Access to radiotherapy: How to make it happen from an economic perspective?

Yolande Lievens, MD, PhD
Radiation Oncology
Ghent University Hospital & Ghent University, Belgium
Co-Chair ESTRO-HERO project
“The aim of the healthcare policy is to maximise the health of the population within the limits of the available means and within an ethical framework, based on values such as fairness and solidarity.”
NI per region and per income group
Growth in healthcare expenses
Health Technology Assessment: the broader picture.

How to pursue value for money?

Evidence generation from an economic perspective.

Leveraging innovative reimbursement strategies.
health system performance

accessibility

quality

efficiency
3 / 10 patients in Europe do not receive the radiotherapy they need.
worldwide radiotherapy coverage highly heterogeneous
Worldwide radiotherapy coverage
MV unit types are highly heterogeneous
IV capability in Europe ifo GNI/capita
do we deliver the *right* radiotherapy to the *right* patient?
hypofractionation in breast-conserving treatment?

2013, Ashworth, CA
2014, Bekelman, End. (n=6,719), US
2014, Bekelman, Perm. (n=8,924), US
2014, Wang (n=113,267), US
2015, Mortimer (n=196), AU
2016, Delaney (n=5,880), AU
2017, Boero (n=22,233), US
2017, Conroy (n=261), AU
2017, Prades, Spain
2014, Jagsi (n=913), US

NICE, 2009
Value for Money?
extra cost 
extra effect 
new treatment

= incremental cost-effectiveness ratio (€/LYG)
= incremental cost-utility ratio (€/QALY)

cost per (quality adjusted) life year gained

standard treatment
<table>
<thead>
<tr>
<th>Comparators clearly defined</th>
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<tbody>
<tr>
<td>Patient group/indication</td>
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<td>Effectiveness evidence based on a systematic review</td>
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<td>HR QoL data reported directly by patients &amp;/or carers</td>
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<td>Appropriate time horizon</td>
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<td>Probabilistic sensitivity analysis used to quantify uncertainty</td>
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<td>Relevant one-way sensitivity analyses</td>
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<td>Comparators used in the NHS UK Setting</td>
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<td>UK NHS and personal social services costs</td>
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<td>Cost-effectiveness analysis using QALYs</td>
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<td>Reference data valuation by representative sample of the public</td>
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<td>Discount rate, 3.5%</td>
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“The main factors for limited transferability of health economic findings were found in *country-specific differences* in *resource consumption* and the resulting *costs*. These differences are affected by a number of *influencing cofactors* (demography, epidemiology and individual patient’s factors) and the *overall health care system* structures (e.g. payment systems, health provider incentives).”
“A consistent picture of radiotherapy costs, based on methodologically sound costing studies, has yet to emerge. These results call for developing a well-defined and generally accepted cost methodology for performing economic evaluation studies in radiotherapy.”
carce & highly variable costing studies
Cost per fraction to install and operate radiotherapy

<table>
<thead>
<tr>
<th>Country Type</th>
<th>Upfront Cost per Fraction</th>
<th>Operating Cost per Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-income countries</td>
<td>235</td>
<td>86</td>
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<tr>
<td>Upper-middle-income countries</td>
<td>86</td>
<td>65</td>
</tr>
<tr>
<td>Lower-middle-income countries</td>
<td>65</td>
<td>349</td>
</tr>
<tr>
<td>Low-income countries</td>
<td>60</td>
<td>352</td>
</tr>
</tbody>
</table>

*Note: Calculated on the basis of the activity-based model. Data are cost in US$. Operating cost=cost / fractions delivered. Upfront cost=one-off cost required to build the capacity, after which operating costs are incurred.*
Cost per course ifo department size

Cost per RT course (US$)

HIC

LMIC
Additional investment per region & income

Per region

Income
- H
- UM
- LM
- L

Add investment per income group

Income
- AP
- EU
- LA
- NA

Region
- AF
- AP
- EU
- LA
- NA
Acceptable…

…and Affordable?
Connecting cost and benefit
<table>
<thead>
<tr>
<th></th>
<th>CEA</th>
<th>BIA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research question</strong></td>
<td>Acceptability</td>
<td>Affordability</td>
</tr>
<tr>
<td><strong>Perspective</strong></td>
<td></td>
<td>Healthcare payers</td>
</tr>
<tr>
<td><strong>Target population</strong></td>
<td>Consistent with reimbursement request</td>
<td>Open</td>
</tr>
<tr>
<td><strong>Comparator</strong></td>
<td>On the efficiency frontier</td>
<td>Current situation</td>
</tr>
<tr>
<td><strong>Costs</strong></td>
<td>Direct healthcare related costs</td>
<td></td>
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<tr>
<td><strong>Health outcomes</strong></td>
<td>Included</td>
<td>Not included **</td>
</tr>
<tr>
<td><strong>Time horizon</strong></td>
<td>As long as incremental costs or outcomes are generated</td>
<td>Up to steady state</td>
</tr>
<tr>
<td><strong>Modelling</strong></td>
<td>Decision tree, Markov model...</td>
<td></td>
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<tr>
<td><strong>Handling uncertainty</strong></td>
<td>Probabilistic and one- or multiple-way probabilistic sensitivity analyses, scenario and subgroup analyses</td>
<td></td>
</tr>
<tr>
<td><strong>Discount rate</strong></td>
<td>Costs: 3%, effects: 1.5%</td>
<td>No discounting</td>
</tr>
<tr>
<td><strong>Presenting results</strong></td>
<td>Incremental cost, incremental effect, ICER, cost-effectiveness plane, CEA-curve, results of the sensitivity analyses</td>
<td>Yearly budget impact, disaggregated impact, results of the sensitivity analyses</td>
</tr>
</tbody>
</table>
wide adoption of SBRT for oligometastatic disease, despite the lack of high level of evidence
changing radiation technology
changing imaging modalities
changing patient population
changing disease presentation
changing surgical techniques
changing systemic treatment
technology and techniques
outcome
e and long-term toxicity
Time is not on our side...

- **market introduction**
- **investment by HC provider**

- Performance & safety
- Premarket
- Emerging
- Diffusing
- Established
- Obsolete

- Safety
- Efficacy, effectiveness & efficiency
the development trap

“Developing evidence for comparative effectiveness with no reimbursement is difficult, but the absence of evidence makes justifying reimbursement difficult.”
Evidence Generation
ORIALS

Causal Trials Provide Essential Evidence, but Rarely Offer a Vehicle for Cost-Effectiveness Analysis
Economic modeling (Markov)

Additional assumptions & sensitivity analysis
  to compare all relevant options
  to incorporate all appropriate evidence
  to translate intermediate endpoints into final consequences
  to extrapolate over the appropriate time horizon
  to generalize to other settings or populations

Dosimetric modeling
modeling and evidence generation
Blended evidence generation

- Recorded clinical outcomes
- Models and nonexperimental studies
- Experimental studies

Contributions to Body of Evidence

Periodic Systematic Reviews of the Evidence

Safety and Efficacy

Market Entry

Safety and Effectiveness
Innovative Reimbursement
an arrangement between a manufacturer and payer/provider that enables access to (coverage or reimbursement of)
Innovative Radiotherapy Coverage with Evidence Generation

Collaboration

National Institute for Health & Disability Insurance
Health Care Knowledge Centre
Belgian Cancer Registry
Belgian Radiation Oncology professionals

real-life data collection = feasible!
18/24 centres participate
4-year provisional financing of SBRT prospective evaluation real-life setting

Which departments?
Which indications?
Which technology?
What standards of care?
What outcome?
What budget?

started 2013, final data analysis on-going inclusion in formal reimbursement 2018
embrace the entire spectrum of research to obtain the maximum impact of innovations in radiotherapy

collect more validated evidence on both costs and outcome

adopt a blended evidence generation approach

leverage the potential of innovative reimbursement strategies for early adoption of innovative radiotherapy and to stimulate evidence generation

use coverage with evidence generation to support technology assessment in radiotherapy, involve all relevant stakeholders
Thank you for your attention!