• Modular structure → can be adapted to a specific setting
• Applicability to multiple European countries
• Consistent with a harmonized unit cost development tool
Implications and further steps

- Comparable results across studies
- Other sectors can be relevant (e.g. transport, environment)
- Further steps
  - Preliminary validation (within PECUNIA project)
    - Health economics and HTA experts (November 2019)
    - Health professionals (April 2020)
    - Former patients and/or caregivers (April-June 2020)
    - Linguistic assessment (currently ongoing)
  - Formal validation
  - Proxy, child version
  - Formal translation
  - Applicability to different settings (disease areas, patient groups, countries)
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In search of a ‘pan-European’ value set – Application for the EQ-5D-3L

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Academic Researcher
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Erasmus School of Health Policy & Management

Erasmus University Rotterdam
Make it happen.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 779292
‘pan-European’ value set

WHEN?

• Increasing number of countries want to standardize their HTA processes to evaluate decision making and reimbursements in health care

• EUnetHTA

• Beneluxa
Why a ‘pan-European’ value set?

• A tool to homogenize health-care decision making and resource allocation

• To help standardize factors such as:
  • clinical practice guidelines
  • health-care infrastructure
  • pricing
  • reimbursement of pharmaceutical drugs and medical devices across Europe
Why EQ-5D?

• Economic evaluations utilize QALYs

• Generation of QALYs requires application of preference weights/utilities for HR-QoL in the general population – comprising a value set

• The most preferred generic instrument to generate these value sets is the EQ-5D
Why EQ-5D-3L?

- Value sets currently exist for nine European countries
- Because of its widespread application in Europe
- The EQ-5D-3L valuation studies are quite homogenous as they are based on the Measurement and Valuation of Health (MVH) protocol from the UK
- Illustrative example, the methods can be applied to EQ-5D-5L and Youth versions
Existing value sets in Europe for EQ-5D-3L
HOW?

• Compared to qualitatively analyse the methodological, procedural and analytical characteristics of the included EQ-5D-3L valuation studies using a pre-defined checklist

DOI 10.1007/s10198-013-0508-x

Time trade-off: one methodology, different methods

Arthur E. Attema · Yvette Edelaar-Peeters · Matthijs M. Versteegh · Elly A. Stolk

• Derived pooled utilities from the published coefficients of existing EQ-5D-3L valuation studies within Europe
Methods

- TTO valuations

- A saturated data set generated a unique value per health state for each country

- Nine countries: 243 \(3^5\) theoretical health states = 2187 data points

- Fixed effects regression model

- Interaction terms: N3, D1, I2, I2^2, I3, and I3^2

- Model selection: RMSE, \(R^2\) and MAE
Results

The pooled utilities from the regression coefficients ranged from -0.711 - 1.000.
# Goodness-of-fit-criteria

<table>
<thead>
<tr>
<th></th>
<th>No interaction</th>
<th>N3</th>
<th>D1</th>
<th>I2</th>
<th>I2²</th>
<th>I3²</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMSE</td>
<td>0.196</td>
<td>0.191</td>
<td>0.195</td>
<td>0.196</td>
<td>0.196</td>
<td>0.193</td>
</tr>
<tr>
<td>R²</td>
<td>0.653</td>
<td>0.668</td>
<td>0.654</td>
<td>0.653</td>
<td>0.653</td>
<td>0.661</td>
</tr>
<tr>
<td>MAE</td>
<td>0.167</td>
<td>0.161</td>
<td>0.167</td>
<td>0.167</td>
<td>0.167</td>
<td>0.164</td>
</tr>
</tbody>
</table>
Summary:

• The values from the N3 model best represent the preferences of the European population

• The developed ‘pan-European’ value set is a pragmatic solution for economic evaluations within Europe

• Interventions influencing HRQoL

• Impact health-informed decision- and policy-making

• The ‘pan-European’ value set is easily updated as new value sets become available.
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Usefulness of Broader Outcomes for Decision-Making in the Field of Vaccinations

Presented by: I. van der Putten, PhD (Maastricht University)
06.03.2020
Research questions

• Identify which economic impacts seem relevant towards aiding decision making for vaccine introduction

• Determine the relative importance of the identified economic impacts based on stakeholder perceptions
## Methods

<table>
<thead>
<tr>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed methods</td>
<td>Best worst scaling</td>
</tr>
<tr>
<td><img src="image" alt="Checklist" /></td>
<td><img src="image" alt="Best worst scaling" /></td>
</tr>
<tr>
<td>N=26</td>
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</tr>
<tr>
<td><img src="image" alt="Interview" /></td>
<td><img src="image" alt="Table" /></td>
</tr>
</tbody>
</table>

### Study 1: Mixed Methods

- N=26

### Study 2: Best Worst Scaling

<table>
<thead>
<tr>
<th>Most Important</th>
<th>Least Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity considerations</td>
<td>X</td>
</tr>
<tr>
<td>Economic information</td>
<td></td>
</tr>
<tr>
<td>Effectiveness vaccines</td>
<td></td>
</tr>
<tr>
<td>Mortality rates</td>
<td>X</td>
</tr>
</tbody>
</table>

References:

2. Relevant economic impacts

<table>
<thead>
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<th>Health-related benefits to vaccinated individuals</th>
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<tr>
<td>Mortality</td>
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2. Relevant economic impacts

<table>
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</tr>
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<tbody>
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*GA No. 779292*
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<td>Productivity</td>
<td>$</td>
</tr>
<tr>
<td>Community or health system externalities</td>
<td>Productivity</td>
</tr>
<tr>
<td>Risk reduction</td>
<td>Herd effect</td>
</tr>
</tbody>
</table>

Mortality refers to the reduction in death rates due to vaccination, while healthcare savings include reduced medical expenses. Absenteeism refers to the decrease in sick leave due to vaccination. Productivity gains are reflected by increased economic activity. Risk reduction and the herd effect are externalities that impact society beyond the vaccinated individuals.
2. Relevant economic impacts

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<td>Tax revenue</td>
</tr>
<tr>
<td>Herd effect</td>
<td>Employment in society</td>
</tr>
</tbody>
</table>
3. Importance of impact (study 1)

New and expensive vaccines
Upper-middle income countries
2. Importance economic impacts (study 2)

<table>
<thead>
<tr>
<th>Health-related benefits to vaccinated individuals</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>healthcare savings</td>
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<tr>
<td>1</td>
<td>absenteeism</td>
</tr>
<tr>
<td>Productivity</td>
<td>2</td>
</tr>
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<td>Community or health system externalities</td>
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<tr>
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<td>Tax revenue</td>
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<tr>
<td>3</td>
<td>Employment in society</td>
</tr>
<tr>
<td>Herd effect</td>
<td>4</td>
</tr>
</tbody>
</table>
The connection between data availability and the perceived importance

![Scatterplot impact of data availability on outcome BWS ratio](image)

Figure 3: Scatterplot impact of data availability on outcome BWS ratio
Application of broader impacts in practice

- Taking broader perspective into account is still not common in economic evaluations
- The importance of taking a broader perspective by including the broader economic impact of vaccines is still mixed
  - In many situations taking into account mortality, morbidity and healthcare costs is sufficient
  - For some situations broader impacts can be important
Important steps to take for the inclusion of broader impacts

• Inform decision makers on possibilities

• Make sure data collected is closely connected to the information needs of decision makers

• Take into consideration extra burden of taking broader impacts into account
  ◦ Time
  ◦ Costs
  ◦ Uncertainty
Thank you!

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