Health Economics

Lionel Perrier, PhD, HDR

Centre Léon Bérard

GATE Lyon Saint-Etienne *(CNRS, Université Lumière Lyon 2, Université Jean Monnet, emlyon business school)*, Lyon, France

Uplift First School 17-22 November 2025

Schedule

A. **Objectives and context**

B. **Taxonomy of health care evaluations and international guidelines**

C. **Effectiveness and costs assessment**

D. **Applications to advanced radiotherapy**

Schedule

A. **Objectives and context**

B. Taxonomy of health care evaluations and international guidelines

C. Effectiveness and costs assessment

D. Applications to advanced radiotherapy

Objectives

In a highly changing context *(increase of innovation, rising costs, higher financial constraints, etc.)*, this Uplift course in health economics aims to detail:

- the evaluation tools to be mobilized to assess the efficiency of health innovations;

- to show how these new conditions contribute making regulatory processes / pricing mechanims more complex;

Specificity of the Health Care Market

- Health care: collection of services, products, institutions, regulations…
- Uncertainty/asymmetric knowledge: how well individual treatments works? Large difference in knowledge between doctors and patients…
- Government interventions: formal certification process before to practice. Minimum level of health insurance coverage; rules determining access to health care…
- Technical change…
- Lack of pricing transparency…

Specificity of the Health Care Market

- Growth on medical prices

"The USA spent $99 billion on orally administered and clinician-administered anticancer therapies *(excluding supportive care)* in 2023 and spending is projected to increase to $180 billion by 2028".

Source Jazowski SA et al. The high costs of anticancer therapies in the USA: challenges, opportunities and progress. Nat Rev Clin Oncol. 2024 Oct 4. doi: 10.1038/s41571-024-00948-1. Epub ahead of print. Erratum in: Nat Rev Clin Oncol. 2024 Oct 30. doi: 10.1038/s41571-024-00958-z. PMID: 39367130. https://pubmed.ncbi.nlm.nih.gov/39367130/

"Between 1995 and 2023, the combined direct and indirect costs of cancer across all *(31 European countries)* countries increased by 43% from EUR 159 billion to EUR 228 billion"

Source: Andrea Manzano et al. The development of the cost of cancer in 31 European countries.. J Clin Oncol 43, 1596-1596(2025).DOI:10.1200/JCO.2025.43.16_suppl.1596
https://ascopubs.org/doi/pdf/10.1200/JCO.2025.43.16_suppl.1596

Specificity of the Health Care Market

The French National Academy of Medicine makes the following recommendations:

– **To the health authorities to**:

– Improve the design of clinical trials, in order to better assess the improvement in the medical benefit provided, particularly concerning rare cancers;

– Significantly shorten the time required to obtain authorization to start a phase 1 clinical trial and, for ATMs, in requiring the Good Manufacturing Practice (GMP) file only at the time of the request marketing authorization;

– Limit the use of the accelerated approval procedure to unmet clinical needs;

– Strengthen European cooperation in clinical trials, analyze the causes of the very high cost of some treatments and the process of price setting, and encourage the involvement of the academic sector, particularly in the production of CAR-T Cells (4), in order to exert downward pressure on the price level;

– Develop medico-economic evaluations based on real-life cohort studies;

– Ensure access to treatments for all patients, regardless of where they live.

– **To the pharmaceutical industry**:

–- Ensure the rigor of post-authorization or post-listing studies, for example on the monitoring of side effects, particularly in the auto-immune field.

– **To prescribers**:

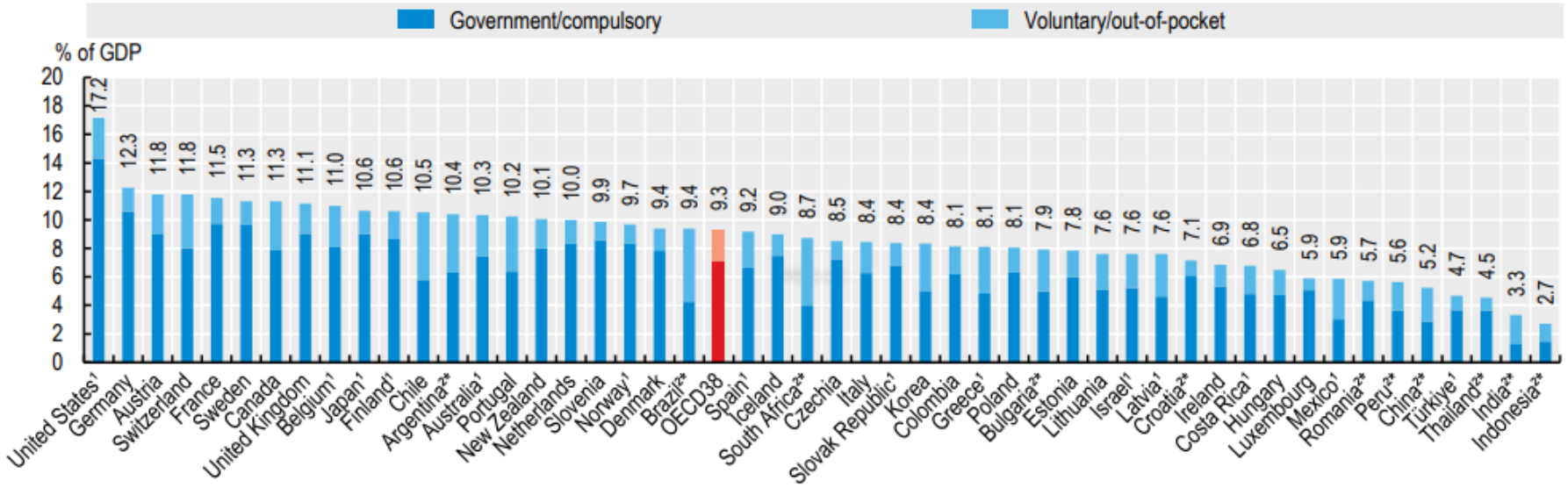
– Exercise an extreme rigor in prescribing these treatments and in monitoring patients in the short, medium or long term;

– Offer patients the opportunity to participate in therapeutic cohort studies.

Source: https://www.academie-medecine.fr/face-au-cout-eleve-des-nouveaux-traitements-medicaux-en-cancerologie/

Health spending

Figure 7.1. Health expenditure as a share of GDP, 2024 (or nearest year)



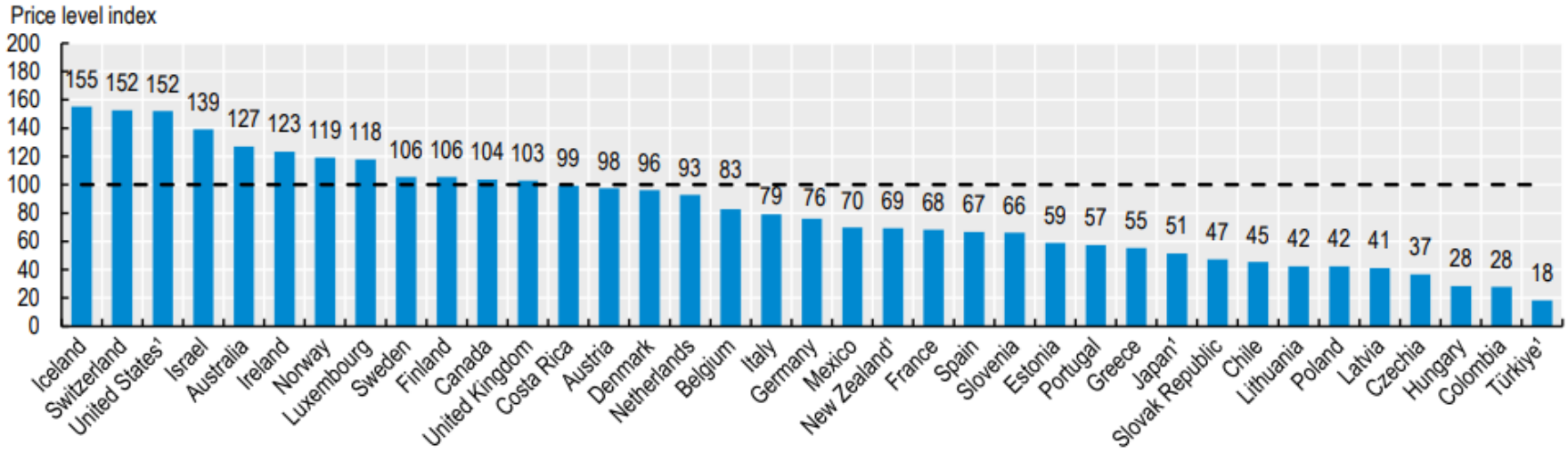
1. OECD estimate for 2024. 2. 2022-2023 data. * Accession/partner country.
Source: OECD Health Statistics 2025; WHO Global Health Expenditure Database.

StatLink https://stat.link/15fht6

Source: https://www.oecd.org/en/publications/health-at-a-glance-2025_8f9e3f98-en.html
Health at a Glance 2025 (EN)

Health spending

Figure 7.6. Comparative price levels in the health sector, 2023 (OECD average = 100)



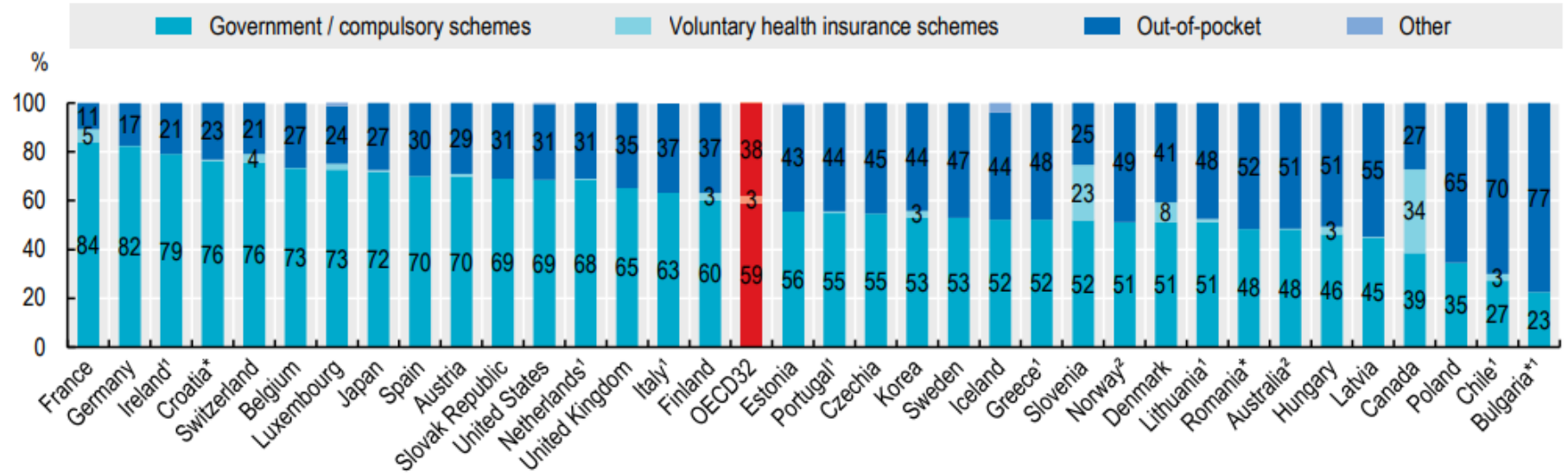
1. For hospitals, PPPs are estimated predominantly by using salaries of medical and non-medical staff (input method).
Source: OECD Statistics 2025.

StatLink https://stat.link/zw0b9d

Source: https://www.oecd.org/en/publications/health-at-a-glance-2025_8f9e3f98-en.html
Health at a Glance 2025 (EN)

Health spending

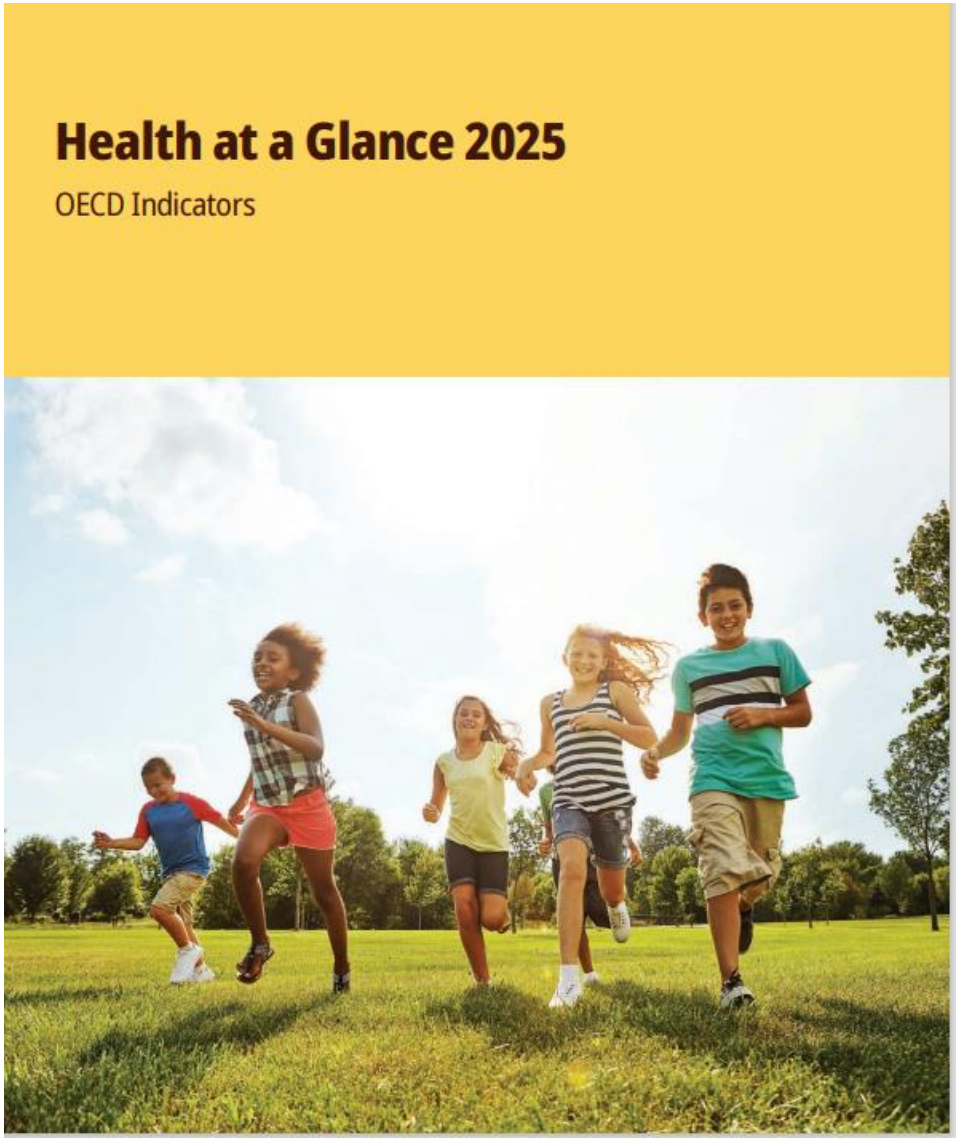
Figure 9.2. Expenditure on retail pharmaceuticals by type of financing, 2023 (or nearest year)



1. Includes medical non-durables. 2. 2022 data. * Accession/partner country.
Source: OECD Health Statistics 2025.

StatLink https://stat.link/gq278w

Source: https://www.oecd.org/en/publications/health-at-a-glance-2025_8f9e3f98-en.html
Health at a Glance 2025 (EN)



Source: https://www.oecd.org/en/publications/health-at-a-glance-2025_8f9e3f98-en.html
Health at a Glance 2025 (EN)

Schedule

A. Objectives and context

B. **Taxonomy of health care evaluations and international guidelines**

C. Effectiveness and costs assessment

D. Applications to advanced radiotherapy

Cost analysis of three-dimensional **radiation therapy** versus intensity-modulated chemoradiotherapy for locally advanced cervical cancer in Peruvian citizens.

Díaz JFR.

Ecancermedicalscience. 2023 Apr 20;17:153

PMID: 37138970 Free PMC article.

Cost-effectiveness of intraoperative **radiation therapy** versus intensity-modulated **radiation therapy** for the treatment of early breast cancer: a disinvestment **analysis**.

Muñoz-Montecinos C, González-Browne C, Maza F, Carreño-Leiton D, González P, Chahuan B, Quirland C.

BMC Health Serv Res. 2024 Apr 3;24(1):417. doi: 10.1186/s12913-024-10739-0.

› Clinicoecon Outcomes Res. 2024 Jun 6:16:483-492. doi: 10.2147/CEOR.S461798. eCollection 2024. rticle.

Cost-Effectiveness and Budget Impact Analyses of Selective Internal Radiation Therapy versus Atezolizumab Plus Bevacizumab from a German Statutory Health Insurance Perspective

Bjoern Schwander [1], Katharina Klesper [2], Siegbert Rossol [3], Ken Herrmann [4], York Francis Zoellner [5]

Cost-Utility **Analysis** of Stereotactic Body **Radiation Therapy** Versus Surgery for Patients With Stage I Non-small Cell Lung Cancer in Japan.

Igarashi A, Onishi H, Shioyama Y, Matsumoto Y, Takayama K, Matsuo Y, Yamashita H, Miyakawa A, , Lee DW, Ito K.

6-67. doi: 10.1016/j.ijrobp.2024.07.2328. Epub 2024 Sep

Cost-benefit analysis of advanced CBCT imaging: Incremental costs and savings.

Larrotta-Castillo DA, Blommestein HM, Kunnen B, Penninkhof JJ, van de Schoot AJAJ, Hoogeman MS, Petit SF.

Radiother Oncol. 2025 Oct;211:111106. doi: 10.1016/j.radonc.2025.111106. Epub 2025 Aug 14.

PMID: 40818490 Free article.

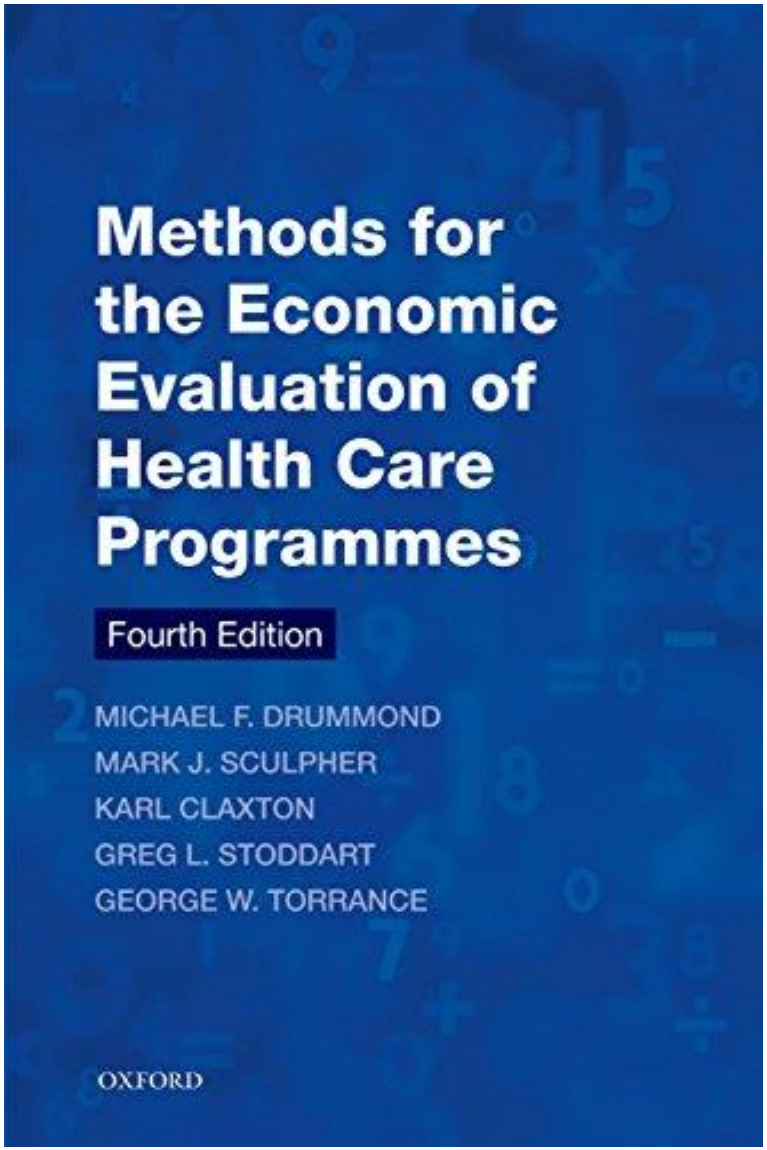
Advanced CBCT systems can replace separate CT scans higher investments costs compared to conventional CB(

A value-based approach to prostate cancer image-guidance in a regional **radiation therapy** centre: a **cost**-minimisation **analysis**.

Robards S, Brown A, Pain T, Patel D, Tan A, Carter H.

Tech Innov Patient Support Radiat Oncol. 2022 Dec 2;24:131-136. doi: 10.1016/j.tipsro.2022.11.002. eCollection 2022 Dec.

PMID: 36561985 Free PMC article.



Drummond, M., Sculpher, M.J., Claxton, K., Stoddart, G.L., Torrance, G.W., Askews & Holts Library Services, 2015. Methods for the economic evaluation of health care programmes. Oxford university press

Are both costs and outcomes of health care programmes examined?

Is there a comparison of two or more health care programmes?

	No		Yes
No	(Examination of outcomes only)	(Examination of costs only)	(Examination of costs and outcomes)
	Partial evaluation		*Partial evaluation*
	Outcome description	Cost description	Cost-outcome description
Yes	*Partial evaluation*		*Full economic evaluation*
	Efficacy/ effectiveness evaluation	Cost analysis	Cost-effectiveness analysis (including cost-utility analysis) Cost-benefit analysis

Drummond, M., Sculpher, M.J., Claxton, K., Stoddart, G.L., Torrance, G.W., Askews & Holts Library Services, 2015. Methods for the economic evaluation of health care programmes. Oxford university press

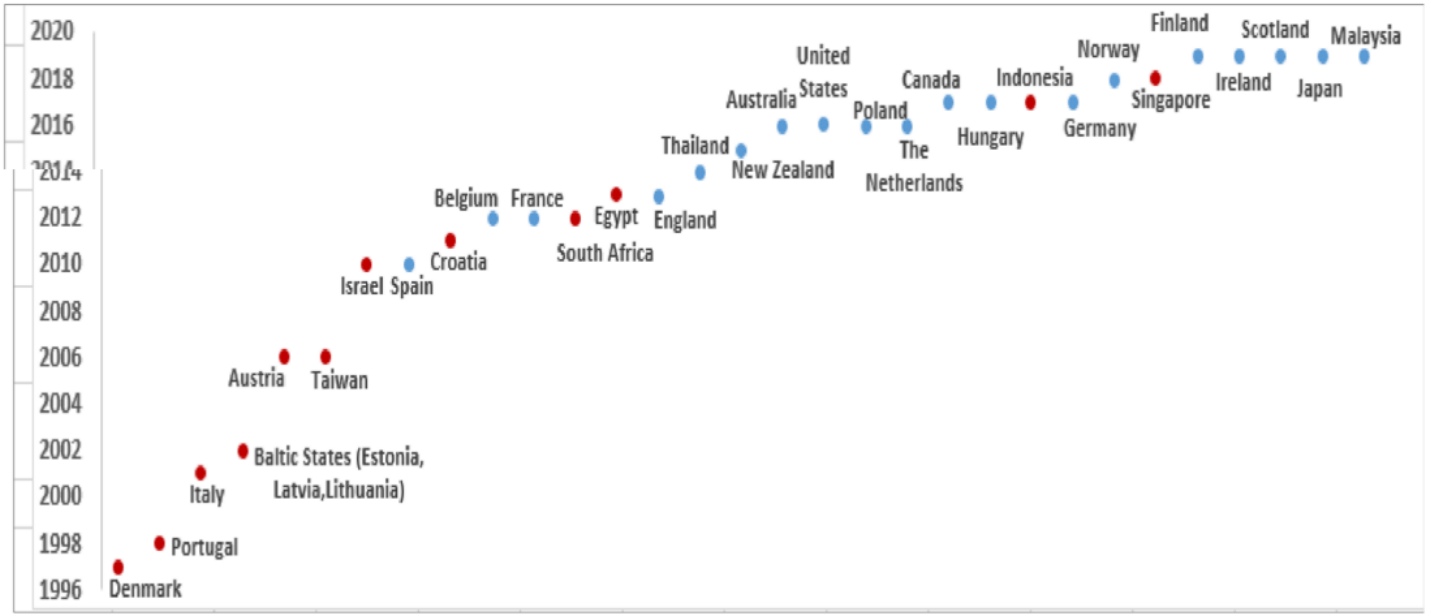
PharmacoEconomics - Open (2021) 5:349–364
https://doi.org/10.1007/s41669-020-00250-7

REVIEW ARTICLE

National Healthcare Economic Evaluation Guidelines: A Cross-Country Comparison

Deepshikha Sharma[1] · Arun Kumar Aggarwal[1] · Laura E. Downey[2] · Shankar Prinja[1]

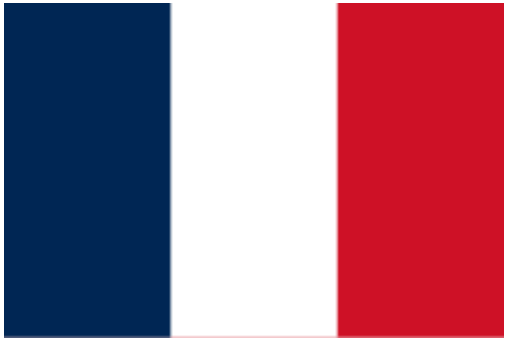
Accepted: 15 December 2020 / Published online: 10 January 2021



*Red dots: Guidelines with only 1 version, Blue dots: Guidelines with multiple versions

Fig. 2 Timeline of the publication of national healthcare economic evaluation guidelines

Source: Sharma D, Aggarwal AK, Downey LE, Prinja S. National Healthcare Economic Evaluation Guidelines: A Cross-Country Comparison. Pharmacoecon Open. 2021 Sep;5(3):349-364. doi: 10.1007/s41669-020-00250-7. Epub 2021 Jan 10. PMID: 33423205; PMCID: PMC8333164.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8333164/pdf/41669_2020_Article_250.pdf



HAS
HAUTE AUTORITÉ DE SANTÉ

EVALUATING
HEALTH TECHNOLOGY

METHODOLOGICAL GUIDANCE

Choices in methods for economic evaluation – HAS

Source: https://www.has-sante.fr/upload/docs/application/pdf/2020-11/methodological_guidance_2020_-choices_in_methods_for_economic_evaluation.pdf

HAS frame of reference

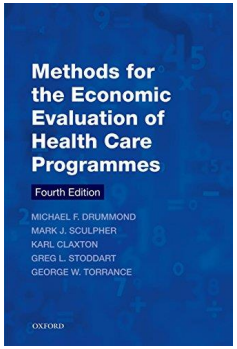
The reference case analysis* – composed of a base-case analysis* and a comprehensive exploration of uncertainty – sets out the main methodological choices defining HAS' frame of reference.

	The chosen methodological options are the responsibility of the author, who must justify their choice.
Objective	Within the framework of HAS' missions, the objective of an economic evaluation is to guide public decision-making regarding the allocation of collective resources, in particular by documenting the cost-effectiveness criteria.
Evaluation method	Cost-effectiveness or cost-utility analysis depending on the nature of the interventions' health effects and data availability. – CEA if health-related quality of life is not an important consequence. – CUA if health-related quality of life is an important consequence.
Perspective	Collective perspective or, failing that, healthcare system perspective. – Population whose health is affected (identification and measure of health effects) and general population (valuation of health preferences) – All of the resources involved in the production of care, irrespective of their source of funding.
Population analysed	All of the individuals concerned, either directly or indirectly, by the intervention evaluated.
Comparator interventions	All options in the population analysed should be identified. The selection of the comparator interventions should be duly justified.
Time horizon	The choice of a time horizon spanning the entire lifetime, or a specific period should be based on an trade-off between the information produced and the uncertainty generated by extrapolation over time.
Discounting	Beyond 12 months, discounting is based on the public discount rate applicable at the time of the evaluation (set at 2.5% at the time of publication of this guidance). After 30 years, the discount rate gradually decreases to 1.5%.
Health outcome criteria	CEA: lifetime (indicator: life years / all-cause mortality). CUA: quality-adjusted life years (indicator: QALY)
Cost criteria	Direct costs based on production costs or, failing that, on their tariff/price.
Conclusion of the evaluation	In terms of cost-effectiveness, the results presented identify the interventions on the cost-effectiveness frontier and provide an estimate of the ICER or NB on the cost-effectiveness frontier. Exploration of uncertainty through deterministic and probabilistic approaches Analysis of expenditure transfers between funders
Critical appraisal of the evaluation	Analysis of the validity of the method and uncertainty of the results Discussion on the conclusions and limitations of the evaluation

Guideline 2: Choice of the evaluation method

The reference case analysis uses the cost-utility analysis and the cost-effectiveness analysis as economic evaluation methods. The choice of the method first depends on the nature of the health-related consequences – whether expected or observed – of the intervention being evaluated.

Source: https://www.has-sante.fr/upload/docs/application/pdf/2020-11/methodological_guidance_2020_-choices_in_methods_for_economic_evaluation.pdf



Is there a comparison of two or more health care programmes?

Are both costs and outcomes of health care programmes examined?

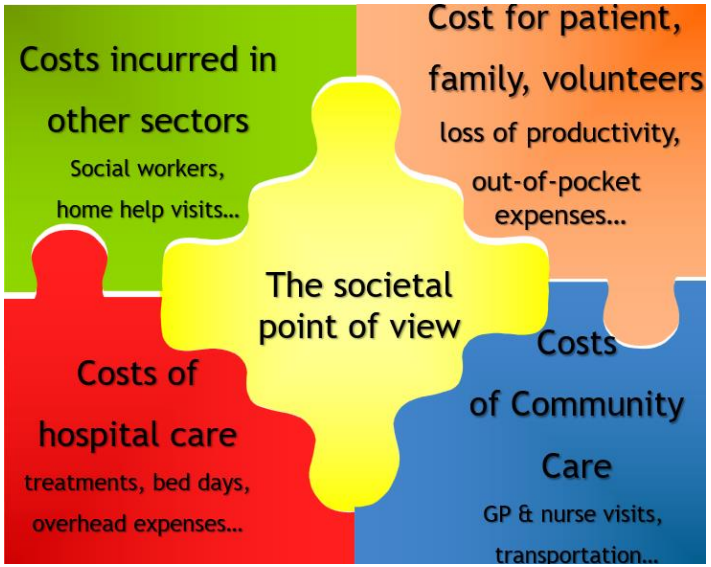
	No		Yes
No	(Examination of outcomes only)	(Examination of costs only)	(Examination of costs and outcomes)
	Partial evaluation		*Partial evaluation*
	Outcome description	Cost description	Cost-outcome description
Yes	*Partial evaluation*		*Full economic evaluation*
	Efficacy/ effectiveness evaluation	Cost analysis	Cost-effectiveness analysis (including cost-utility analysis) Cost-benefit analysis

Drummond, M., Sculpher, M.J., Claxton, K., Stoddart, G.L., Torrance, G.W., Askews & Holts Library Services, 2015. Methods for the economic evaluation of health care programmes. Oxford university press

15

Guideline 3: Choice of the perspective

The reference case analysis should be based on a collective perspective, covering all of the people or institutions affected (in terms of health effects or cost) by the production of an intervention within the scope of the overall patient care.



Source: https://www.has-sante.fr/upload/docs/application/pdf/2020-11/methodological_guidance_2020_-choices_in_methods_for_economic_evaluation.pdf

Guideline 5: Choice of interventions to be compared

The reference case analysis should identify all clinically relevant interventions in the population analysed.

The arguments supporting the inclusion or exclusion of an intervention in the reference case analysis should be clearly set out.

› Cost Eff Resour Alloc. 2024 Sep 13;22(1):66. doi: 10.1186/s12962-024-00577-6.

Cost-effectiveness of proton beam therapy vs. conventional radiotherapy for patients with brain tumors in Sweden: results from a non-randomized prospective multicenter study

Filipa Sampaio [1], Ulrica Langegård [2 3], Patricio Martínez de Alva [4], Sergio Flores [4], Camilla Nystrand [4], Per Fransson [5], Emma Ohlsson-Nevo [6], Ingrid Kristensen [7 8], Katarina Sjövall [9], Inna Feldman [4], Karin Ahlberg [2]

Radiotherapy and Oncology 183 (2023) 109417

Contents lists available at ScienceDirect

Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

Guidelines

Cost-effectiveness of proton radiotherapy versus photon radiotherapy for non-small cell lung cancer patients: Exploring the model-based approach

Loeki Aldenhoven [a], B. Ramaekers [a,*], J. Degens [b], C. Oberije [c], J. van Loon [d], A.C. Dingemans [e], D. De Ruysscher [d], M. Joore [a]

[a] Department of Clinical Epidemiology and Medical Technology Assessment; [b] Department of Respiratory Medicine, School for Nutrition and Translational Research in Metabolism (NUTRIM); [c] The D-Lab: Decision Support for Precision Medicine, GROW - School for Oncology and Developmental Biology; [d] Department of Radiation Oncology (MAASTRO clinic), GROW School for Developmental Biology and Oncology, Maastricht University Medical Center, Maastricht, the Netherlands; and [e] Department of Respiratory Medicine, Erasmus MC Cancer Institute, University Medical Center, Rotterdam, the Netherlands

Source: https://www.has-sante.fr/upload/docs/application/pdf/2020-11/methodological_guidance_2020_-choices_in_methods_for_economic_evaluation.pdf
Cost-effectiveness of proton beam therapy vs. conventional radiotherapy for patients with brain tumors in Sweden: results from a non-randomized prospective multicenter study - PubMed
Cost-effectiveness of proton radiotherapy versus photon radiotherapy for non-small cell lung cancer patients: Exploring the model-based approach - PubMed

Guideline 6: Choice of the time horizon

The time horizon of the evaluation may be defined as the entire lifetime or a specific duration.

The choice of the time horizon should be based on an trade-off between the information produced by taking into account the expected or observed consequences of an intervention over the long term, and the uncertainty generated by extrapolation over time. This trade-off should be clearly set out and the choice should be justified.

Guideline 7: Discounting method

Future costs and health outcomes should be discounted to present values whenever the time horizon exceeds 12 months.

The reference case analysis should use the public discount rate applicable at the time of the evaluation. On the date of publication of this guidance, that rate was 2.5% for time horizons of less than 30 years. Beyond that, the rate gradually decreases to a floor level set at 1.5%.

In the reference case analysis, costs and results should be discounted using the same rate.

Source: https://www.has-sante.fr/upload/docs/application/pdf/2020-11/methodological_guidance_2020_-choices_in_methods_for_economic_evaluation.pdf

Guideline 15: Utility score evaluation methods

The utility scores used to weight life-years should be estimated using a multi-attribute approach, comprising the collection of health state data from patients via a generic questionnaire and the valuation of health states according to the preferences of the general population.

Among available classification systems, EQ-5D-5L is recommended (French EQ-5D-5L value set and EQ-5D-5L questionnaire). The French value set which prevails at the time of the evaluation should be used.

Source: https://www.has-sante.fr/upload/docs/application/pdf/2020-11/methodological_guidance_2020_-choices_in_methods_for_economic_evaluation.pdf

Guideline 18: Evaluation of costs

The evaluation of the total cost of an intervention is based on the intervention's production costs. This requires the identification, measurement and valuation of the resources consumed.

The scope of the cost items evaluated depends on the perspective adopted.

Under a collective perspective, all resources consumed in the production of the overall patient care are taken into consideration. They cover the domestic sphere (e.g. informal care), the healthcare sphere (e.g. stays, procedures, and health products) and the medico-social sphere (e.g. stays, personal care services).

Under the healthcare system perspective, the resources considered are those involved in the production of care (stays, procedures, and healthcare products).

Only direct costs should be considered in the reference case analysis.

A direct cost analysis may be presented as a supplemental analysis.

Guideline 25: Exploration of uncertainty in the model

A systematic exploration of the sources of uncertainty associated with the evaluation's structural choices, the modelling choices and the model parameter estimations should be presented according to an appropriate methodology.

Sensitivity analyses should quantify the impact of a different structural choice in the reference case analysis (e.g. perspective, time horizon, population analysed, comparators, discount rate).

Source: https://www.has-sante.fr/upload/docs/application/pdf/2020-11/methodological_guidance_2020_-choices_in_methods_for_economic_evaluation.pdf

IQWiG

General Methods[a]

Version 7.0
of 19 September 2023

[a] This translation is based on the German document *Allgemeine Methoden* (Version 7.0) of 19 September 2023. Please note: The translation is provided as a service by IQWiG to English-language readers. However, solely the German original text is absolutely authoritative and legally binding.

Source: Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen
https://www.iqwig.de/en/about-us/methods/methods-paper/https://www.iqwig.de/methoden/general-methods_version-7-0.pdf

Table 6: Overview over the components of a reference case (multipage table)

HEE component	Explanation
Question / decision problem	▪ This is defined in the G-BA's commission[a], which specifies in particular the following components:
Population	▪ E.g., the population (or individual subpopulations or subgroups) eligible for treatment with the drug to be assessed
Intervention and comparator(s)	▪ Comparison between the drug to be assessed and the treatment option of the appropriate comparator therapy used in the preceding benefit assessment procedure for the demonstration of added benefit ▪ Separate analyses are conducted taking into account the treatment costs of other treatment options covered by the appropriate comparator therapy (sensitivity analyses in the sense of a cost variation). ▪ Depending on the commission, other comparators may be considered in the HEE. A new benefit assessment including the other comparators may be necessary.
Health economic outcome	▪ ICER: difference in costs divided by difference in the outcome assessed in the benefit assessment (weighted if applicable) or difference in QALYs
Perspective	▪ SHI-insured community
Time horizon	▪ Depending on the research question or commission, the available evidence and the perspective of the decision-maker, an appropriate time horizon is chosen that is sufficient to depict all relevant medical and economic consequences. ▪ In addition, a 5-year time horizon is considered in a sensitivity analysis.
Study type HEE	▪ Cost-utility analysis or cost-effectiveness analysis, each with an additional BIA.
Effectiveness and other clinical input parameters	▪ A benefit assessment according to §35a SGB V should already be available. Its results are included in the decision-analytic model, particularly for determining transition probabilities. ▪ The result of the HEE does not call into question the result of the benefit assessment. ▪ Development of the decision-analytic model usually requires additional clinical input parameters to depict the health care situation.
Utilities	▪ For the calculation of QALYs, the utilities used in the decision-analytic model should be based on valuations by patients. ▪ Utilities based on valuations by the general population are particularly useful if the valuations do not differ from those of patients.
Costs	▪ The costs should be as up-to-date as possible: The resources used should be relevant and justified. ▪ Direct (medical and non-medical) reimbursable and non-reimbursable costs should be recorded. ▪ The quantification and valuation of resource use may require a combination of different approaches (bottom-up, top-down, micro- and macro[gross]-costing approaches).
Inflation adjustment and discounting	▪ If cost data are from different time periods, they need to be adjusted for inflation. ▪ After the first year in the base case, costs and benefits that last longer than 1 year should be discounted at the identical constant rate of 3% per year.

Source: Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen https://www.iqwig.de/en/about-us/methods/methods-paper/https://www.iqwig.de/methoden/general-methods_version-7-0.pdf

NICE National Institute for Health and Care Excellence

NICE health technology evaluations: the manual

NICE process and methods
Published: 31 January 2022
Last updated: 23 October 2025

www.nice.org.uk/process/pmg36

Source: https://www.nice.org.uk/process/pmg36/chapter/introduction-to-health-technology-evaluation

Table 4.1 Summary of the reference case

Element of health technology assessment	Reference case	Section providing details
Defining the decision problem	The scope developed by NICE	4.2.4 to 4.2.6
Comparator(s)	As listed in the scope developed by NICE	2.2.12 to 2.2.16, 4.2.6, 4.2.13
Perspective on outcomes	All health effects, whether for patients or, when relevant, carers	4.2.7, 4.2.8
Perspective on costs	NHS and personal social services (PSS)	4.2.9 and 4.2.10
Types of economic evaluation	Cost-utility analysis with fully incremental analysis Cost-comparison analysis	4.2.14 to 4.2.17 4.2.18 to 4.2.21
Time horizon	Long enough to reflect all important differences in costs or outcomes between the technologies being compared	4.2.22 to 4.2.25
Synthesis of evidence on health effects	Based on systematic review	3.4
Measuring and valuing health effects (see note)	Health effects should be expressed in quality-adjusted life years (QALYs). The EQ-5D is the preferred measure of health-related quality of life in adults	4.3.1, 4.3.6
Source of data for measurement of health-related quality of life (see note)	Reported directly by patients or carers, or both	4.3.3

Source: https://www.nice.org.uk/process/pmg36/chapter/introduction-to-health-technology-evaluation

Guidelines for submitting Health Economic Evaluations to AIFA for pricing and reimbursement of medicines (Section E of the dossier)

The process for pricing and reimbursement of medicinal products begins with the submission to AIFA of an application (P&R dossier) by pharmaceutical companies and ends with the resolution of the AIFA Board of Directors and the subsequent publication in the Italian Official Journal, after consulting the Technical-Scientific Committee (CTS) and the Pricing and Reimbursement Committee (CPR).

According to the Ministerial Decree 2 August 2019, pharmaceutical companies are required to submit a P&R dossier in line with the provisions of the AIFA Guideline to the submission of applications published on the website of the Agency. The following document is an extract from the AIFA Guideline concerning the compilation of Section E of the P&R dossier and the related Appendix 2.

Pricing and reimbursement >
Negotiation and reimbursement >
Economic evaluations >
Technical and scientific reports >
Economic Evaluations guidelines >

Source: Economic Evaluations guidelines | Italian Medicines Agency

Dossier P&R con analisi farmacoeconomiche	Tipologia di analisi farmacoeconomiche nei dossier P&R				Totale BIA	Totale CEA	Totale Dossier P&R
Tipologie negoziali	**BIA**	**CEA**	**CEA + BIA**	**Altro**			
01 - Farmaci orfani per malattie rare 100 gg	15	4	7	2	22	11	28
02 - Nuove entità chimiche	33	4	19	0	52	23	56
04 - Estensione delle indicazioni terapeutiche/posologia	20	13	19	5	39	32	57
05 - Confezioni in sostituzione o nuove, per numero di unità posologiche o per forma farmaceutica o device	1	0	2	0	3	2	3
06 - Modifica del dosaggio unitario	2	1	0	0	2	1	3
07 - Variazioni del regime di rimborsabilità	1	0	1	0	2	1	2
09 - Rinegoziazione prezzo e/o condizioni	0	0	0	1	0	0	1
11 - Associazione di principi attivi noti	15	0	1	0	16	1	16
Totale	**87**	**22**	**49**	**8**	**136**	**71**	**166**

Source: Le valutazioni economiche sottomesse ad AIFA nei dossier di richiesta della rimborsabilità e del prezzo

MUNI | HEPII

English

Domů Projekty a publikace Master's Degree Spolupráce Lidé Kontakt Newsletter MUNI I-DAYS 2025

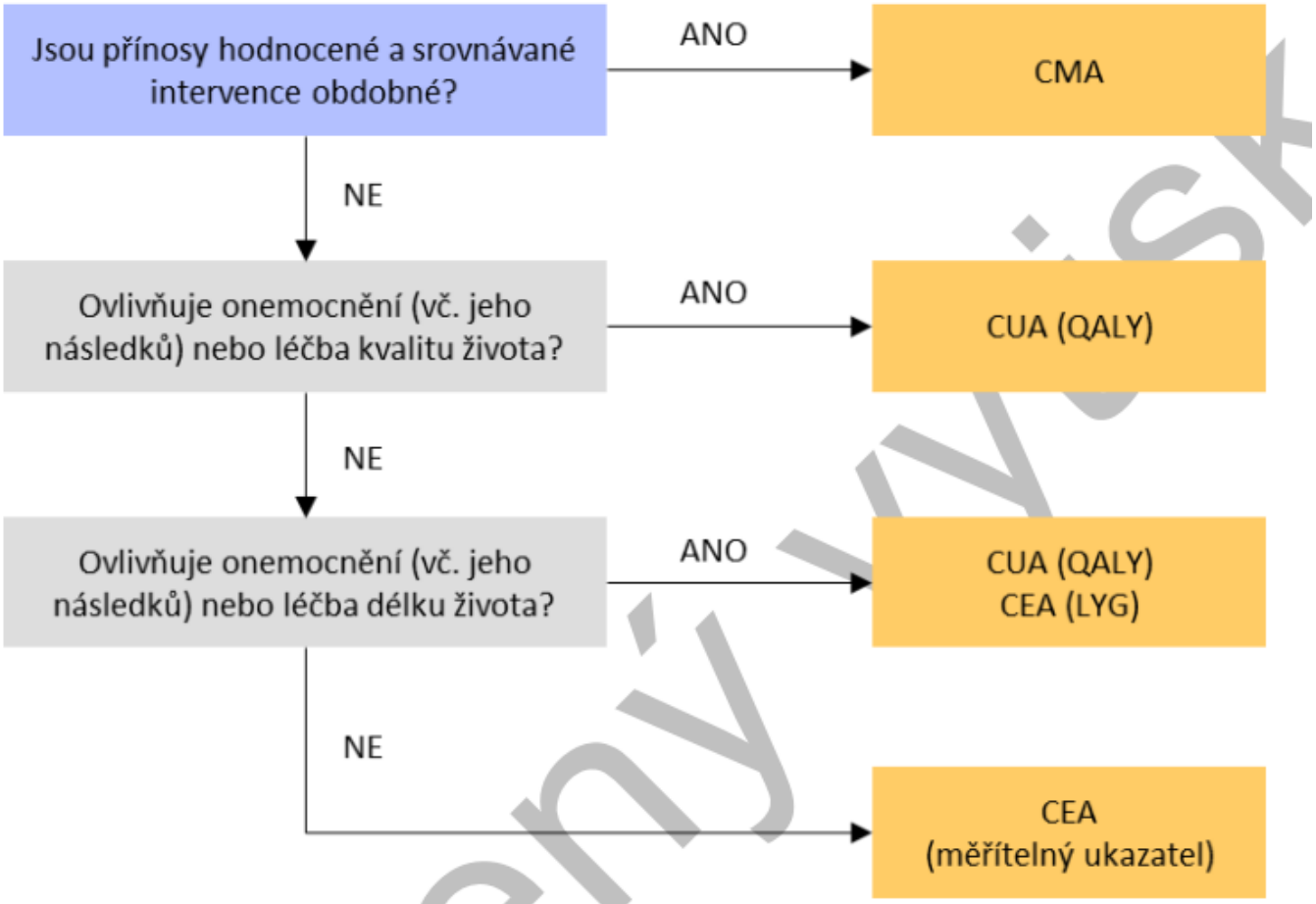
Novinky > Nová éra ekonomie zdravotnictví v České republice: ohlédnutí za rokem 2024

Nová éra ekonomie zdravotnictví v České republice: ohlédnutí za rokem 2024

Rok 2024 byl pro ekonomii zdravotnictví v České republice mimořádně úspěšný. V krátkém ohlédnutí za tímto rokem se podívejme, co se nám v Institutu pro zdravotní ekonomii, politiku a inovace (HEPII) na Masarykově univerzitě podařilo.

2024 has been an enormously successful year for health economics in the Czech Republic. In a brief review of the year, let's see what we have accomplished at the Health Economics, Policy, and Innovation Institute (HEPII) at Masaryk University.

Source: https://hepii.econ.muni.cz/en/news/a-new-era-for-health-economics-in-the-czech-republic-looking-back-at-2024



Obrázek 2 Rozhodovací strom výběru typu analýzy a parametru přínosu

Source: file-46-659e5bf651091.pdf

ISPOR - Good Practices Reports & More

Value-Based Health Care (VBHC)

- Increasing attention to the work of Michael E. Porter developed at Harvard more than ten years ago *[Porter 2009; Porter 2010 ; Kaplan & Porter 2011 ; Porter & Lee 2013]*

$$v = \frac{o}{c}$$

- Value-Based Health Care (VBHC) model that aims to improve health outcomes per monetary unit spent

- Reducing costs c while maintaining the same results o or improving results while keeping costs constant. Both scenarios lead to an increase in value.

=> Requires rigorous measurement of v value

Porter ME. A strategy for health care reform--toward a value-based system. N Engl J Med. 2009;361(2):109-12.
Porter ME. What is value in health care? New England Journal of Medicine 2010; 363 (26), 2477-2481.
Kaplan R, Porter M. How to solve the cost crisis in health care?. Harvard Bus Rev 2011;9:47–64.
Porter, M.E. and Lee, T.H., 2013. The strategy that will fix health care. Harvard business review, 91(12), pp.24-24.

Value-Based Health Care (VBHC)

- Requires the production of accurate cost information over the course of the cycle of care/episodes of care *(hospital cost accounting systems designed more for billing)*
- Requires the adaptation of health information systems
- Literature review by Reitblat et al. 2021: only one study *(of 22 articles)* estimates costs for all patients
- Alves et al. 2018 literature review of economic analyses in cancer using the TDABC *(N=27 studies (U.S. and Belgium (n=6 each), Canada N=3))*

Alves RJV, Etges APBDS, Neto GB, Polanczyk CA. Activity-Based Costing and Time-Driven Activity-Based Costing for Assessing the Costs of Cancer Prevention, Diagnosis, and Treatment: A Systematic Review of the Literature. Value Health Reg Issues. 2018 Dec;17:142-147. doi: 10.1016/j.vhri.2018.06.001. Epub 2018 Aug 24. PMID: 30149318.
Reitblat C, Bain PA, Porter ME, Bernstein DN, Feeley TW, Graefen M, Iyer S, Resnick MJ, Stimson CJ, Trinh QD, Gershman B. Value-Based Healthcare in Urology: A Collaborative Review. Eur Urol. 2021 May;79(5):571-585. doi: 10.1016/j.eururo.2020.12.008. Epub 2021 Jan 4. PMID: 33413970.

Value-Based Health Care (VBHC)

- Is it possible to calculate a ratio? Problem: we don't have to deal with a single result *[Lindgren P & Althin R 2021]*

⇒ Lindgren P & Althin propose to express the value equation using a vector notation *(o would then correspond to a vector of patient relevant outcomes)*

⇒ Poses the question of how value-based health care is positioned in relation to microeconomic tools *(producer theory, etc.)*

Lindgren P, Althin R. Something borrowed, something new: measuring hospital performance in the context of value based health care. Eur J Health Econ. 2021 Aug;22(6):851-854. doi: 10.1007/s10198-020-01209-5. PMID: 32548650.

Value-Based Health Care (VBHC)

⇒ Also raises the question of the positioning of value-based health care in relation to economic evaluation such as Cost-Effectiveness Analysis (CEA)

- Value-based health care still under construction, "in infancy" *[Walraven et al. 2021]*
- CEA: a well-documented and widely accepted field with a defining role in recent decades

Drummond, M., Sculpher, M.J., Claxton, K., Stoddart, G.L., Torrance, G.W., Askews & Holts Library Services, 2015. Methods for the economic evaluation of health care programmes. Oxford university press.
Walraven J, Jacobs MS, Uyl-de-Groop CA. Leveraging the similarities between cost-effectiveness Analysis and Value-Based healthcare. Value Health 2021. Jul;24(7):1038-1044.

	ACE (Cost-effectiveness Analysis)	Soins de santé fondés sur la valeur (Value-Based Health Care)
Formulas	$\frac{\Delta C}{\Delta E}$	$\frac{\text{Outcomes}}{Total\ costs}$
Perspectives	Health system, collective, societal	Patients
Time horizon	Whole life	Cycle / episodes of care
Outcomes	QALY	Multidimensional approaches
Methods	CEA based on experimental or quasi-experimental studies Modeling (Markov model, discrete event simulations)	Time Driven Activity Based Costing Process Approach

Tsevat J, Moriates C. Value-Based Health Care Meets Cost-Effectiveness Analysis. Ann Intern Med. 2018 Sep 4;169(5):329-332. doi: 10.7326/M18-0342. Epub 2018 Aug 7. PMID: 30083766.

Schedule

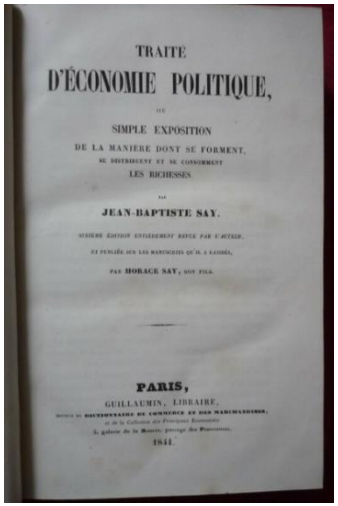
A. Objectives and context

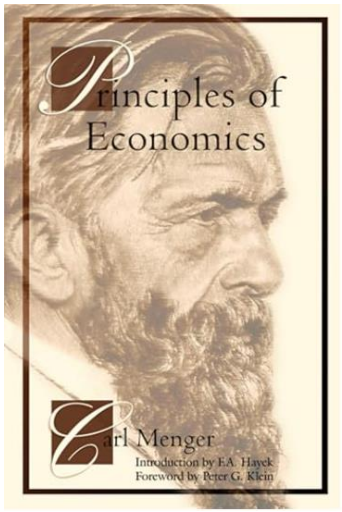
B. Taxonomy of health care evaluations and international guidelines

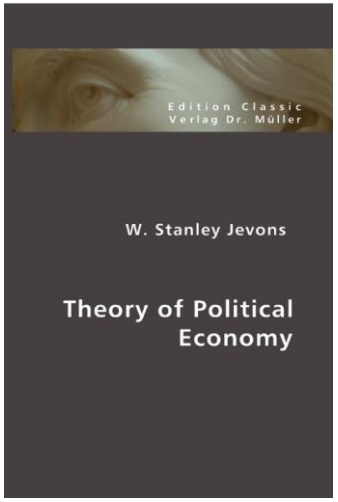
C. **Effectiveness and costs assessment**

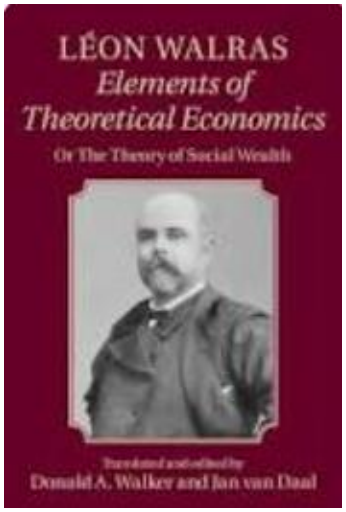
D. Applications to advanced radiotherapy

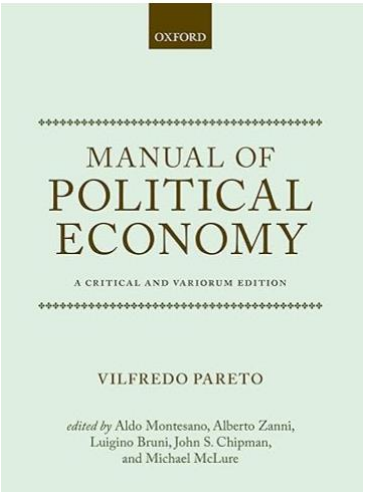
Utility, Preference, Value set

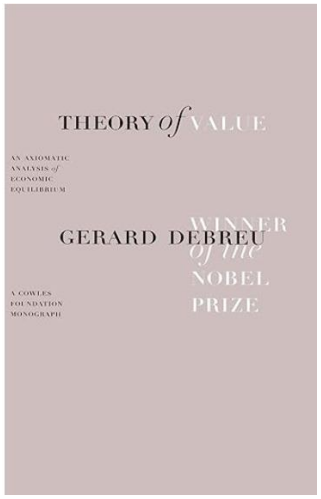












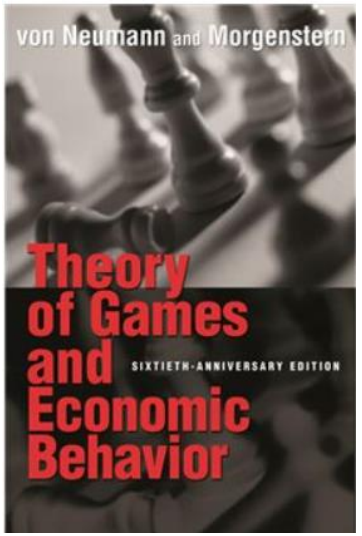
ECONOMIC THEORY IN THE MATHEMATICAL MODE

Nobel Memorial lecture, 8 December, 1983

by

GERARD DEBREU

Department of Economics, University of California, Berkeley, CA 94720



Utility, Preference, Value set

HSR HEALTH SERVICES RESEARCH
Impacting Health Practice and Policy Through State-of-the-Art Research and Thinking

Health Serv Res. 1972 Summer;7(2):118–133.

A Utility Maximization Model for Evaluation of Health Care Programs

George W Torrance [1], Warren H Thomas [1], David L Sackett [1]

Applications of utility theory in the economic evaluation of health care

Toepassingen van nutstheorie in de economische evaluatie van gezondheidszorg

Proefschrift

Ter verkrijging van de graad van doctor aan de Erasmus Universiteit Rotterdam op gezag van de rector magnificus prof. dr. P.W.C. Akkermans M.A. en volgens het besluit van het college voor promoties.

De openbare verdediging zal plaatsvinden op donderdag 18 januari 1996 om 16.00 uur

door

Han Bleichrodt
geboren te Almelo

ELSEVIER

Socio-Economic Planning Sciences
Volume 10, Issue 3, 1976, Pages 129-136

Comparative Study > J Health Econ. 1997 Apr;16(2):155-75. doi: 10.1016/s0167-6296(96)00509-7.

Social preferences for health states: An empirical evaluation of three measurement techniques ☆

George W. Torrance

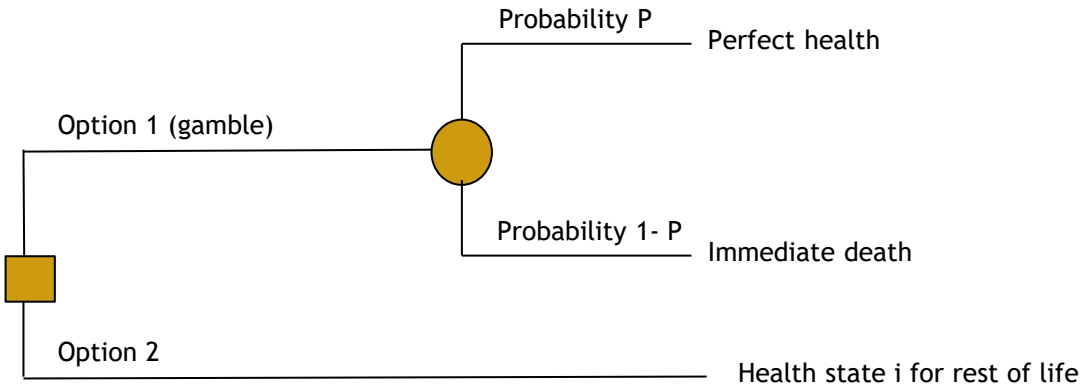
Standard gamble, time trade-off and rating scale: experimental results on the ranking properties of QALYs

H Bleichrodt [1], M Johannesson

Source: Social preferences for health states: An empirical evaluation of three measurement techniques - ScienceDirect
https://www.sciencedirect.com/science/article/abs/pii/0038012176900367
A utility maximization model for evaluation of health care programs - PubMed
https://repub.eur.nl/pub/22305/960118_Bleichrodt,%20Han.pdf960118_Bleichrodt, Han.pdf

Utility, Preference, Value set

e.g. the Standard gamble method



- Standard gamble follows the axioms of von Neumann & Morgenstern's expected utility theory.
- Involves asking a person to choose between a risky option *(the person either lives in perfect health for the rest of life or dies immediately)* and a certain option *(where the person remains in Health State i for the rest of live).*
- The probability of perfect health is varied until the person is indifferent between the gamble and the certain health state.

› Pharmacoeconomics. 1998 Apr;13(4):421-33. doi: 10.2165/00019053-199813040-00005.

Valuation of EuroQOL (EQ-5D) health states in an adult US sample

J A Johnson [1], S J Coons, A Ergo, G Szava-Kovats

Affiliations + expand

PMID: 10178666 DOI: 10.2165/00019053-199813040-00005

› Health Econ. 2018 Jan;27(1):7-22. doi: 10.1002/hec.3564. Epub 2017 Aug 22.

Valuing health-related quality of life: An EQ-5D-5L value set for England

Nancy J Devlin [1 2], Koonal K Shah [1], Yan Feng [1], Brendan Mulhern [2 3], Ben van Hout [2]

Affiliations + expand

PMID: 28833869 PMCID: PMC6680214 DOI: 10.1002/hec.3564

› Pharmacoeconomics. 2023 Nov;41(11):1515-1524. doi: 10.1007/s40273-023-01280-9. Epub 2023 Jun 21.

EQ-5D-5L Value Set for Slovenia

Valentina Prevolnik Rupel [1 2], Marko Ogorevc [3]

Affiliations + expand

PMID: 37341959 PMCID: PMC10570207 DOI: 10.1007/s40273-023-01280-9

https://pubmed.ncbi.nlm.nih.gov/31912325/
https://pubmed.ncbi.nlm.nih.gov/28833869/
EQ-5D-5L Value Set for Slovenia - PubMed

Under each heading, please tick the ONE box that best describes your health TODAY

MOBILITY

- I have no problems in walking about ☐
- I have slight problems in walking about ☐
- I have moderate problems in walking about ☐
- I have severe problems in walking about ☐
- I am unable to walk about ☐

SELF-CARE

- I have no problems washing or dressing myself ☐
- I have slight problems washing or dressing myself ☐
- I have moderate problems washing or dressing myself ☐
- I have severe problems washing or dressing myself ☐
- I am unable to wash or dress myself ☐

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

- I have no problems doing my usual activities ☐
- I have slight problems doing my usual activities ☐
- I have moderate problems doing my usual activities ☐
- I have severe problems doing my usual activities ☐
- I am unable to do my usual activities ☐

PAIN / DISCOMFORT

- I have no pain or discomfort ☐
- I have slight pain or discomfort ☐
- I have moderate pain or discomfort ☐
- I have severe pain or discomfort ☐
- I have extreme pain or discomfort ☐

ANXIETY / DEPRESSION

- I am not anxious or depressed ☐
- I am slightly anxious or depressed ☐
- I am moderately anxious or depressed ☐
- I am severely anxious or depressed ☐
- I am extremely anxious or depressed ☐

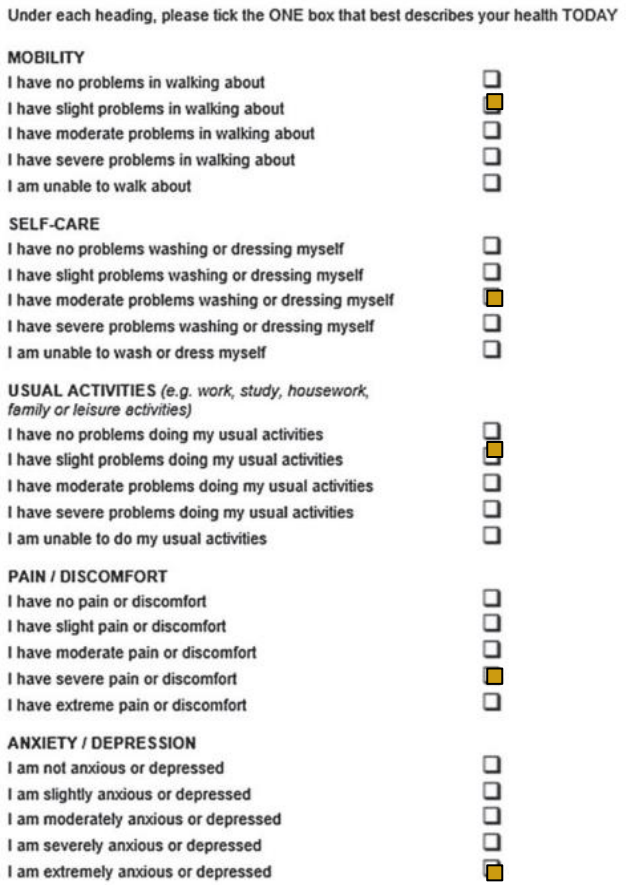
Source: Devlin NJ, Shah KK, Feng Y, Mulhern B, van Hout B. Valuing health-related quality of life: An EQ-5D-5L value set for England. Health Econ. 2018 Jan;27(1):7-22. doi: 10.1002/hec.3564. Epub 2017 Aug 22. PMID: 28833869; PMCID: PMC6680214. https://pmc.ncbi.nlm.nih.gov/articles/PMC6680214/pdf/HEC-27-7.pdfValuing health-related quality of life: An EQ-5D-5L value set for England

TABLE 2 An EQ-5D-5L value set for England

	Central estimate[a]	Value for health state 23245
Constant	1.000	1.000
Mobility		
Slight	0.058	0.058
Moderate	0.076	
Severe	0.207	
Unable	0.274	
Self-care		
Slight	0.050	
Moderate	0.080	0.080
Severe	0.164	
Unable	0.203	
Usual activities		
Slight	0.050	0.050
Moderate	0.063	
Severe	0.162	
Unable	0.184	
Pain/discomfort		
Slight	0.063	
Moderate	0.084	
Severe	0.276	0.276
Extreme	0.335	
Anxiety/depression		
Slight	0.078	
Moderate	0.104	
Severe	0.285	
Extreme	0.289	0.289
The value for health state 23245	$1 - (0.058 + 0.080 + 0.050 + 0.276 + 0.289)$	$= 0.247$

CODA results from final model available from the authors upon request.

[a]Note that the coefficients reported here are the mean coefficients from the Bayesian regressions.



Under each heading, please tick the ONE box that best describes your health TODAY

MOBILITY
- I have no problems in walking about ☐
- I have slight problems in walking about ■
- I have moderate problems in walking about ☐
- I have severe problems in walking about ☐
- I am unable to walk about ☐

SELF-CARE
- I have no problems washing or dressing myself ☐
- I have slight problems washing or dressing myself ☐
- I have moderate problems washing or dressing myself ■
- I have severe problems washing or dressing myself ☐
- I am unable to wash or dress myself ☐

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*
- I have no problems doing my usual activities ☐
- I have slight problems doing my usual activities ■
- I have moderate problems doing my usual activities ☐
- I have severe problems doing my usual activities ☐
- I am unable to do my usual activities ☐

PAIN / DISCOMFORT
- I have no pain or discomfort ☐
- I have slight pain or discomfort ☐
- I have moderate pain or discomfort ☐
- I have severe pain or discomfort ■
- I have extreme pain or discomfort ☐

ANXIETY / DEPRESSION
- I am not anxious or depressed ☐
- I am slightly anxious or depressed ☐
- I am moderately anxious or depressed ☐
- I am severely anxious or depressed ☐
- I am extremely anxious or depressed ■

Source: Devlin NJ, Shah KK, Feng Y, Mulhern B, van Hout B. Valuing health-related quality of life: An EQ-5D-5L value set for England. Health Econ. 2018 Jan;27(1):7-22. doi: 10.1002/hec.3564. Epub 2017 Aug 22. PMID: 28833869; PMCID: PMC6680214. https://pmc.ncbi.nlm.nih.gov/articles/PMC6680214/pdf/HEC-27-7.pdfValuing health-related quality of life: An EQ-5D-5L value set for England

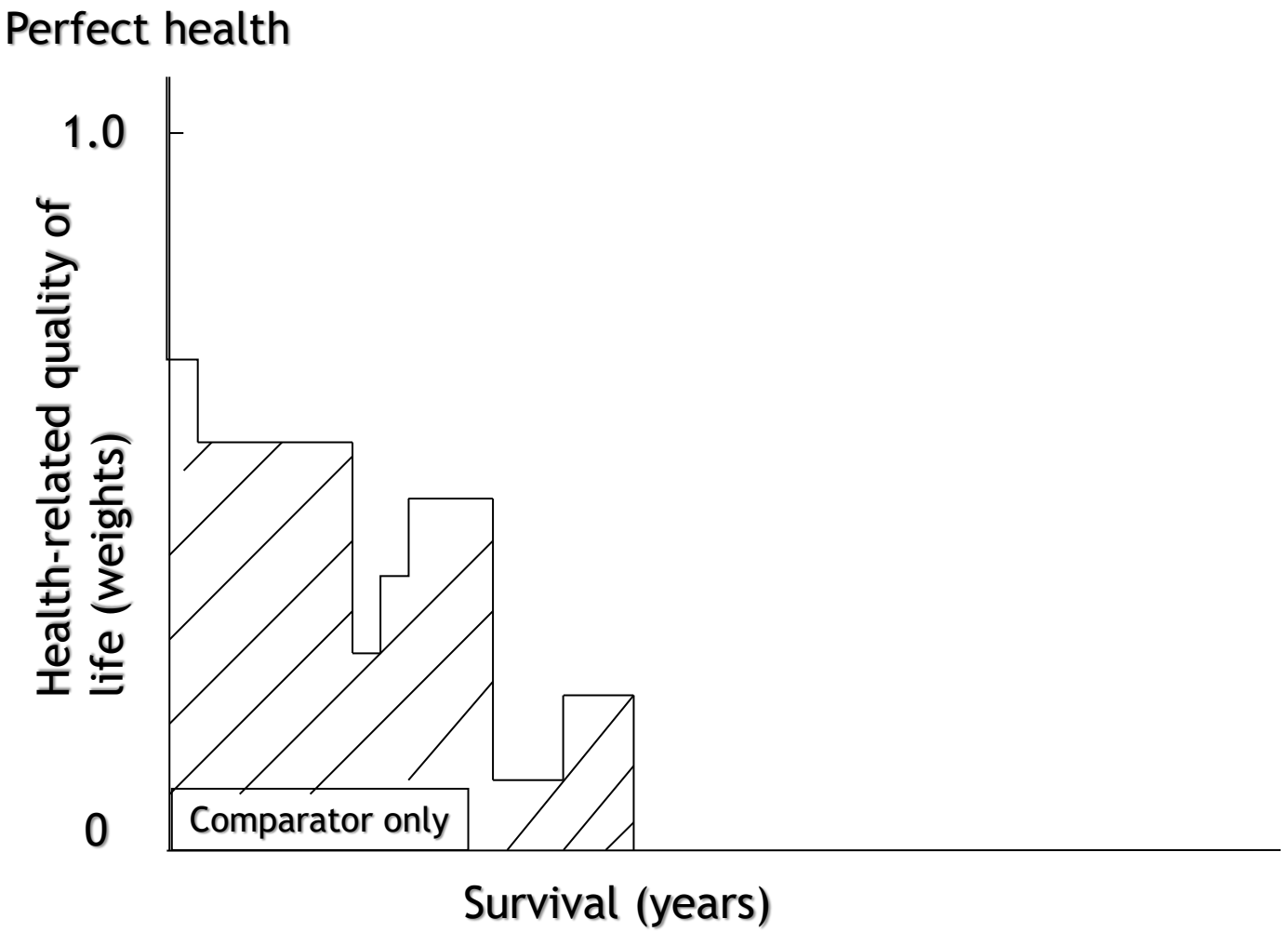
Table 1. Evidence table summarizing the methodological elements of EQ-5D-5L for the retained studies ($n = 31$).

Country	Publication year	General study characteristics						Preference elicitation technique and modeling						Value set
		Sample		Data collection				TTO			DCE			
		Sampling	Analyzed[a]	Training	Mode	Protocol version	QC[b]	Design	C/R	Model[c]	Design	C/R	Model[c]	Final model
EQ-VT Version 2														
Uganda[26]	2022	Q	492	Y	CAPI	EQ-VT Lite	Y	cTTO	20	Tobit	—	—	—	Tobit
Denmark[37]	2021	—	1,014	Y	CAPI	EQ-VT 2.1	Y	cTTO	10	Tobit	DCE	7	CLM	Hybrid
Egypt[28]	2021	Q	974	Y	CAPI	EQ-VT 2.1	Y	cTTO	10	Heteroskedastic	DCE	7	CLM	Heteroskedastic
Mexico[27]	2021	St	1,000	Y	CAPI	EQ-VT 2.0	Y	cTTO	10	Heteroskedastic	—	—	—	Heteroskedastic
France[9]	2020	Q	1,048	Y	CAPI	EQ-VT 2.0	Y	cTTO	10	Tobit	DCE	7	CLM	Hybrid
Hungary[48]	2020	Q	1,000	—	CAPI	EQ-VT 2.1	Y	cTTO	10	Tobit	DCE	7	—	Tobit
Peru[29]	2020	St	1,000	Y	CAPI	EQ-VT 2.1	Y	cTTO	11	Tobit	DCE	34	ZBT	Tobit
Vietnam[43]	2020	St	1,200	Y	CAPI	EQ-VT 2.1	Y	cTTO	10	Tobit	DCE	7	LM	Hybrid
Ethiopia[51]	2019	St	1,048	Y	CAPI	EQ-PVT 2.1	Y	cTTO	10	OLS	DCE	7	CLM	Hybrid
Poland[35]	2019	Q	1,252	Y	CAPI	EQ-VT 2.0	Y	cTTO	10	—	DCE	7	—	Hybrid
Portugal[34]	2019	St	1,451	Y	CAPI	EQ-VT 2.0	Y	cTTO	10	Tobit	DCE	7	CLM	Hybrid
US[45]	2019	Q	1,102	Y	CAPI	EQ-VT 2.0	Y	cTTO	10	Tobit	DCE	7	MLM	Tobit
Germany[41]	2018	Q	1,158	Y	CAPI	EQ-VT 2.0	Y	cTTO	10	Tobit	DCE	13	CLM	Hybrid
Ireland[36]	2018	St	1,160	Y	CAPI	EQ-VT 2.0	Y	cTTO	10	—	DCE	7	—	Hybrid
Malaysia[49]	2018	St	1,125	Y	CAPI	EQ-VT 2.0	Y	cTTO	10	Mixed effect	DCE	7	CLM	Hybrid
Taiwan[40]	2018	St	1,000	Y	CAPI	EQ-VT 2.0	Y	cTTO	10	Tobit	DCE	7	CLM	Hybrid
Hong Kong[52]	2017	—	1,014	Y	CAPI	EQ-VT 2.0	Y	cTTO	10	Tobit	DCE	7	CLM	Hybrid
Indonesia[46]	2017	St	1,054	Y	CAPI	EQ-VT 2.0	Y	cTTO	10	Tobit	DCE	7	CLM	Hybrid
EQ-VT Version 1														
Spain[47]	2018	St	973	Y	CAPI	EQ-VT 1.0	Re	cTTO	10	Linear	DCE	7	CLM	Hybrid
Thailand[44]	2018	St	1,205	Y	CAPI	EQ-VT 1.1	Y	cTTO	10	Multilevel	DCE	7	CLM	Hybrid
China[42]	2017	Q	1,271	Y	CAPI	EQ-VT 1.0	—	cTTO	10	Nonlinear	DCE	—	—	Non-linear
England[33]	2017	R	912	Y	CAPI	EQ-VT 1.0	Re	cTTO	10	—	DCE	7	—	Hybrid
Canada[53]	2016	Q	1,073	–	CAPI	EQ-VT 1.0	—	cTTO + tTTO	10	Linear	—	—	—	Linear
Japan[15]	2016	St	1,026	Y	CAPI	EQ-VT 1.1	Y	cTTO	10	Linear mixed	DCE	7	CLM	Linear mixed
Korea[38]	2016	St	1,080	Y	CAPI	EQ-VT 1.1	Y	cTTO	10	Linear mixed	DCE	7	CLM	Linear mixed
Netherlands[16]	2016	St	992	Y	CAPI	EQ-VT 1.0	Re	cTTO	10	Tobit	DCE	7	CLM	Tobit
Uruguay[30]	2016	St	794	Y	CAPI	EQ-VT 1.1	Y	cTTO	10	Robust	DCE	7	—	Robust
Others														
New Zealand[50]	2020	Re	2,468	—	SAOS	—	Y	—	—	—	DCE (PAPRIKA)	—	—	—
Sweden[31d]	2020	R	25,867	—	SAPS	—	—	TTO	1	OLS	—	—	—	OLS
US[32]	2018	Q	8,222	—	SAOS	—	—	—	—	—	DCE	20	ZBT	ZBT
Germany[39d]	2017	R	8,114	—	SAPS	*N*	—	—	—	—	—	—	—	GLM

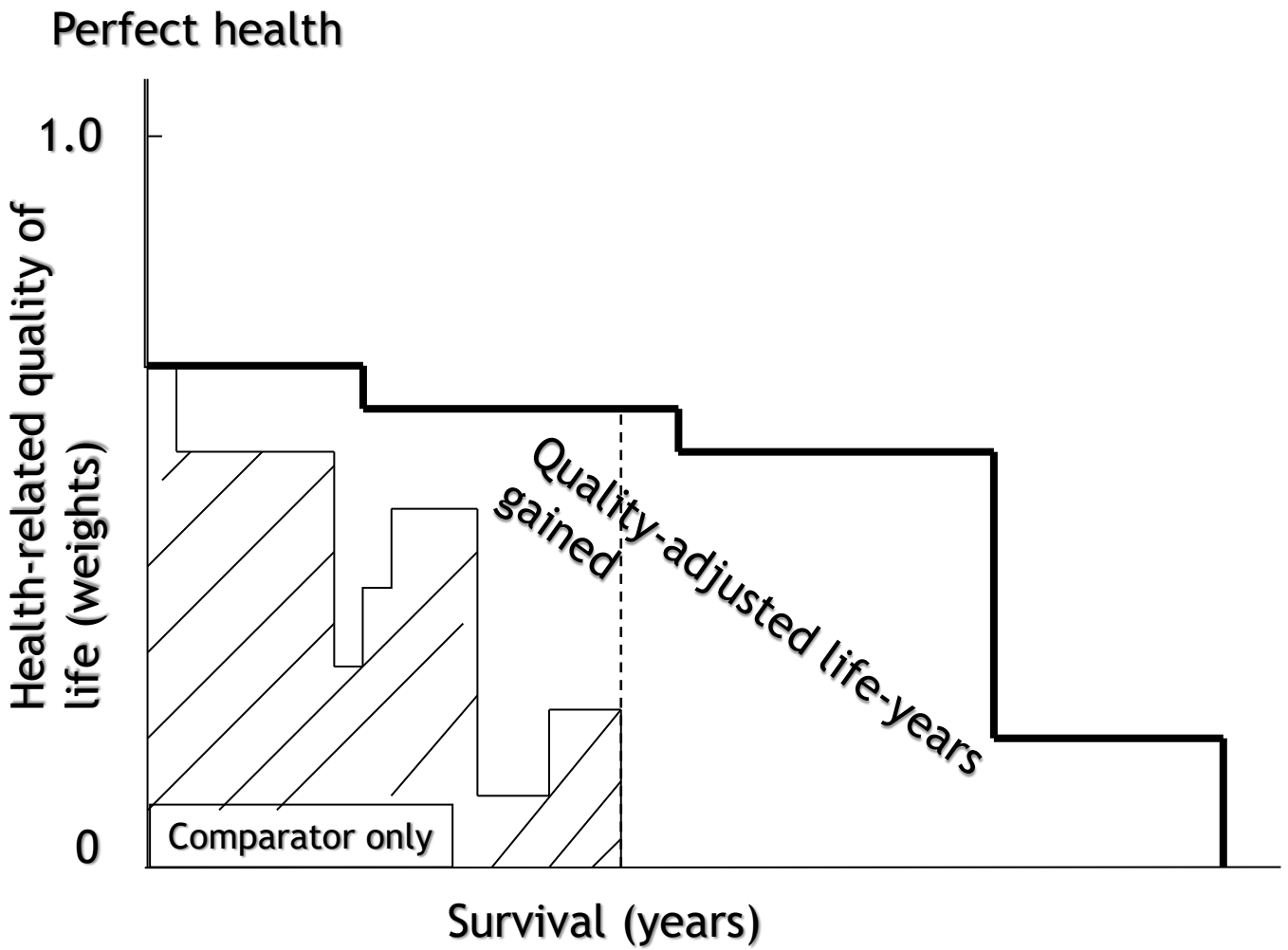
Abbreviations. –, not used/unspecified/unclear; CAPI, face-to-face computer-assisted personal interviewing; CLM, conditional logit model; C/R represents choice/respondent; cTTO, composite time trade-off; DCE, discrete choice experiment; EB, experience based; EQ-PVT, EuroQol portable valuation technology; EQ-VT, EuroQol valuation technology; GLM, generalized linear model; HS, hypothetical state; LM, logit model; MLM, mixed logit model; OLS, ordinary least square; Q,

Source: Poudel N, Fahim SM, Qian J, Garza K, Chaiyakunapruk N, Ngorsuraches S. Methodological similarities and variations among EQ-5D-5L value set studies: a systematic review. J Med Econ. 2022 Jan-Dec;25(1):571-582. doi: 10.1080/13696998.2022.2066441. PMID: 35416095.

How are Quality Adjusted Life-Years calculated?



How are Quality Adjusted Life-Years calculated?



Example 1

Health status	Utility scores
11111	1-0-0-0-0-0 = 1 (perfect health)
11112	1-0-0-0-0-0.02046 =0.97954
23332	1-0.03759-0.050781-0.03979-0.04704-0.02046= 0.80434

Table 3 Cumulative decrements of utilities per dimension

	MO	SC	UA	PD	AD
Unweighted model					
Level 2	0.0338811	0.0374599	0.0310561	0.0231809	0.0192951
Level 3	0.0433628	0.0494621	0.0367977	0.0487449	0.0484484
Level 4	0.1778412	0.1715431	0.1558802	0.2660137	0.2027724
Level 5	0.318512	0.2580992	0.2380036	0.4455017	0.261614
Weighted model					
Level 2	0.03759	0.03656	0.03313	0.02198	0.02046
Level 3	0.04774	0.050781	0.03979	0.04704	0.04683
Level 4	0.17949	0.172251	0.15689	0.26374	0.20005
Level 5	0.32509	0.258331	0.24005	0.44399	0.25803

PD pain and discomfort, *MO* mobility, *AD* anxiety/depression, *SC* self-care, *UA* usual activities

MOBILITY
I have no problems in walking about
I have slight problems in walking about
I have moderate problems in walking about
I have severe problems in walking about
I am unable to walk about

SELF-CARE
I have no problems washing or dressing myself
I have slight problems washing or dressing myself
I have moderate problems washing or dressing myself
I have severe problems washing or dressing myself
I am unable to wash or dress myself

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*
I have no problems doing my usual activities
I have slight problems doing my usual activities
I have moderate problems doing my usual activities
I have severe problems doing my usual activities
I am unable to do my usual activities

PAIN / DISCOMFORT
I have no pain or discomfort
I have slight pain or discomfort
I have moderate pain or discomfort
I have severe pain or discomfort
I have extreme pain or discomfort

ANXIETY / DEPRESSION
I am not anxious or depressed
I am slightly anxious or depressed
I am moderately anxious or depressed
I am severely anxious or depressed
I am extremely anxious or depressed

Andrade LF, Ludwig K, Goni JMR, Oppe M, de Pouvourville G. A French Value Set for the EQ-5D-5L. Pharmacoeconomics. 2020 Apr;38(4):413-425. doi: 10.1007/s40273-019-00876-4. PMID: 31912325; PMCID: PMC7080328.

Example 2

Suppose a 3-year clinical trial in which utility scores are as follow:

Mois	Scores patient i
0	0.873
3	0.921
6	0.669
9	0.6183
12	0.491
15	0.499
24	0.535
36	0.206

Calculate undiscounted QALYs

Calculate the QALYs discounted at the beginning of the period (discount rate r= 2.5%)

$$\sum_t \frac{U_t}{(1+r)^t}$$

Example 2

Months	Score patient i	undiscounted QALYs	QALYs discounted	
0	0.873			
3	0.921	0.22425		0.22425=(0.873+0.921)*0,5*(3/12)
6	0.669	0.19875		
9	0.6183	0.16091		
12	0.491	0.13866		
QALY (year 1)		0.72258	0.70495	0.70495= 0.72258/1.025
15	0.499	0.12375		
24	0.535	0.38775		0.38775=(0.499+0.535)*0.5*(9/12)
QALY (year 2)		0.51150	0.48685	
36	0.206	0.37050		0.337050=(0.535+0.206)*0.5*(12/12)
QALY (year 3)		0.37050	0.34405	0.34405= 0.37050/$(1.025)^2$
QALYs for patient i		1.60458	1.53585	1.53585= 1.60458/$(1.025)^3$

Example 3

Survival	Health strategies	Utility score
8 years	dialysis at home	0.65

Question: a diagram and a number of QALYs when a patient gets an additional lifetime of 8 years through a dialysis at home (without discounting and with discounting)

5.2	QALY	without discounting *(8*0.65)*
4.66	QALY	with discounting *(2.5%)*

$4.66=(0.65/1.025)+(0.65/1.025^2)+(0.65/1.025^3)+(0.65/1.025^4)+(0.65/1.025^5)+(0.65/1.025^6)+(0.65/1.025^7)+(0.65/1.025^8)$

How to assess the costs?

Depending upon:

- The type of health care programme(s) considered in the study. *Relevant alternatives should be not omitted!*
- The viewpoint of the study.

  A caregiver's point of view?

  A payer's point of view?

  The patient's point of view?

  The societal point of view?
- The duration of the cost tracking. *A relevant time period should be chosen.*

Further questions about costs

Do not invest too much time and effort for small costs *(justify the elimination based for example on previous empirical work)*.

Perform sensitivity analysis.

Adjust costs for differential timing *(formula to account for time preference, with r the real discount rate)*.

$$\sum_t \frac{C_t}{(1+r)^t}$$

Systematic Review

Review of Diagnosis-Related Group-Based Financing of Hospital Care

Health Services Research and Managerial Epidemiology
Volume 3: 1-8

DOI: 10.1177/2333392816647892
hme.sagepub.com

Natasa Mihailovic[1], Sanja Kocic[1,2], and Mihajlo Jakovljevic[3]

Abstract

Since the 1990s, diagnosis-related group (DRG)-based payment systems were gradually introduced in many countries. The main design characteristics of a DRG-based payment system are an exhaustive patient case classification system (ie, the system of diagnosis-related groupings) and the payment formula, which is based on the base rate multiplied by a relative cost weight specific for each DRG. Cases within the same DRG code group are expected to undergo similar clinical evolution. Consecutively, they should incur the costs of diagnostics and treatment within a predefined scale. Such predictability was proven in a number of cost-of-illness studies conducted on major prosperity diseases alongside clinical trials on efficiency. This was the case with risky pregnancies, chronic obstructive pulmonary disease, diabetes, depression, alcohol addiction, hepatitis, and cancer. This article presents experience of introduced DRG-based payments in countries of western and eastern Europe, Scandinavia, United States, Canada, and Australia. This article presents the results of few selected reviews and systematic reviews of the following evidence: published reports on health system reforms by World Health Organization, World Bank, Organization for Economic Co-operation and Development, Canadian Institute for Health Information, Canadian Health Services Research Foundation, and Centre for Health Economics University of York. Diverse payment systems have different strengths and weaknesses in relation to the various objectives. The advantages of the DRG payment system are reflected in the increased efficiency and transparency and reduced average length of stay. The disadvantage of DRG is creating financial incentives toward earlier hospital discharges. Occasionally, such polices are not in full accordance with the clinical benefit priorities.

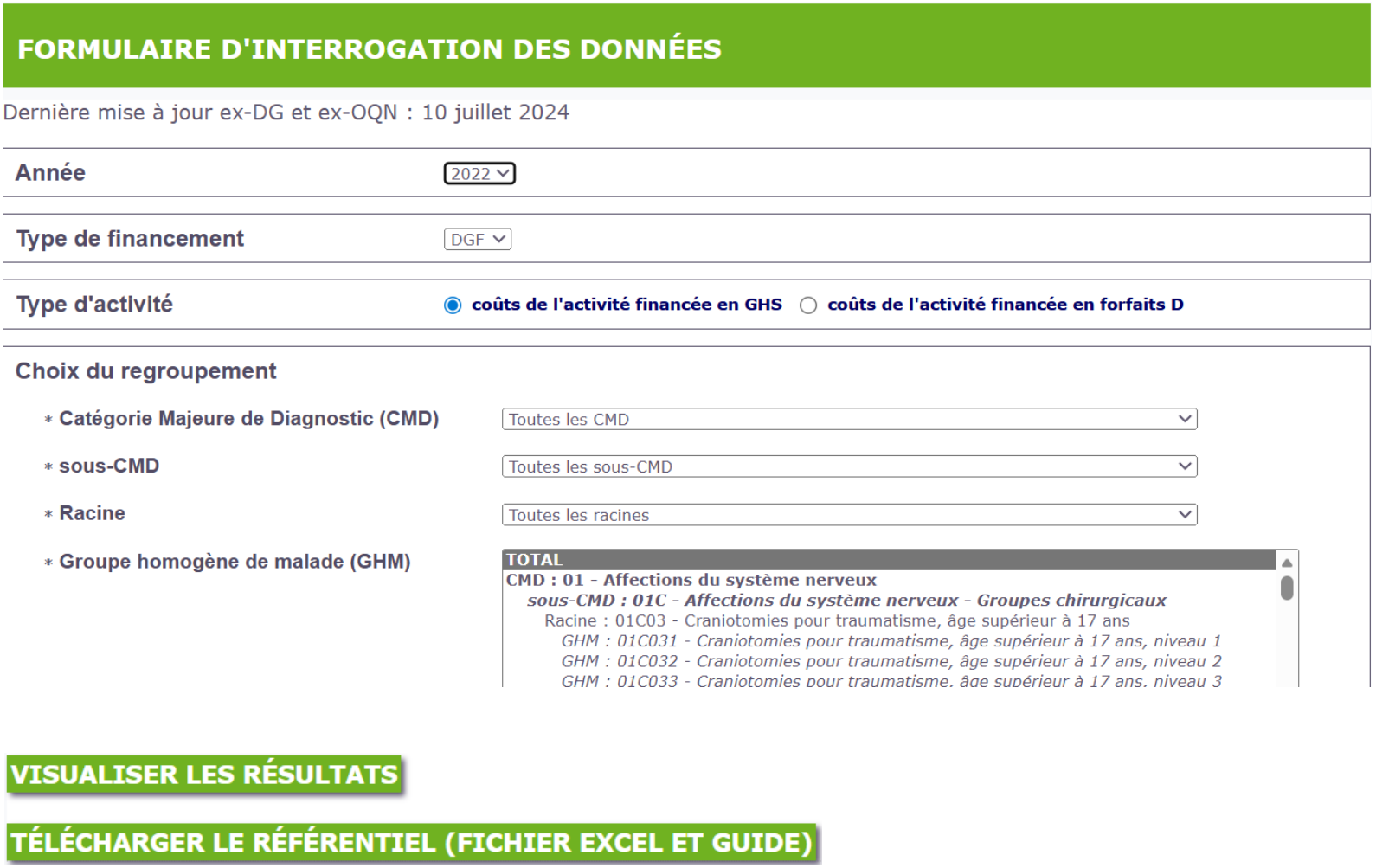
Keywords

DRG, payments systems, efficiency, managed care, hospital health services

Source: https://www.researchgate.net/publication/303029934_Review_of_Diagnosis-Related_Group-Based_Financing_of_Hospital_Care

https://atih.sante.fr/tarifs-mco-et-had

https://www.scansante.fr/applications/enc-mco



https://www.scansante.fr/applications/enc-mco

DONNEES DE COUTS DETAILLEES

Données de coûts par GHM	2022	Coûts décomposés par grands postes	Coûts décomposés détaillés	Caractéristiques statistiques du coût moyen du GHM et Références nationales
Données de coûts 2022 par GHS		Coûts décomposés détaillés		Caractéristiques statistiques du coût moyen du GHS et Références nationales
Données 2022 sur les UO		Consommation d'UO par GHM	Consommation d'UO par GHS	

CMI	sous CM	raci	GHM v202	Libellé GHM	Coût modifié (*)	Nombre de séjours ENC 2022	Coût complet hors structur	Dépenses cliniques
17	17K	17K04	17K041	Autres irradiations, niveau 1		829	**4084**	458
17	17K	17K04	17K042	Autres irradiations, niveau 2		134	**7006**	3516
17	17K	17K04	17K043	Autres irradiations, niveau 3		99	**10766**	5877
17	17K	17K04	17K044	Autres irradiations, niveau 4		31	**20841**	11652
17	17K	17K04	TOTAL	Autres irradiations		1093	**4809**	1065
17	17K	17K09	17K091	Irradiations internes, niveau 1		2203	**9369**	906
17	17K	17K09	17K092	Irradiations internes, niveau 2	*	30	**10317**	2915

CMI	sous CM	raci	GHM v202	Libellé GHM	Coût modifié (*)	Nombre de séjours ENC 2022	Coût complet hors structur	Dépenses cliniques
28	28Z	28Z19	28Z19Z	Préparations à une irradiation externe par RCMI ou techniques spéciales		21385	**1241**	0
28	28Z	28Z19	TOTAL	Préparations à une irradiation externe par RCMI ou techniques spéciales		21385	**1241**	0
28	28Z	28Z20	28Z20Z	Préparations à une irradiation externe avec dosimétrie tridimensionnelle avec HDV		5104	**925**	0
28	28Z	28Z20	TOTAL	Préparations à une irradiation externe avec dosimétrie tridimensionnelle avec HDV		5104	**925**	0
28	28Z	28Z21	28Z21Z	Préparations à une irradiation externe avec dosimétrie tridimensionnelle sans HDV		66	**732**	0
28	28Z	28Z21	TOTAL	Préparations à une irradiation externe avec dosimétrie tridimensionnelle sans HDV		66	**732**	0
28	28Z	28Z22	28Z22Z	Autres préparations à une irradiation externe		1192	**168**	1
28	28Z	28Z22	TOTAL	Autres préparations à une irradiation externe		1192	**168**	1
28	28Z	28Z23	28Z23Z	Techniques complexes d'irradiation externe avec repositionnement, en séances		83831	**234**	0
28	28Z	28Z23	TOTAL	Techniques complexes d'irradiation externe avec repositionnement, en séances		83831	**234**	0
28	28Z	28Z24	28Z24Z	Techniques complexes d'irradiation externe sans repositionnement, en séances		771	**187**	0

https://www.scansante.fr/applications/enc-mco

- Specific prescription rules have been developed for high cost drugs…

https://www.atih.sante.fr/unites-communes-de-dispensation-prises-en-charge-en-sus

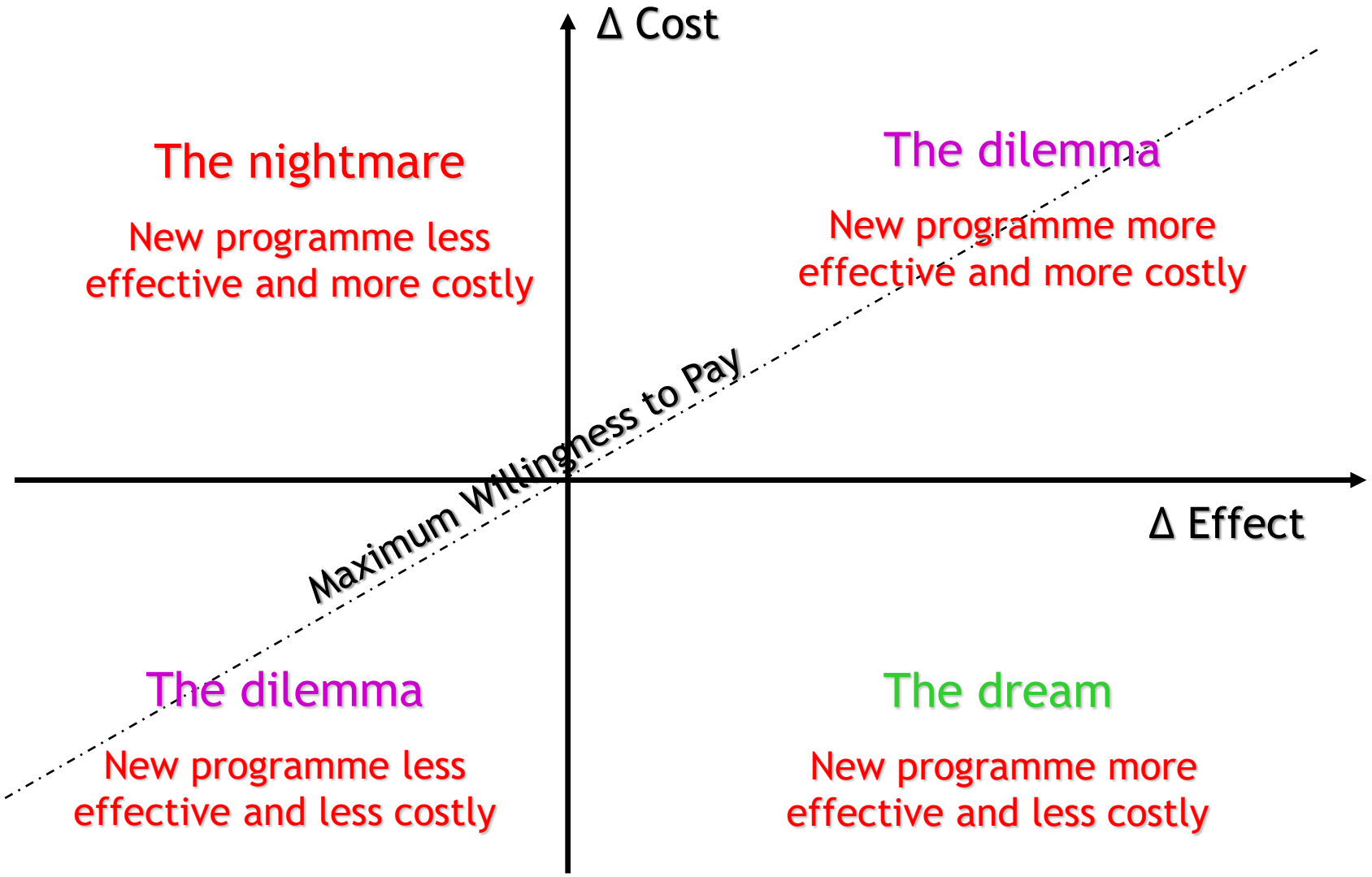
…and medical devices

https://atih.sante.fr/dispositifs-medicaux-pris-en-charge-en-sus

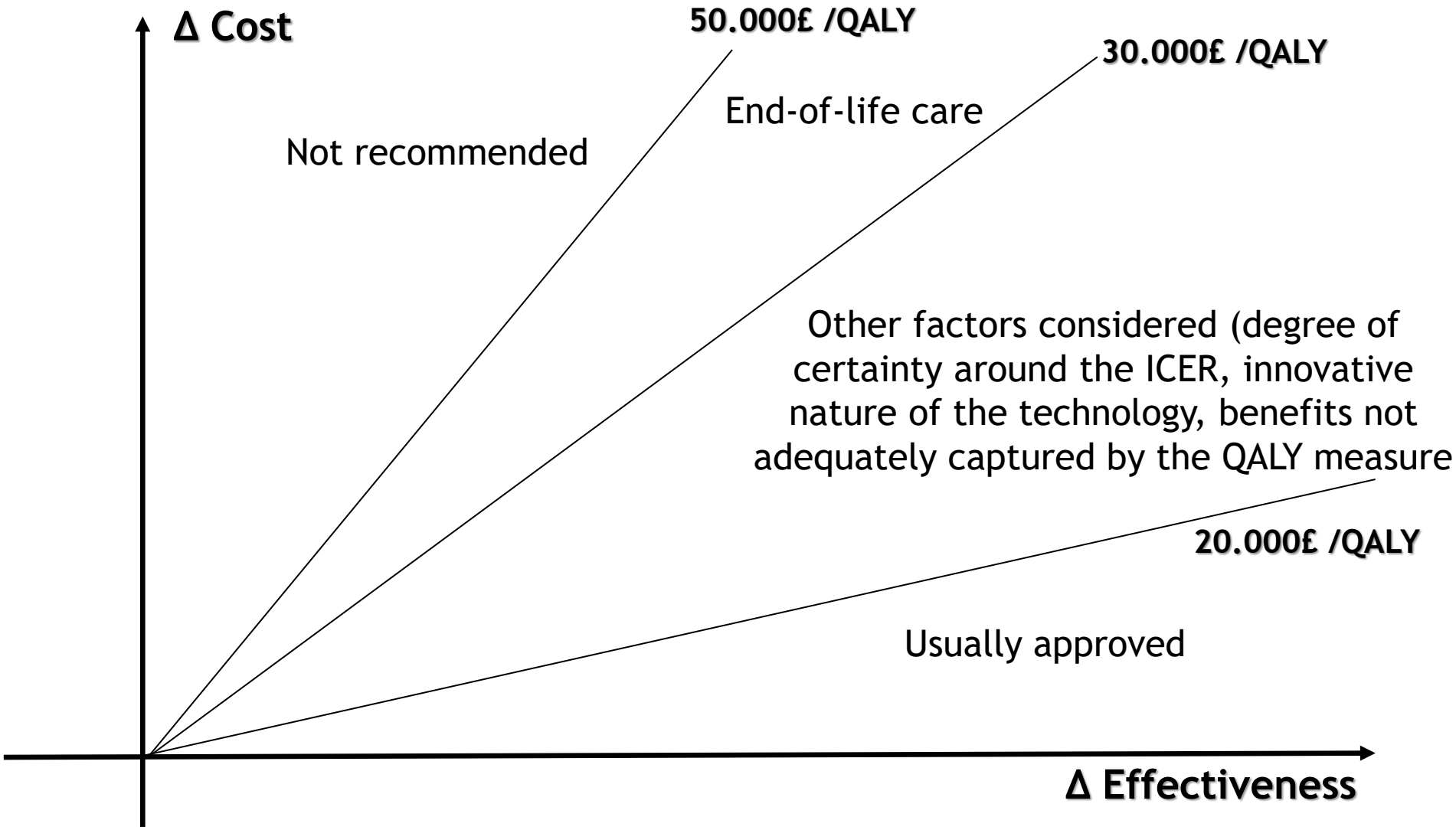
The incremental cost-effectiveness ratio (ICER)

$$\frac{Cost_A - Cost_B}{Effect_A - Effect_B} = \frac{\Delta C}{\Delta E}$$

The cost-effectiveness plane



The cost per QALY : the international reference



Exemple 6

New strategy	Average cost	£30,520
	Average QALYs	1.56
Standard strategy	Average cost	£22,858
	Average QALYs	1.44

1. Calculate the ICER $\frac{Cost_A - Cost_B}{Effect_A - Effect_B} = \frac{\Delta C}{\Delta E}$ **£63,850**

2. Would the new strategy benefit from the NHS reimbursement in England **No £56,539 (>£30 000)**

	Incremental effectiveness (innovation versus standard)			
Incremental cost (innovation versus standard)		More	Same	Less
	More	7	4	2
	Same	3	9	5
	Less	1	6	8

- Strong dominance for decision ? 1 (accept) and 2 (reject)
- Weak dominance for decision ? 3 (accept) 4 (reject) 5 (reject) 6 (accept)
- Non-dominance ? 7 ? 8 ?

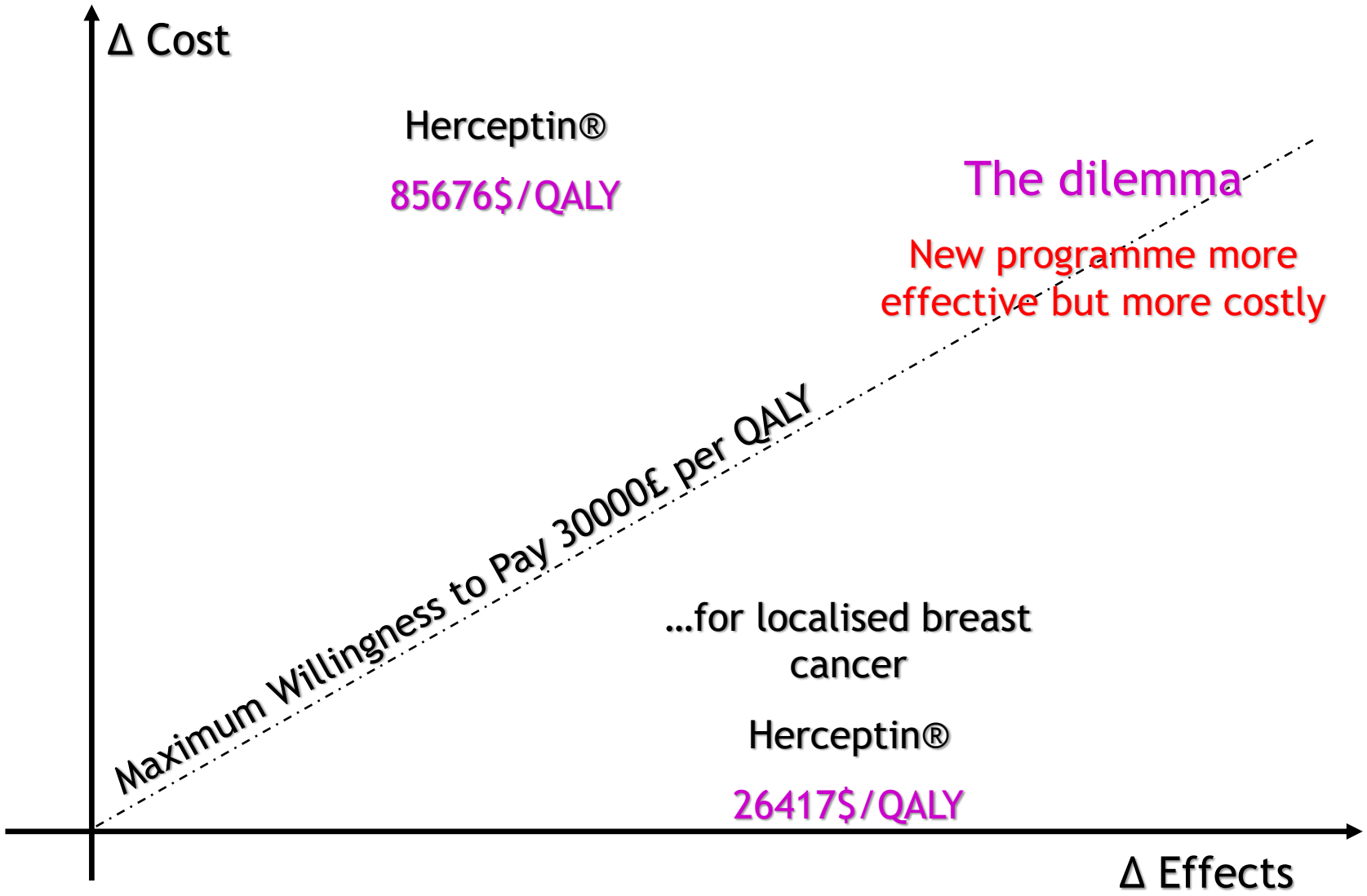
Trastuzumab (Herceptin®) in breast cancer

	Localized breast cancers	Metastatic breast cancers
Total cost without trastuzumab	28 749$	40 000$
Total cost with trastuzumab	73 672$	87 728$
QALY without trastuzumab	10.08	0.7
QALY with trastuzumab	11.78	1.26
Δ Cost **Δ QALY**	44 923$ 1.70	47 728$ 0.56
Extra cost/QALY **ICER**	**26 417$**	**85 676$**

Source: Garrison, Louis P.; Veenstra, David L. The Economic Value of Innovative Treatments over the Product Life Cycle: The Case of Targeted Trastuzumab Therapy for Breast

Cancer. Value in Health 2009, 12(8):1118-1123.

Back to the cost-effectiveness plane



Front Health Serv. 2023 Aug 24:3:1055471. doi: 10.3389/frhs.2023.1055471. eCollection 2023.

A theory on ICER pricing and optimal levels of cost-effectiveness thresholds: a bargaining approach

Mikel Berdud [1], Jimena Ferraro [2 3], Adrian Towse [1]

Affiliations + expand

PMID: 37693236 PMCID: PMC10484610 DOI: 10.3389/frhs.2023.1055471

CETs used in HTA decision-making regulate the prices for new health technologies by setting the threshold for the maximum acceptable price. Pricing new medicines using this ICER-CET mechanism is part of a family of value-based pricing mechanisms (8, 9). We refer to this mechanism as ICER pricing where the developer prices the new health technology at the maximum price the CET

Berdud M, Ferraro J, Towse A. A theory on ICER pricing and optimal levels of cost-effectiveness thresholds: a bargaining approach. Front Health Serv. 2023 Aug 24;3:1055471. doi: 10.3389/frhs.2023.1055471. PMID: 37693236; PMCID: PMC10484610. https://pubmed.ncbi.nlm.nih.gov/37693236/

Pricing mechanisms

Cost per QALY
(England, Canada, Sweden)

Determining the efficiency path to universal health coverage: cost-effectiveness thresholds for 174 countries based on growth in life expectancy and health expenditures

Andres Pichon-Riviere, Michael Drummond, Alfredo Palacios, Sebastián Garcia-Marti, Federico Augustovski

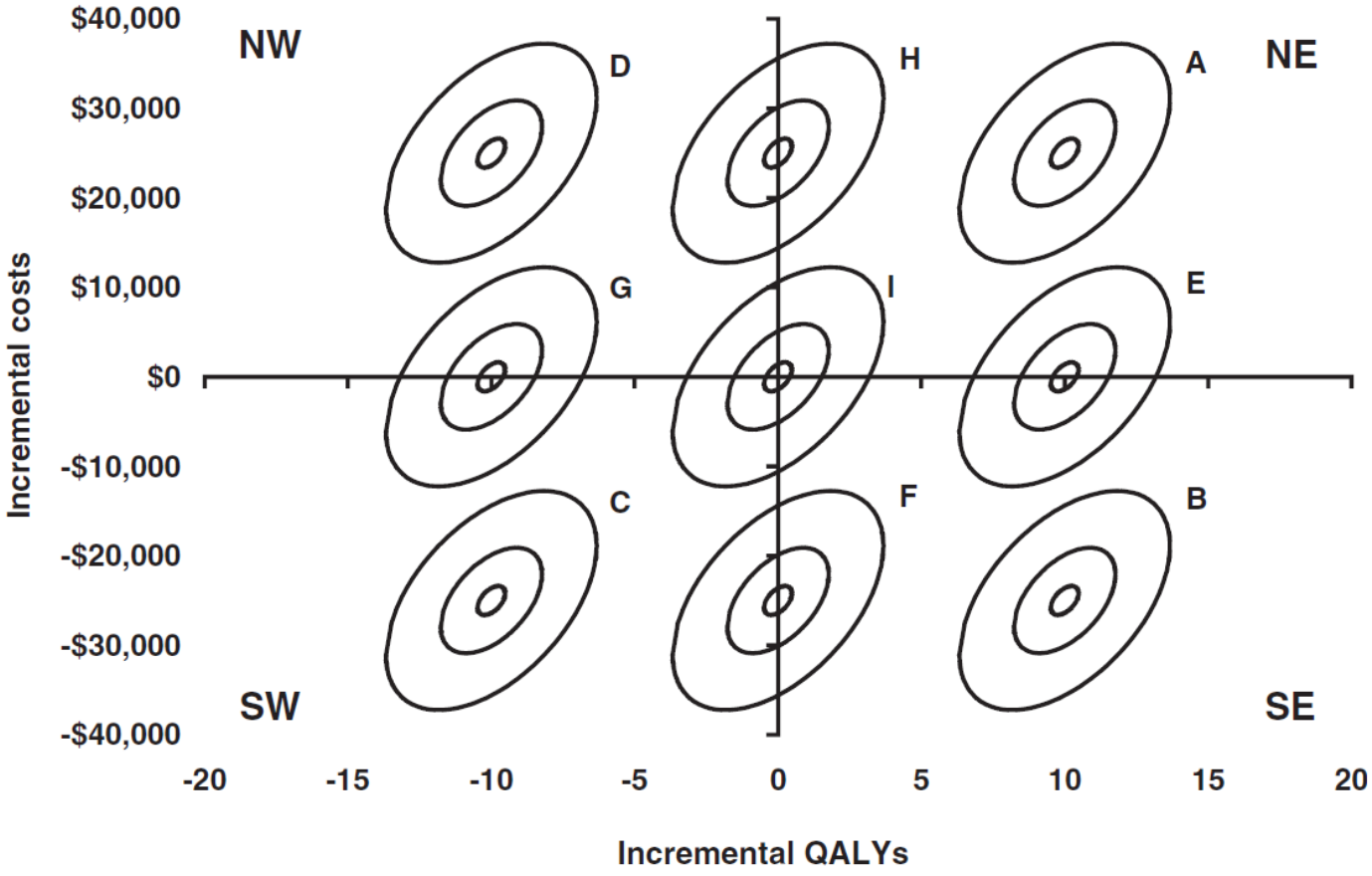
Budget driven *(Italy, Spain)*

Benefit assessment *(France, Germany)*

International reference pricing *(Switzerland)*

Market pricing *(USA)*

Source: Pichon-Riviere A, Drummond M, Palacios A, Garcia-Marti S, Augustovski F. Determining the efficiency path to universal health coverage: cost-effectiveness thresholds for 174 countries based on growth in life expectancy and health expenditures. Lancet Glob Health. 2023 Jun;11(6):e833-e842. doi: 10.1016/S2214-109X(23)00162-6. PMID: 37202020.



Fenwick, E. and O'Brien, B.J. and Briggs, A. (2004) Cost-effectiveness acceptability curves - facts, fallacies and frequently asked questions. *Health Economics* 13(5):pp. 405-415.

Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) statement: updated reporting guidance for health economic evaluations

Don Husereau, Michael Drummond, Federico Augustovski, Esther de Bekker-Grob, Andrew H Briggs, Chris Carswell, Lisa Caulley, Nathorn Chaiyakunapruk, Dan Greenberg, Elizabeth Loder, Josephine Mauskopf, C Daniel Mullins, Stavros Petrou, Raoh-Fang Pwu, Sophie Staniszewska

Source: Husereau D, Drummond M, Augustovski F, de Bekker-Grob E, Briggs AH, Carswell C, Caulley L, Chaiyakunapruk N, Greenberg D, Loder E, Mauskopf J, Mullins CD, Petrou S, Pwu RF, Staniszewska S; CHEERS 2022 ISPOR Good Research Practices Task Force. Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) Statement: Updated Reporting Guidance for Health Economic Evaluations. Value Health. 2022 Jan;25(1):3-9. doi: 10.1016/j.jval.2021.11.1351. PMID: 35031096.

Table 1. The CHEERS 2022 checklist.

Section/topic	Item No	Guidance for reporting	Reported in section
Title			
Title	1	Identify the study as an economic evaluation and specify the interventions being compared.	_____
Abstract			
Abstract	2	Provide a structured summary that highlights context, key methods, results, and alternative analyses.	_____
Introduction			
Background and objectives	3	Give the context for the study, the study question, and its practical relevance for decision making in policy or practice.	_____
Methods			
Health economic analysis plan	4	Indicate whether a health economic analysis plan was developed and where available.	_____
Study population	5	Describe characteristics of the study population (such as age range, demographics, socioeconomic, or clinical characteristics).	_____
Setting and location	6	Provide relevant contextual information that may influence findings.	_____
Comparators	7	Describe the interventions or strategies being compared and why chosen.	_____
Perspective	8	State the perspective(s) adopted by the study and why chosen.	_____
Time horizon	9	State the time horizon for the study and why appropriate.	_____
Discount rate	10	Report the discount rate(s) and reason chosen.	_____
Selection of outcomes	11	Describe what outcomes were used as the measure(s) of benefit(s) and harm(s).	_____
Measurement of outcomes	12	Describe how outcomes used to capture benefit(s) and harm(s) were measured.	_____
Valuation of outcomes	13	Describe the population and methods used to measure and value outcomes.	_____
Measurement and valuation of resources and costs	14	Describe how costs were valued.	_____

Schedule

A. Objectives and context

B. Taxonomy of health care evaluations and international guidelines

C. Effectiveness and costs assessment

D. **Applications to advanced radiotherapy**

Cost Eff Resour Alloc. 2024 Sep 13;22(1):66. doi: 10.1186/s12962-024-00577-6.

Cost-effectiveness of proton beam therapy vs. conventional radiotherapy for patients with brain tumors in Sweden: results from a non-randomized prospective multicenter study

Filipa Sampaio [1], Ulrica Langegård [2 3], Patricio Martínez de Alva [4], Sergio Flores [4], Camilla Nystrand [4], Per Fransson [5], Emma Ohlsson-Nevo [6], Ingrid Kristensen [7 8], Katarina Sjövall [9], Inna Feldman [4], Karin Ahlberg [2]

Affiliations + expand

PMID: 39272105 PMCID: PMC11396687 DOI: 10.1186/s12962-024-00577-6

Abstract

Background This study assessed the cost-effectiveness of proton beam therapy (PBT) compared to conventional radiotherapy (CRT) for treating patients with brain tumors in Sweden.

Methods Data from a longitudinal non-randomized study performed between 2015 and 2020 was used, and included adult patients with brain tumors, followed during treatment and through a one-year follow-up. Clinical and demographic data were sourced from the longitudinal study and linked to Swedish national registers to get information on healthcare resource use. A cost-utility framework was used to evaluate the cost-effectiveness of PBT vs. CRT. Patients in PBT group ($n=310$) were matched with patients in CRT group ($n=40$) on relevant observables using propensity score matching with replacement. Costs were estimated from a healthcare perspective and included costs related to inpatient and specialized outpatient care, and prescribed medications. The health outcome was quality-adjusted life-years (QALYs), derived from the EORTC-QLQ-C30. Generalized linear models (GLM) and two-part models were used to estimate differences in costs and QALYs.

Results PBT yielded higher total costs, 14,639 US$, than CRT, 13,308 US$, with a difference of 1,372 US$ (95% CI, -4,914–7,659) over a 58 weeks' time horizon. Further, PBT resulted in non-significantly lower QALYs, 0.746 compared to CRT, 0.774, with a difference of -0.049 (95% CI, -0.195–0.097). The probability of PBT being cost-effective was < 30% at any willingness to pay.

Conclusions These results suggest that PBT cannot be considered a cost-effective treatment for brain tumours, compared to CRT.

Trial registration Not applicable.

Source: Cost-effectiveness of proton beam therapy vs. conventional radiotherapy for patients with brain tumors in Sweden: results from a non-randomized prospective multicenter study - PubMed

Methods

Overview

In Sweden, a non-randomized non-blind longitudinal study from the ProtonCare project collected data of 350 patients, which were followed during their treatment for a brain tumor, and through a one-year follow-up period [30]. Of those, 310 patients recieved PBT, while

Health outcomes

The primary outcome in this economic evaluation was the QALY, a composite measure encompassing both HRQoL and mortality (length of life). HRQoL was assessed by the European Organisation for Research and Treatment of Cancer (EORTC) QLQ-C30 questionnaire, an instrument designed to measure HRQoL in patients diagnosed with cancer [31]. It includes five

Table 4 Cost-effectiveness results (costs in 2023 US$)

	Costs mean (95% CI)	QALY mean (95% CI)	Incremental costs mean (95% CI)	Incremental QALY mean (95% CI)	ICER
PBT	14,639 (11,829 – 17,449)	0.746 (0.685– 0.8074)	1,372 (-4,914– 7,659)	-0.049 (-0.195– 0.097)	Dominated
CRT	13,308 (8,111– 18,505)	0.774 (0.648– 0.901)			

Abbreviations PBT – Proton beam therapy, CRT– Conventional radiotherapy, ICER – Incremental cost effectiveness ratio, QALY – Quality adjusted life year

Dominated means that PBT is more costly and yields less QALYs than CRT

Source: Cost-effectiveness of proton beam therapy vs. conventional radiotherapy for patients with brain tumors in Sweden: results from a non-randomized prospective multicenter study - PubMed

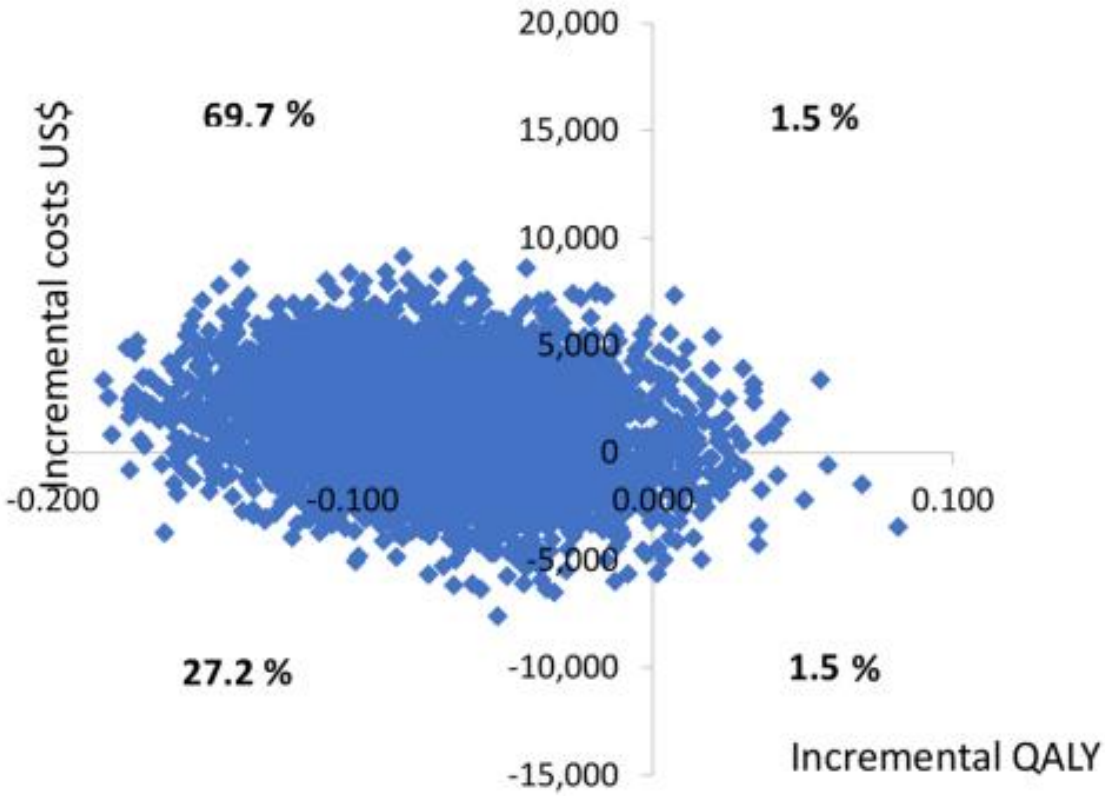


Fig. 1 Cost Effectiveness plane PBT vs. CRT

Source: Cost-effectiveness of proton beam therapy vs. conventional radiotherapy for patients with brain tumors in Sweden: results from a non-randomized prospective multicenter study - PubMed

Radiother Oncol. 2023 Jun:183:109417. doi: 10.1016/j.radonc.2022.11.006. Epub 2022 Nov 12.

Cost-effectiveness of proton radiotherapy versus photon radiotherapy for non-small cell lung cancer patients: Exploring the model-based approach

Loeki Aldenhoven [1], B Ramaekers [2], J Degens [3], C Oberije [4], J van Loon [5], A C Dingemans [6], D De Ruysscher [5], M Joore [1]

A B S T R A C T

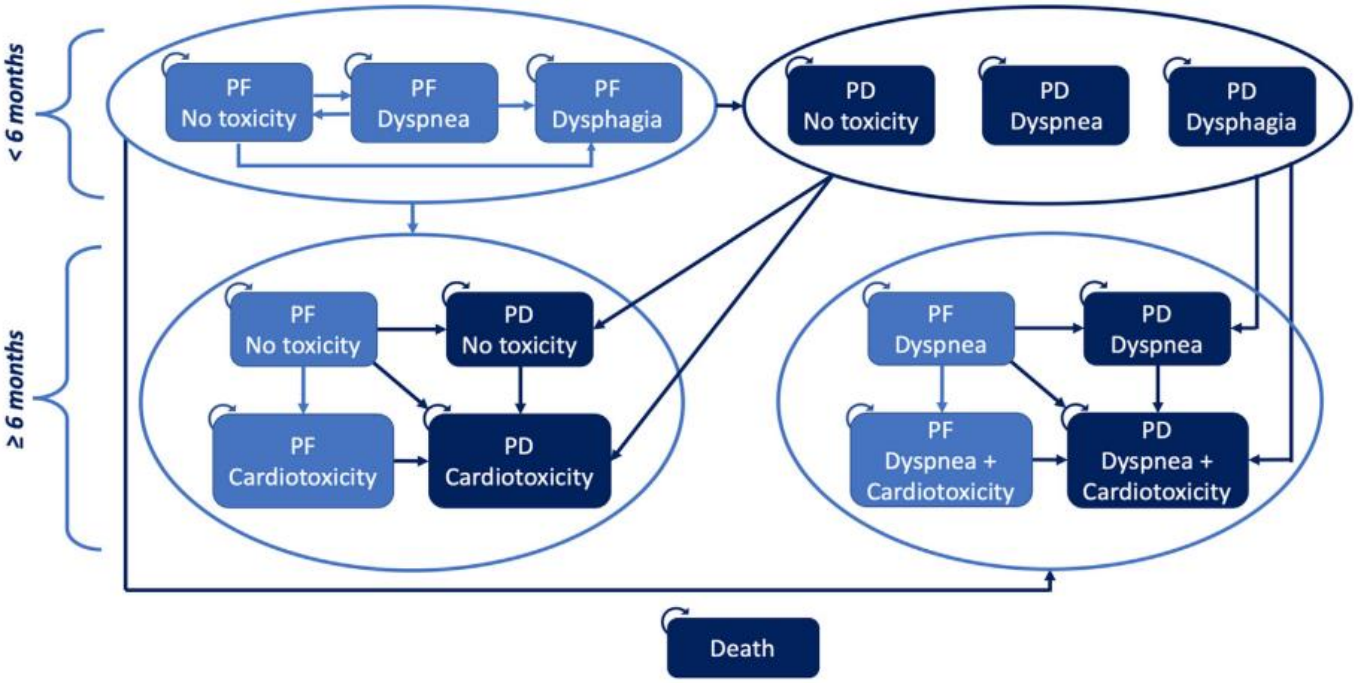
Introduction: Proton radiotherapy (PT) is a promising but more expensive strategy than photon radiotherapy (XRT) for the treatment of non-small cell lung cancer (NSCLC). PT is probably not cost-effective for all patients. Therefore, patients can be selected using normal tissue complication probability (NTCP) models with predefined criteria. This study aimed to explore the cost-effectiveness of three treatment strategies for patients with stage III NSCLC: 1. *photon radiotherapy for all patients (XRT_{All})*; 2. *PT for all patients (PT_{All})*; 3. *PT for selected patients ($PT_{Individualized}$)*.

Methods: A decision-analytical model was constructed to estimate and compare costs and QALYs of all strategies. Three radiation-related toxicities were included: dyspnea, dysphagia and cardiotoxicity. Costs and QALY's were incorporated for grade 2 and ≥ 3 toxicities separately. Incremental Cost-Effectiven Ratios (ICERs) were calculated and compared to a threshold value of €80,000. Additionally, scenario, sensitivity and value of information analyses were performed.

Results: PT_{All} yielded most QALYs, but was also most expensive. XRT_{All} was the least effective and least expensive strategy, and the most cost-effective strategy. For thresholds higher than €163,467 per QALY gained, $PT_{Individualized}$ was cost-effective. When assuming equal minutes per fraction (15 minutes) for PT and XRT, $PT_{Individualized}$ was considered the most cost-effective strategy (ICER: €76,299).

Conclusion: Currently, PT is not cost-effective for all patients, nor for patient selected on the current NTCP models used in the Dutch indication protocol. However, with improved clinical experience, personnel and treatment costs of PT can decrease over time, which potentially leads to $PT_{Individualized}$, with optimal patient selection, will becoming a cost-effective strategy.

Source: Cost-effectiveness of proton radiotherapy versus photon radiotherapy for non-small cell lung cancer patients: Exploring the model-based approach - PubMed



The state-transition model was constructed using cohort simulation and adopted a cycle length of three months. According to the Dutch health economic guidelines, a life-time time horizon, a societal perspective and a discount rate of 4.0 % for costs and 1.5 % for

Source: Cost-effectiveness of proton radiotherapy versus photon radiotherapy for non-small cell lung cancer patients: Exploring the model-based approach – PubMed

Table 5
Results of probabilistic sensitivity analyses (Sorted by costs).

Analysis	*Strategy*	*Costs*	*Compared with XRT For all patients*					*Compared with next best*
			QALY	*NMB*	*ΔCosts*	*ΔQALY*	*ICER*	*ICER*
Base Case	XRT_{All}	€45,912	1,769	€95,627	-	-	-	-
	$PT_{Individualized}$	€70,866	1,922	€82,885	€24,954	0,153	€163,467	€163,467
	PT_{All}	€79,695	1,951	€76,400	€33,783	0,182	€185,673	€301,396
Healthcare perspective	XRT_{All}	€41,231	1,769	€100,289	-	-	-	-
	$PT_{Individualized}$	€61,726	1,922	€92,034	€20,495	0,153	€134,256	€134,256
	PT_{All}	€68,904	1,951	€87,176	€27,673	0,182	€152,094	€245,053
Excluding productivity losses PT	XRT_{All}	€41,912	1,769	€95,608	-	-	-	-
	$PT_{Individualized}$	€69,662	1,922	€84,098	€23,750	0,153	€155,582	€155,582
	PT_{All}	€78,023	1,951	€78,057	€32,111	0,181	€176,485	€285,415
Equal minutes per fraction	XRT_{All}	€45,410	1,753	€97,794	-	-	-	-
	$PT_{Individualized}$	€57,416	1,910	€95,376	€12,007	0,157	€76,299	€76,299
	PT_{All}	€61,189	1,940	€94,023	€15,780	0,188	€84,106	€124,719

QALY = Quality Adjusted Life Years.
NBM = Net Monetary Benefit.
ICER = Incremental Cost Effectiveness Ratio.

Source: Cost-effectiveness of proton radiotherapy versus photon radiotherapy for non-small cell lung cancer patients: Exploring the model-based approach - PubMed

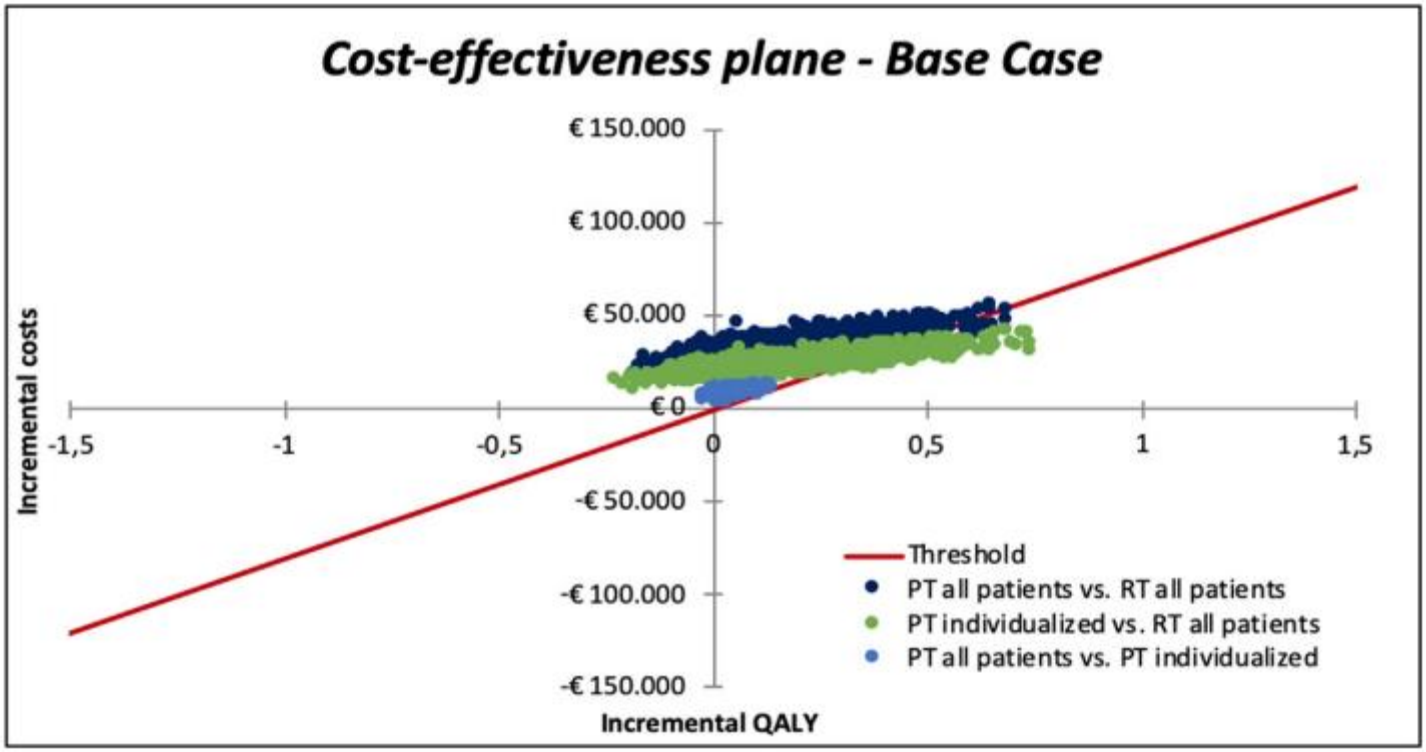


Fig. G1. CE plane: Base case analysis.

Source: Cost-effectiveness of proton radiotherapy versus photon radiotherapy for non-small cell lung cancer patients: Exploring the model-based approach – PubMed

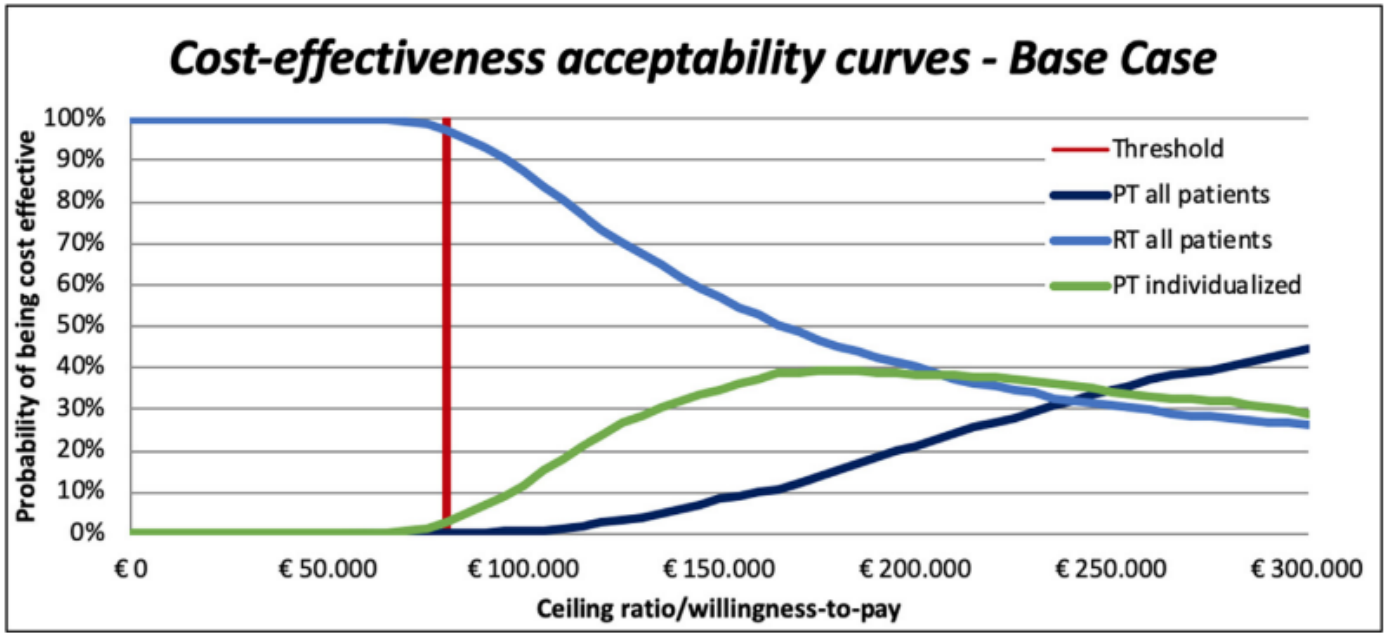


Fig. G2. CEAC: Base case analysis.

Source: Cost-effectiveness of proton radiotherapy versus photon radiotherapy for non-small cell lung cancer patients: Exploring the model-based approach – PubMed

Bibliography

- Drummond, M., Sculpher, M.J., Claxton, K., Stoddart, G.L., Torrance, G.W., Askews & Holts Library Services, 2015. Methods for the economic evaluation of health care programmes. Oxford university press
- John Brazier, Julie Ratcliffe, et al. Measuring and Valuing Health Benefits for Economic Evaluation 2016
- Alastair M. Gray. Applied Methods of Cost-effectiveness Analysis in Health Care (Handbooks in Health Economic Evaluation Series). 2010
- Muennig P, Bounthavong M. Cost-Effectiveness Analysis in Health: A Practical Approach, 3rd Edition. Jossey-Bass 2016. http://www.wiley.com/WileyCDA/WileyTitle/productCd-1119011264.html
- https://www.ispor.org/heor-resources/good-practices-for-outcomes-research
- https://www.cadth.ca/guidelines-economic-evaluation-health-technologies-canada-0
- https://www.thelancet.com/action/showPdf?pii=S2772-3682%2823%2900101-4

Bibliography

- https://www.ispor.org/docs/default-source/euro2022/economic-evaluation-guideline-development-the-lebanese-experience.pdf?sfvrsn=74ab5376_0
- https://icer.org/wp-content/uploads/2021/01/ICER_HTA_Guide_102720.pdf
- https://cirsci.org/wp-content/uploads/dlm_uploads/2022/06/CIRS-RD-Briefing-85-6-agencies-v2.3.pdf
-
- https://www.cirsci.org/
-
- https://www.efpia.eu/media/rm4kzdlx/the-pharmaceutical-industry-in-figures-2023.pdf
-
- https://www.efpia.eu/media/s4qf1eqo/efpia_patient_wait_indicator_final_report.pdf
-
- https://germanmarketaccesssimplified.com/category/news-and-updates/pricing/
- Husereau D, Drummond M, Augustovski F, de Bekker-Grob E, Briggs AH, Carswell C, Caulley L, Chaiyakunapruk N, Greenberg D, Loder E, Mauskopf J, Daniel Mullins C, Petrou S, Pwu RF, Staniszewska S; CHEERS 2022 ISPOR Good Research Practices Task Force. Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) statement: Updated reporting guidance for health economic evaluations. Health Policy Open. 2022 Jan 5;3:100063. doi: 10.1016/j.hpopen.2021.100063. PMID: 37383570; PMCID: PMC10297740. https://pubmed.ncbi.nlm.nih.gov/37383570/

Thank you for your attention