Cost-effectiveness in the endovascular world

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The doubling time of medical knowledge ... 
... in 1950 was 50 years; 
... in 1980, 7 years; 
... and in 2010, 3.5 years.

In 2020 it is projected to be 0.2 years—just 73 days.
Healthcare expenditures

PER CAPITA HEALTH EXPENDITURES
(annual dollars)

U.S. HEALTH CARE EXPENDITURES
(in millions of dollars)
Why do we Need Economic Evaluations?

- There is a limited healthcare budget; not all of the required resources can be funded.
- Economic evaluations assess which technologies represent value for money.
- They can be used as a framework to inform decisions concerning investment in current services and future research.

The total annual cost of PAD-related hospitalisations in the US in 2004 was estimated to exceed $21 billion.

Mandatory evidence requirement to ensure funding for new therapies

- Safety
- Efficacy
- Cost Effectiveness
- Tolerability

Reimbursement Criteria “The Fourth Hurdle”

Regulatory Criteria
What is Health Economics?

- **Economics**
  - *Study of the allocation of scarce resources.*

- **Health Economics**
  - *Economic principles applied to healthcare.*

- **Economic Evaluation**
  - Main decision making tool in economics.
  - Economic evaluation is about efficiency and is: *‘the comparative analysis of alternative courses of action in terms of both their costs and consequences’* (Drummond, 1997).
  - There are different types…….
Types of economic evaluations

- **Cost minimisation analysis**
  - Equal outcomes / clinical benefit assumed
  - Which has lowest overall total costs?

- **Cost Benefit analysis**
  - Both costs and outcomes expressed in monetary value
  - Difficult to value all health benefits in monetary terms

- **Cost Effectiveness analysis**
  - Outcomes expressed in natural units
  - Cost per “% drop in blood pressure” / SRE avoided / cure

- **Cost Utility analysis**
  - Outcomes expressed in QALYs
  - Cross disease comparisons possible
  - What NICE use!
  - Considered current gold standard measure
Should a country adopt a new therapy?

- Cost (+)
- Effectiveness - QALYs (+)

Areas of uncertainty Decision rule is required

Cost per QALY less than £30,000

Do not Adopt

Adopt

Cost per QALY less than £30,000

Decision rule is required

Areas of uncertainty

Question mark

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Example: Cost-effectiveness of Paclitaxel-coated balloons

Cost-Effectiveness Analysis of Paclitaxel-Coated Balloons for Endovascular Therapy of Femoropopliteal Arterial Obstructions

Nicolas Diehm, MD, MBA; and Henrique Schneider

1Clinical and Interventional Angiology, Swiss Cardiovascular Center, Inselspital, University Hospital Bern, Switzerland. 2Swiss Federation of Small and Medium Enterprises, Bern, Switzerland.
Purpose of the study [1]

- Use of DCBs may be associated with significant increases in healthcare expenditures at baseline compared with PTA.

- Purpose: to analyse the cost-effectiveness of DCBs within the SwissDRG system based on outcome data of the THUNDER study [2].

- Hypothesis: use of DCBs is cost-effective within 1 year of follow-up in patients with femoropopliteal arterial obstructions of moderate complexity.

Hypothesis: DCB is cost-effective at 12 months

DCB
Device cost fraction

Reduction of TLR
DCB versus POBA

* Endovascular Tx of moderate complexity

* THUNDER study

Assumptions

• Reduction of TLR from 37% (POBA) to 4% (DCB) \(^1\)

• Pathology of moderate complexity, i.e. one DCB and no stent required.

• Only direct costs considered.

• Steady patient admission to the hospital.

• Re-treatments performed within the same institution.

• Re-treatments performed with the use of POBA. More expensive devices such as stents, etc. are not included.

• Costs associated with further outpatient follow-up examinations not considered.

Index Procedure

POBA

Two possible outcomes for both treatment modalities

No TLR

DEB

Repeated TLR

Results after 1 year: 
Third party payer perspective

- Use of DCB was associated with substantially lower total inpatient treatment costs when compared with PTA, despite the need for a greater investment at baseline related to higher prices for DEBs.

Summary at Baseline and Follow-up Investments and Total Costs for 100 Patients

<table>
<thead>
<tr>
<th></th>
<th>Investments at Baseline (CHF)</th>
<th>Investments at 12 Months (CHF)</th>
<th>Total Costs at 12 Months (CHF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTA</td>
<td>643,160</td>
<td>308,717</td>
<td>951,877</td>
</tr>
<tr>
<td>DCB</td>
<td>797,600</td>
<td>64,316</td>
<td>861,916</td>
</tr>
<tr>
<td>Δ (for DCB)</td>
<td>+154,440</td>
<td>- 244,401</td>
<td>-89,961</td>
</tr>
</tbody>
</table>

Results after 1 year: Physician / Facility Provider perspective

- In the absence of **dedicated reimbursement incentives**, use of DCB was shown to be the financially less favorable treatment approach.

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Rank</th>
<th>Strategy</th>
<th>12-Month Total Healthcare costs (CHF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third-party providers</td>
<td>1</td>
<td>DCB</td>
<td>861,916</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>PTA</td>
<td>951,877</td>
</tr>
<tr>
<td>Physicians and/or facility providers</td>
<td>1</td>
<td>PTA</td>
<td>333,678</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>DCB</td>
<td>179,238</td>
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</tbody>
</table>

Conclusions from the study

• Use of DCBs may be cost-effective through a prevention of repeated TLR already at one year of follow-up.

• The introduction of dedicated financial incentives aimed at improving DEB reimbursements may help lower total healthcare costs.

### 6. Periphhere Gefässintervention

#### 6.1 SwissDRG-Positionen

<table>
<thead>
<tr>
<th>Beschreibung</th>
<th>CHOP Code</th>
<th>Swiss DRG</th>
<th>Partition</th>
<th>SwissDRGText</th>
<th>Kosten-gewicht</th>
<th>Mittlere Verweildauer</th>
<th>Unt. Grenzverw.dauer 1)</th>
<th>Ob. Grenzverw.dauer</th>
<th>Erlös bei Baserate CHF 5'000</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTA mit unbeschichtet Bollen</td>
<td>39.50.19</td>
<td>39.00.10 (00.45)</td>
<td>F59C</td>
<td>O</td>
<td>Komplexe oder mässig komplexe Gf. ohne äusserst schwere CC, ohne komplexe Prozedur</td>
<td>0,820</td>
<td>2,8</td>
<td>1</td>
<td>0,182</td>
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<tr>
<td>und 1 BMS</td>
<td>39.50.19</td>
<td>39.00.10 (00.46 ft)</td>
<td>F54Z</td>
<td>O</td>
<td>Komplexe oder mehrfache Gf. ohne komplizierende Proz., ohne Revision, ohne komplexe Diagnose, Alter &gt; 2 J. oder mässig komplexe Gf. mit komplizierender Diagnose, ohne äusserst schwere CC, ohne Rotationstrombektomie</td>
<td>1,282</td>
<td>5,4</td>
<td>1</td>
<td>0,439</td>
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<tr>
<td>und 2 oder mehr BMS</td>
<td>39.50.14</td>
<td>00.4C.11</td>
<td>F59B</td>
<td>O</td>
<td>Komplexe oder mässig komplexe Gf. ohne äusserst schwere CC, mit komplexer Prozedur</td>
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<td>39.00.10 (00.45)</td>
<td>00.4C.12 ff</td>
<td>F54Z</td>
<td>O</td>
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<td>1,282</td>
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<td>1</td>
</tr>
<tr>
<td>PTA mit 2 oder mehr DEB</td>
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<td>00.4C.11</td>
<td>F59B</td>
<td>O</td>
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<tr>
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<td>2,5</td>
<td>1</td>
<td>0,190</td>
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<td>00.4C.11</td>
<td>F59B</td>
<td>O</td>
<td>siehe oben</td>
<td>1,282</td>
<td>5,4</td>
<td>1</td>
<td>0,439</td>
</tr>
<tr>
<td>Rotationstrombektomie mit DEB und 1 BMS</td>
<td>39.75.11</td>
<td>39.00.10 (00.46 ft)</td>
<td>00.4C.11</td>
<td>F59B</td>
<td>O</td>
<td>Komplexe oder mässig komplexe Gf. ohne äusserst schwere CC, mit komplexer Prozedur</td>
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Medtronic, Endovaskuläre und periphere Gefässéingriffe Kodierung und Vergütung 2015
Conclusions

• Healthcare expenditures are rising dramatically.

• Cost-effectiveness analyses mandatory to assess which technology is clinically worth its price.
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